ABC's and 123's: The Role of the Home Learning Environment in Cognitive and Socioemotional Development in Early Childhood.

Clara Hoyne M.A.

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Supervisor: Dr. Suzanne Egan

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Abstract

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Play in early childhood is known to have benefits for children across cognitive and socioemotional domains. The purpose of this research was to examine factors that influence play and learning in the home environment in early childhood, including the contribution of family and other factors to both cognitive and socioemotional development. Many studies have focused on the benefits of activities for language and literacy outcomes, but less research has examined the effect of activities on other aspects of development, such as nonverbal reasoning or socioemotional outcomes. Another objective of the current research was to examine the effect of other factors on development, such as parental beliefs about play and learning, the quality of the home environment and parent and child engagement in different activities. Using a bioecological framework, the research included both a secondary analysis of the Growing Up in Ireland data, a nationally representative birth cohort study, as well as primary data collection, to further examine questions about parental beliefs, the home environment, and parent and child engagement in activities. Findings indicated that informal play activities such as games, painting and drawing, and reading have the largest effect on both cognitive and socioemotional development, in comparison with activities such as letter or number games. We also found that parent-child relationship factors of warmth, hostility and closeness, as well as parental beliefs about the positive value of play, are particularly important for socioemotional development. The findings highlight the importance of different types of playful activities, positive parent-child relationships and a rich home environment to support early childhood development. The implications of the findings for theory are discussed in the context of Bronfenbrenner's Bioecological model of development.

Declaration

College: Mary Immaculate College, University of Limerick

Department: Psychology

Degree: PhD

Name of Candidate: Clara Hoyne

ID number: 11030542

Title of Thesis: ABC's and 123's: The Role of the Home Learning Environment in Cognitive and Socioemotional Development in Early Childhood

Declaration: I hereby declare that this thesis is the result of my own original research and does not contain the work of any other individual. All sources that have been consulted have been identified and acknowledged in the appropriate way.

Signature of Candidate:

Signature of Supervisor: ___________________________________

Dr. Suzanne Egan

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List of Acronyms and Abbreviations

ALDeQ	Alberta Language and Development Questionnaire
BAS	British Abilities Scale
CPPBS	Chinese Parent Play Beliefs Scale
ECCE	Early Childhood Care and Education
EPPE	Effective Pre-school and Primary Education project
GUI	Growing Up in Ireland
GUS	Growing Up in Scotland
HLE	Home Learning Environment
HPE	Home Play Environment
LSAC	Longitudinal Study of Australian Children
MIC	Mary Immaculate College
MCS	Millennium Cohort Study
MICS	Multiple Indicator Cluster Survey
NICHD	National Institute of Child Health and Development
NV	Naming Vocabulary
PLEY	The Play and Early Years Study
PPBS	Parent Play Belief Scale
PS	Picture Similarities
SDQ	Strengths and Difficulties Questionnaire
SES	Socio Economic Status
SPSS	Statistical Package for the Social Sciences

Chapter One

Overview and Summary

The overall aim of this research is to examine the influence of different types of play and learning activities in the home on different aspects of development during early childhood. Although this area of developmental psychology has received considerable attention, much research to date has focused on the benefits of activities in the home learning environment for language and literacy outcomes. In fact, very few studies have examined the effects of individual play and learning activities on other areas of cognitive development, such as non-verbal reasoning, or on socioemotional development in early childhood. This research adopts a bioecological approach to considering the role of play and learning activities in early child development, in the context of other environmental factors. This theoretical approach is introduced in Chapter Two. It underpins the empirical research described in a series of studies reported in Chapters Three, Four and Five.

The research in this thesis sought to address three main aims. The first main aim was to explore the impact of different types of play activities on multiple aspects of early childhood development, to examine whether different types of activities influence different aspects of development. The second main aim was to examine if any effects of these activities on early childhood development were still present, even after family and other factors were accounted for within the bioecological framework. The third and final main aim was to move beyond considering the role of sociodemographic factors in the family environment, to explore the role of parental beliefs about the value of play in shaping the home play environment and how this may influence early child development.

Chapter Two of this thesis introduces the home learning environment and the importance of play and learning in the home for early development. It highlights some of the benefits of play for development and learning. We move then to examine the role parents have in engaging in play with their child, and the potential benefits for both cognitive and socioemotional development. Parents regularly engage in both formal activities (e.g., teaching the alphabet) and informal activities (e.g., reading and singing songs and nursery rhymes) at home and we discuss the impact of both kinds of activities on development.

Underlying this thesis is a bioecological framework which is also introduced in Chapter Two. We consider Urie Bronfenbrenner's bioecological model of human development and summarise the bioecological framework for understanding human development. We begin by describing proximal processes and their critical role in development, as well as how the individual's environment is divided into four nested or interrelated systems; the microsystem, mesosystem, exosystem and macrosystems. We then describe the chronosystem, and the Process, the Person, Context and Time (PPCT) model. The chapter describes other research that has applied this framework and discusses how the framework is useful for examining play and learning activities in the home. It also explores the influence of family and other influences (e.g., parent-child relationship and maternal education), on children's cognitive and socioemotional development. These factors are underpinned by a bioecological framework. Chapter Two concludes by describing research on the home learning environment. A review of the literature in this chapter reveals that there are a number of areas that have received little attention to date.

In Chapter Three we describe previous research that has examined the effect of play and learning activities on early cognitive development and note that much of the previous research has focused on language and literacy, rather than other aspects of cognition. In order to address this, in this chapter we report a secondary analysis of the

Growing Up in Ireland study data using the British Ability Scales (BAS). These standardised scales include a measure of non-verbal reasoning using the Picture Similarities (BAS-PS) scale. This aspect of cognition has received little attention in previous research on the home learning environment, and little is known about how play activities shape development in this area, particularly when family and other factors are also considered.

These findings are contrasted with those based on the Naming Vocabulary (BAS-NV) scale, which measures expressive vocabulary development. The studies presented in this chapter examined the impact of parental engagement in different types of play and learning activities when the children were aged three on their current cognitive development in Study 1, but also on their future cognitive development, examined using the same BAS scale measures when the children were aged five in Study 2. The findings from this chapter suggest that informal play activities have an impact on both expressive vocabulary and non-verbal reasoning and continue to have a longer term effect at age five. In contrast, engaging in formal learning activities such as learning the alphabet or numbers had no impact at age three, but a small direct effect at age five.

Similarly, Chapter Four examined the effect of play and learning activities, but with a focus on socioemotional development. As in Chapter Three, we report a secondary analysis of the Growing Up in Ireland study data and used the standardised scale, the Strengths and Difficulties Questionnaire (SDQ). This scale included measures of Internalizing, Externalising and Prosocial behaviour. Previously, research on the home learning environment has tended to focus on aspects of cognitive development rather than socioemotional development, and few studies have examined how different types of individual play and learning activities shape socioemotional development, independently of family and other factors. The findings in Chapter Four, compare the impact of play and learning activities on each of the three internalizing, externalising and prosocial subscales of the Strengths and Difficulties Questionnaire (SDQ). Study 3 in this chapter examined the impact of play and learning activities on current socioemotional development at age three, and Study 4, followed this by examining the same socioemotional outcomes when the children were aged five.

The research reported in Chapters Three and Four draw on a large nationally representative, longitudinal dataset, the Growing up In Ireland Study (GUI), which permitted exploration of the frequency and engagement in play and learning activities and their impact on cognitive and socioemotional development, both concurrently and longitudinally. We also wanted to explore the impact of these activities independently of family and other factors, including parental engagement in play and learning activities in the home have. The findings from Chapters Three and Four, provided a strong basis for the influence of play and learning activities on development. However, little is known how other factors such as parental beliefs about play impact on development domains.

Chapter Five aims to investigate whether other factors such as parents' beliefs about play and learning, influence their engagement in these activities and impact on socioemotional and cognitive development. To address this gap, data were collected using a survey to examine factors not examined in the GUI study. The research reported in this empirical chapter examined the influence of parent's beliefs about play on their engagement in play and learning activities with their young child and the richness of the home environment in Study 5. The impact of these factors and other environmental factors (e.g., maternal education and work) on early childhood development was also investigated, in Study 6, using standardised measures of development, such as the Strengths and Difficulties Questionnaire (SDQ), which was used in in the GUI study and reported on in Chapter Four in this thesis. Measures of cognitive development were also included in the survey and explored in Study 7. Studies 6 and 7 also explored if child engagement in activities demonstrated similar or different effects on development compared to parental engagement in play and learning activities in the home, and also to explore the relationship between parent beliefs, parent and child engagement in activities and the home play environment.

In the final chapter, Chapter Six, results from the empirical chapters are summarised and discussed. We highlight how different activities have different impacts on different types of development, as well as how parental factors interact with play activities for different types of development. We also emphasise the role of family and other factors in early childhood development. Finally, we discuss the implications of this research for theory and real world settings.

Chapter Two

Literature Review

"Play is not a luxury but rather a crucial dynamic of healthy physical, intellectual and social-emotional development at all age levels".

David Elkind (2007, p.4)

Introduction to the area of study

The first three years of life is a time when the relationships and activities at home exert the greatest influence on the child's development (Yu & Daraganova, 2015). Each home environment is unique, but generally families create environments that have lots of play and learning activities. Within individual homes there are multiple influences that affect how those distinctive home and play environments are created. These include parental factors such as how parents engage and interact with their children in activities (Manz et al., 2014) and the beliefs that parents have about play and learning in the home (Fisher et al., 2008; Fogle & Mendez, 2006; Parmar et al., 2004). Play begins in the home and parents are usually their child's first play partners (Howard & McInnes, 2013). The act of play allows a chance for parents to wholly engage together with their child (Ginsburg, 2007).

The present research focuses on the role of the home learning environment and how parental engagement in play and learning activities in the home support early child development. It stems from research in developmental psychology that has focused on the importance of the home environment for development across domains. Research on the early home learning environment has found developmental benefits for language (Son & Morrison, 2010), cognition (Bornstein & Putnick, 2012; Bradley et al., 1988; Kuo et al., 2004), and socio emotional development (Bradley et al., 1988; Foster et al., 2005), as well as academic skills (Son & Morrison, 2010) in early childhood. Other important factors in the home learning environment include availability and access to resources (e.g. books and toys; Rodriguez et al., 2009) as well as measures of family socio-economic background (e.g. parental education and family income; Yu & Daraganova, 2015). There is ample support for the importance of play and the strong relationship between play and learning for early development (Parten 1933; Pellegrini & Smith 1998; Smith & Pellegrini 2008; Whitebread et al., 2012).

Haight et al. (1997) found that parents had distinct views about the benefits of different types of play for their child's development. They found that parents believed pretend play offered developmental opportunities for creativity, that reading aided language development and rough and tumble play was important for social development (Haight et al., 1997). However, while many studies to date have looked at the home learning environment, they have mainly examined the role of a combination of activities within the home learning environment (Sammons et al., 2015; Hayes et al., 2018; Sylva et al., 2010), rather than focusing on the individual effects of different types of play and learning activities (Niklas et al., 2016). While it is well established that the overall home learning environment has an impact on development, it is not yet clear what the impact of individual play and learning activities are on different aspects of development, such as different aspects of cognitive development. Additionally, while the benefits of play for socioemotional development are well researched (e.g., Klein et al., 2003; Golinkoff et al., 2006; McClintic & Petty, 2015), less is known about the effects of play and learning activities on socioemotional development.

Another aspect of research on the home learning environment that has also received relatively little attention are parental beliefs about play. Parental beliefs about play and learning are thought to be associated with the kind of activities that parents engage in and the frequency which they engage in them at home with their children (Parmar et al., 2004; Super et al., 1986). As well as examining the home learning environment and play and learning activities within it, the current research also wanted to explore parental beliefs about the value of play and learning, to see are parents more academically or play support focused. Up to now, only a limited number of studies have examined this area, and to our knowledge, parental beliefs about play have not been examined in an Irish sample.

Bronfenbrenner's bioecological model of development is one of the most widely used theoretical frameworks in human development (Velez-Agosto et al., 2017). Bronfenbrenner proposed a model of development that stressed the importance of relationships and interactions that shape early child development, as well as how development occurs in the different environments that people inhabit. This research primarily uses Bronfenbrenner's bioecological model (Bronfenbrenner, 1995; Bronfenbrenner & Morris, 2006) as a framework to explore parental engagement in play and learning activities in the home, and the relationships and interactions that support early child development including the richness of the home environment. The bioecological model proposed by Bronfenbrenner, explains how children develop at the centre of five nested systems. The interactions that take place within and between the nested systems both directly and indirectly shape early child development. This framework has frequently been applied to early year settings, but less attention has been given to a bioecological perspective on parental engagement in play and learning in the home (Hayes et al., 2017).

This chapter reviews the literature concerning play and learning activities in the home. It discusses the bioecological framework in the context of the home environment. It also examines the effect of activities and the home learning environment on both cognitive and socioemotional development. It is laid out in five sections. The first section defines play and examines play and learning activities and their developmental benefits as well as the benefits of parental engagement for early development. The second section describes Bronfenbrenner's bioecological approach, the framework that underpins the thesis, which is applied to understand how early development is shaped by the home environment. The third section examines other factors that influence early childhood development. In the fourth section the role of the home learning environment in development is explored. The fifth and final section concludes this chapter by focusing on the current research.

Play and Learning in the Home

Play is important right from the beginning of life for babies and young children (Abbott & Langston, 2005), and always present in society (Lai et al., 2018). While play is universal across cultures, how children play varies according to cultural contexts (Brooker, 2010). Play has also been regarded as an essential part of learning and development (Avornyo & Baker, 2018; Shiakou & Belsky, 2013). Researchers have argued that it is the act of play itself which provides value and learning and while there are educational benefits to play, children are normally driven by their own interests and motivation (e.g., Sahlberg & Doyle, 2019). Through play, the child learns about themself and the world they live in (Fisher et al., 2008). When playing with others, children experience rich language and social interactions that are new, playful, and exhilarating (LaForett & Mendez, 2016). As well as educational advantages, play has benefits for socioemotional development including building resilience and coping skills in childhood (Sahlberg & Doyle, 2019).

Such is the significance of play in current society that it is embedded in an international human rights treaty. Article 31 of the United Nations Convention on the Rights of the Child, (UNCRC) states “That every child has the right to rest and leisure, to engage in play and recreational activities appropriate to the age of the child and to participate freely in cultural life and the arts.” Despite this, it has been termed the forgotten right and has been reported as being the most neglected of human rights given to the child (Shackel, 2015). Additionally, the environment that play occurs in, which includes both the physical and social environment, is very important to consider in discussions about play (Vickerius & Sandberg, 2006).

In contemporary literature, play is typically described as multidimensional in nature (Pellegrini & Smith, 1998) and play can be identified easily from non-play (e.g. attending sporting events or structured activities or schoolwork; Jenvey & Jenvey, 2002). However, even though play is a very distinct behaviour and easy to identify, it is also difficult to define exactly because of its complex nature (Jenvey & Jenvey, 2002). Depending on the exact definition of play, activities that can be classified as play will broaden or narrow (Fisher et al., 2008), and not all childrens activity can be classified as play (Wood, 2013). Indeed, Garvey (1991) regarded play as an attitude, rather than an activity, that was demonstrated in many ways, including what children played with and what they played at.

Instead of defining play many researchers focus on identifying typical characteristics of play or classifying different types of play. For example, there are a number of characteristics that define play, and these include positive affect, active engagement, freedom from rules, intrinsic motivation and attention to the process rather the product (Klein et al., 2003). Parten (1933) classified play into subtypes based around social engagement apparent during play that displayed developmental progression, from solitary play with objects onto parallel play to associative play, and then cooperative play. These subtypes, which were also based more on developmental stages, centred around engagement, but also included the use of objects and materials for play. Other categories of play included Hughes (2002) taxonomy of play. This was developed to assist playworkers identify the types of play children engaged in (Marsh et al., 2016) and includes sixteen play types (i.e., symbolic play, rough and tumble play, socio-dramatic play, social play, creative play, communication play, dramatic play, locomotor play, deep play, exploratory play, fantasy play, imaginative play, mastery play, object play, role play and recapitulative play; Hughes, 2000).

Whitebread et al. (2012) also categorised play and suggested it can be classed more simply into one of five types: physical play (e.g., rough and tumble play), play with objects (e.g., play doh and building and constructing), symbolic play (e.g., reading, writing, numbers, songs and painting), pretence/socio-dramatic play (e.g., make believe or free play) and games with rules (e.g., board games). Symbolic forms of play include a range of everyday activities such as verbal and artistic expression, role play as well as games with rules. It also includes oral language activities such as reading, writing, and number activities, and a variety of artistic activities such as painting and drawing. In addition, musical activities, which are much less researched are also symbolic forms of play (Whitebread et al., 2012). Singing and movement have important social and interactive qualities that support development across a number of domains. Music is a form of communication that encourages playful and joyful learning (Moyles, 2010a).

There are parallels between the classifications that both Parten, Hughes and Whitebread et al. proposed, as they each identify play with objects for example. Additionally, there can be overlap between play types (e.g., physical outdoor game can involve pretence) but each type of play has some developmental function and supports child development and learning in a different way. Generally a mixture of play types encourages physical as well as cognitive and socioemotional development (Whitebread et al., 2012). Overall however, there has been difficulty in organising play into types or categories and no consistent system that currently names and defines play activites that can be agreed upon by researchers in the area (Hirsh-Pasek et al., 2008).

In addition, despite all the defintions and descriptions of play in the literature, there are few clear descriptions of what parents really believe play to be. Few studies to date have directly explored how parents define play (Lin & Li, 2018). One study in early childhood education that did, found complex views among parents. O'Gorman and Ailwood (2012) investigated parents perceptions on play and found that parents held broad definitions and diverse views of what constituted play. A number of studies have examined parents beliefs about the value of play to understand what constitutes play (Lin & Li, 2018). Overall, research to date has primarily focused on parents understanding of play in relation to early and formal education (Breathnach et al., 2016) rather than parents understanding of play in the home.

Benefits of Play for Development

Play in the home environment is important across developmental domains in early childhood, including for cognitive (Fisher et al. 2008; Smith, 2008; Tamis-LeMonda et al, 2004) and socioemotional development (Singer & Singer 2005; Howard and McInnes 2013). Previous research shows that play is important for creativity (Bergen & Fromberg, 2009), language development (Saracho & Spodek, 2007; Tamis-LeMonda et al., 2004), executive functioning (Bergen & Fromberg, 2009) and socioemotional development (Howard & McInnes, 2013), including peer relations (MacDonald & Parke, 1984). When play is initiated by the child, it encourages curiosity and has been linked to cognitive development and later academic achievement (Fisher et al., 2008; Smith & Pellegrini, 2008). Through play adults support the child's skill development and offer information to children that broadens their knowledge of areas such as numeracy (Ramani et al., 2015). During play children use many cognitive skills such as executive functioning (e.g.

when planning games, using rules in games, writing scripts and in inventing constructions; Bergen & Fromberg, 2009).

A playful context (e.g., using pretend play or construction play) may aid in the development of cognitive skills in structured tasks (Schmitt et al., 2018). Research has demonstrated that neurological connections are created during play and that active brains, through play, make permanent neurological connections that are crucial for learning (Isenberg & Quisenberry, 2002). Play has physical health benefits too. Frequent short breaks can aid cognitive performance in school (Pellegrini, 2009) and some outdoor games such as hopscotch or tag require building imagery skills to support eye hand coordination while taking aim at a target (Bergen & Fromberg, 2009). Language is nurtured through play and encourages language development through role play, or as adults join in and label or comment on play (Klein et al., 2003). Young children's play has been shown to enhance literacy and print skills through their play experiences with books (Christie & Enz, 1993; Christie & Roskos, 2006; Saracho & Spodek, 2007).

As well as cognitive and language benefits, there are many known benefits to socioemotional development because of play. Through play, children make discoveries about themselves, what they like and dislike as well as what is easy or difficult to do. They also learn to understand empathy and other people's feelings and in group play they can learn about the social world (Klein et al., 2003). From an early stage, games like peek a boo help develop warm and trusting relationships aiding the development of attachment and social relationships (Howard & McInnes, 2013). Additionally, play helps to increase confidence, cooperation with peers and social competence (Golinkoff et al., 2006; Howard & McInnes, 2013). Benefits of play with peers also include developing social skills and learning about other children's perspectives (Loeb et al., 2007).

When children play freely with other children, they cooperate and learn to work together (Hirsh-Pasek et al., 2006; Howard & McInnes, 2013) and they get to both express and listen to the opinions and ideas of their peers (Fantuzzo et al., 1998). Play also allows the child to learn how to self-regulate and manage their emotions and behaviour. Children who engage in interactive play at home with parents, were found to have a more positive attitude to learning and demonstrated better prosocial behaviour in school (Fantuzzo & McWayne, 2002). Outdoor play has been found to have multiple benefits for children's developments including health and socialisation skills (McClintic & Petty, 2015). Play has also multiple benefits for a child's learning and their engaging actively in their environment.

Many parents see play as beneficial but when children begin school, play is often seen as less important than learning (Warash et al., 2017). Brooker (2010) believed parents were encouraged in school settings, when there were visible learning resources (e.g., books, numbers, letters, and computers) which assured parents their child was "learning" (Brooker, 2010). In one of O'Gorman and Ailwood (2012) studies, many parents viewed play and learning as being interconnected and believed play to be learning without the child knowing they were learning. Other parents believed play and learning to be distinct activities (Kane, 2016). However, most of the research on parent's views on play and its learning values are focused on preparation for school. While research explores the importance of the home learning environment for development, less is known about what parents believe learning to be in the home.

Developmental theorists also consider that children are actively engaged in their learning. Piaget believed that children learn best when they were actively involved in learning and through play, children assimilated what they already know (Howard & McInnes, 2013). This links in with Bronfenbrenner's view that children influence their experience through reciprocal interaction with their environment and express their agency in many ways (e.g., playing or refusing to engage in play; Hayes et al., 2017). The child is likely to take an active part in shaping the learning environment at home as they grow and develop (Toth et al., 2020). Piaget held a constructivist view and believed in the importance of play for learning and development. For the child to learn, or to discover, the child had to be active in their learning (Piaget, 1973). However, he did see play as secondary to learning, and it was through play the child assimilated what they already knew (Piaget, 1951).

Lev Vygotsky (1978), a Russian psychologist, considered that children learn in social and cultural contexts and particularly learn through participating in play (Howard & McInnes, 2013). He believed play to be socially constructed and that learning occurs in the child's natural environment. He linked symbolic play to speech and communication and believed that social interactions were where literacy knowledge began. He believed that it was through social interactions and not just self-guided exploration that skills and abilities emerged, and that it was the need to communicate and be accepted that motivated learning (Howard & McInnes, 2013). These literate ways of thinking with their knowledge, tools and skills imitate the child social actions with their peers (Saracho & Spodek, 2007). Both Piaget and Vygotsky believed that play allows the child to learn about the world they live in, to absorb new ideas and nurtured a child's imagination (Hirsh-Pasek et al., 2006).

Engaging in shared activities supports learning and allows parents to engage in developmentally appropriate activities in the child's zone of proximal development (Murray & Egan, 2014). For example, when engaging in regular home activities such as reading a story or playing, parents naturally scaffold and extend their child's skills beyond their present performance level. With parental support and guidance, the child is instructed in activities beyond their current ability, or what Vygotsky (1978) called the zone of proximal development (ZPD). Vygotsky (1978) highlights the importance of one of the many roles a parent has in scaffolding their child's learning and thinking through rich language interactions.

Another advocate of the child as an active agent, was Sigel, who believed “the child as an active learner has to have opportunities for self-directed activities through play and other exploratory adventures as a means of self-stimulation and healthy development” (Sigel, 1987, p. 214). He believed that children’s environments should provide educational opportunities that allow them to develop and understand objects, people, and events in their world but only when it is determined appropriate to their interest and capabilities (Sigel, 1987). He argued against ‘hothousing’ children, where parents induce knowledge such as reading or maths that is not normally acquired till a later developmental stage. He believed that “a child needs a supportive, structured, encouraging, guiding environment that provided the space to explore, to think, to feel, to play, to problem solve”. A child should seek “enjoyment in the doing” (Sigel, p. 224). These were some of the necessary components he believed were important for growth and development in childhood.

In summary, developmental theorists believe the child to be actively involved in learning through play and in doing so they shape their environment. Social interaction is critical along with developmentally appropriate activities, and parents have an important role in scaffolding their children’s early play and learning. A structured, encouraging and guiding environment are the key ingredients for optimal growth and development. It is clear in the literature that there are multiple benefits for play and learning in the home, which extend across cognitive and socioemotional development domains. The next section explores parental engagement and how a supportive environment with lots of play and learning activities and resources, make different contributions to child development outcomes.

Is play essential for development?

Earlier in the introduction, many of the developmental benefits of play in research to date were outlined. However, research in the area suggests that when we look at various types of play, there is some evidence that play may not be critical for development, particularly pretend play (Lillard et al., 2013; Smith, 2007; Wing, 1995). For example, while some links have been found between pretend play and development, Wing (1995), did not find support for the exclusive importance of pretend play for development and suggested additional and improved research in the area. Similarly, Smith (2007), reviewed older experimental studies on play and found dangers in how the studies were conducted. To improve research, they had a number of suggestions (e.g., using blind studies to the condition that children were in, a need to control for verbal stimulation, the need for negative results to be reported as well as positive findings) to enhance the research design (Smith cited in Roskos, 2007).

Lillard et al. (2013), also challenged the claim that pretend play had a definite impact on development. Smith (2010), previously put forward three potential theoretical views of the importance of play for development. These included the argument that play was essential for development, a view held by Vygotsky who believed play had a prominent role in development in early childhood. Research on social skills favours this approach (Lillard et al., 2013). The second perspective was a middle view that play had 'important and beneficial functions' (Smith, 2010, p. 213) or equifinality, and play was only one potential source of development. Lillard et al. held the equifinality view that pretend play is only one of many ways that early development is supported. A number of other researchers had also taken the middle position regarding the role of play in development (see Roskos et al. 2010 for a complete description of the three positions in the play literature). Finally, the third position is known as epiphenomenon and may be caused by a number of other causal factors. This is similar to Piaget's view when play coincides with something rather than actually being causal.

By reviewing a large number of studies in the literature and their methodologies and finding problems with research design (e.g., correlational results, failure to replicate studies, experimenter bias, small sample sizes) to name the main complaints overall, Lillard et al. (2013) argued that play was only one of many routes for development. Similar to Smith (2007), they questioned research on pretend play and development and its scientific approach to the problem. Instead, they suggest that pretend play is one of many ways to positive development outcomes or equifinality and suggested that Maria Montessori's own empirical observations are why pretend play does not appear on the Montessori curriculum. Lillard et al. (2013) suggests that the contemporary cultural view that pretend play is important requires more convincing research to establish whether or not pretend play has a role in child development and that evidence at present does not support the unique importance of pretend play in development (Lillard et al., 2013).

Lillard's research was a comprehensive study of the different types of pretend play (e.g., solo pretend play, social pretend play, pretend play and play with pretence status unspecified). A number of the studies included also examined the effects of functional play (i.e., repetition of motor actions on objects) and enacting stories with dolls or children and imaginary companions on development outcomes. However fewer of the studies examined other types of play (e.g., construction play or play with blocks) with none of the studies examining story reading without enactment. In fact, Lillard suggests that additional research should examine reading (i.e., without enactment). Therefore, while Lillard's argument challenges previous literature on the crucial role of play for development it does not consider the multiple types of play (e.g., Parten and Whitebread's classifications of play) as the research by Lillard focused on pretend play and not more general play and learning activities.

Many of these other play and learning activities (e.g., play with games and songs) have not been as well explored in particular to examine if they are vital for development or only one route to development as suggested by Lillard. It may be that different play activities have different impacts on development outcomes, (e.g., that some play activities may benefit from interactions with parents for socioemotional development). It may also be that the interaction and relationship between parent and child are as important for development as the play activity itself. In addition, pretend play may be a play type that is more frequent in western society, so the argument that play is not crucial for development may not apply across all cultures. Therefore, further research is necessary to examine the multitude of play types and activities and their impact on early child development.

Other researchers supported Lillard's view suggesting a need for a solid scientific approach and rigorous research design in studies examining play and development (Bergen et al., 2013; Weisberg et al., 2013). However, Weisberg et al. (2013) responded to the claims suggesting that instead of re-examining individual studies that they take a more holistic view of the evidence on play and learning. They also suggested a move away from empirical research and embracing more complex statistical analysis to look at the complexity of play and learning. They believed that the gold standard of double-blind, random-assignment method that attempts to control for variances not been examined in the study, do not consider that children do not live in laboratories but in the real world and children cannot be randomly assigned to certain types of parents. Weisberg et al. also believed different studies rather than improved studies may better explain the relationship between play and learning as pretend play is a complex construct and the traditional empirical framework is not without its own failings (Weisberg et al., 2013).

Bergen suggested that what Lillard had measured was 'playful work' rather than pretend play. She also suggests whether play needs to be defended for having positive benefits on other development domains. While Lillard has clearly reviewed and revealed methodological shortcomings, she believes more research needs to be conducted before concluding that pretend play has no relationship with other developmental domains

(Bergen, 2013). As Lillard herself (2015) declares, the role of play in development is still not entirely comprehended. Likewise, Whitebread (2018), suggests we need to understand the range of processes in play that influence development. In fact, there are more likely to be several processes which interact with each other which need to be further understood (Whitebread, 2018).

Another response to the current challenges on the distinctive role of play in early child development, Howard (2019) suggests a shift toward examining play or playfulness as a state of mind rather than viewing play solely as an activity. Future research also needs to consider child's own autonomy, choice and control in play. Furthermore, Howard suggested that when adults adopt a playful approach in play and activities with a child, it strengthens development. Another consideration is that a lot of emphasis in the media is on the promotion of literacy and numeracy with less emphasis on the role of play for development and parents themselves do not consider the important role play has in development (Howard, 2019).

Overall, it seems that there is no definitive answer currently to the question if play is crucial for development. Howard (2019) also suggested that crucial can simply mean developing a skill to the best of one's ability. Overall, there remains a lack of evidence as to the role and function of play in development suggesting further research on many aspects of play is important. However, moving forward, children's own perception of play need to be included and central in an understanding of the role of play in development (Howard, 2019). Therefore, including the child's voice and their perception of play in future studies is another way to overcome some of the weaknesses described by Lillard et al. (2013). Pellegrini (2009) believed that the confusion regarding the significance of play was as a result of how play has been defined and perceived and this may also be what is adding to the argument that play is not crucial for development. To conclude, much more research is necessary to examine some of the important issues raised by

Lillard et al., (2013), Weisberg et al., (2013), Bergen (2013£ and Howard (2019). Rigorous methodology, a holistic view of play and many different types of studies that examine a range of play activities and a wider focus than on pretend play is essential. In addition, future research needs to look at the range of processes in play and if play is merely a state of mind or an activity need to be explored.

Benefits of Parental Engagement in Play

As well as supporting learning, parental engagement in play with their children has demonstrated a number of benefits across cognitive and socioemotional domains. Informal activities in the home have been associated with positive academic outcomes and parents play a vital role as both a caregiver and teacher (Rodriguez & Tamis-LeMonda, 2011). Parents influence children's development because they engage steadily with their children from the time they are born (Niklas, Cohrsen & Tayler, 2016b). Parenting is a multi- dimensional effort, and parents engage with their children across domains including cognitive and socioemotional aspects of development (Bornstein & Putnick, 2012). By engaging in activities with their children, parents can also support cognitive stimulation (Lugo-Gil & Tamis-Le Monda, 2008). Rosen et al., (2019) found an association between cognitive stimulation in the home, and the development of executive functioning. They used the Home Observation of the Environment (HOME) measure that assessed learning materials and resources (e.g., books and toys) and included as well parental involvement in child's learning. Tamis-LeMonda et al., (2004) also found benefits for cognitive development when both mothers and fathers supported free play with their child. Over the last decades, there has been increasing encouragement for parents to engage in play with their children. Parental engagement in play is regarded as an important activity in early childhood which supports the development of specific skills (e.g., problem solving skills) as well as overall creativity (Ryalls et al., 2013).

Parents have a significant role in their child's learning and development (Semke

& Sheridan, 2012) and at home, there are multiple ways that parents can support their child's development and learning (Fantuzzo et al., 2000). Additionally, family routines, values, attitudes and play activities and preferences in the shared family environment also support children's play and learning (Lynch et al., 2016). McFadden and Tamis-LeMonda (2013) found that daily activities in the home such as singing songs and nursery rhymes, drawing and playing games have been associated with language and literacy development. Daily and regular activities (e.g., reading, playing games) that parents engage in with their children are also known to support cognitive outcomes (Melhuish et al., 2008). Research has also found that many activities have an impact on cognitive development, and studies have examined the relationships between various parenting behaviours and home learning activities on aspects of cognitive development (Bornstein & Putnick, 2012; Melhuish et al., 2008; McMullin et al., 2020; Sammons et al., 2015).

Parental engagement is not only important for cognitive development, there are socioemotional benefits also. Haight et al. (1997) found that parents valued being close to their children, and that "facilitating the parent-child relationship" was most frequently mentioned as why participating in play activities, including reading with their child, was important (Haight et al., 1997, p. 283). When parents express affection and respect towards their child, they support a range of skills including mastery, autonomy and self-efficacy (Lugo-Gil & Tamis-LeMonda, 2008). There is growing evidence that parent play beliefs are linked to greater parental engagement in activities. For example, parent beliefs have the potential to influence the quantity and quality of play that parents engage in early childhood (DiBianca Fasoli, 2014; Fisher et al., 2008; Manz & Bracaliello, 2016; Parmar et al., 2004).

Parental engagement is important for educational achievement when it includes a supportive home environment that encourages learning. Fantuzzo et al. (2004) identified three ways that parents engage differently: home based involvement, school based involvement and home school conferencing. Relevant to the current study is the home based involvement dimension. Such is the importance of home based involvement, they found that parental engagement in home based learning which included activities such as reading, creative activities and story sharing to be the strongest predictor of child outcomes. In addition to the home activities, the measure also included educational visits as well as routines that supported educational learning (Fantuzzo et al., 2004). They also found that greater family involvement was significantly related to children's overall motivation to learn, their attention, task persistence and receptive vocabulary skills in preschool as well as lower conduct problems in the classroom (Fantuzzo et al., 2004).

Overall, previous research indicates that there are multiple benefits of play for development, and that parental engagement has a critical role in supporting cognitive and socioemotional development (e.g., Rodriguez & Tamis-LeMonda, 2011; Haight et al., 2007). There are multiple ways and activities parent can engage in to support child development (Fantuzzo et al., 2000). The next section introduces the bioecological framework which underlies the thesis, (Bronfenbrenner, 1979; 2005). A number of studies (e.g., the Growing Up in Ireland study) have previously examined early childhood development using a bioecological framework.

Introduction to Bronfenbrenner’s Bioecological Theory of Development

One of the aims of the current research is to examine play and learning in the home using the lens of Bronfenbrenner’s bioecological theory. The bioecological systems theory developed by Urie Bronfenbrenner, views children’s development as dynamic and considers the child’s development in the context of wider influences of their environment and their relationships. Bronfenbrenner explained how human development throughout life is affected by the different environmental systems that we occupy. The ecological environment stretches beyond the immediate environment of the developing child

(Bronfenbrenner, 2005) as children learn and develop in the many environments that they inhabit (e.g., preschool and neighbourhood), and particularly in their immediate environment (e.g., the home). Discussing the importance of play in early childhood, Bronfenbrenner argued that “play as a process lies at the very core of human behaviour and development” (Bronfenbrenner, 1979, p. xv).

Bronfenbrenner and Evans (2000) identified the importance of proximal processes for development. He stated in his first proposition that:

> “Throughout the life course, human development takes place through processes of progressively more complex, reciprocal interaction between an active evolving bio-psychological human organism and the persons, objects, and symbols in its immediate external environment. To be effective, the interaction must occur on a fairly regular basis over extended periods of time**.** Such enduring forms of interaction in the immediate environment are referred to as proximal processes”.
>
> (Bronfenbrenner & Evans, 2000, p. 117).

Proximal processes are “reciprocal interactions” and were also described as the “the primary engines of effective development” (Bronfenbrenner & Evans, 2000). He further elaborated on proximal processes as involving a transfer of energy between the developing child and persons, objects or symbols in their immediate environment. The transfer of energy could be in one, or both directions and occur independently or simultaneously (Bronfenbrenner & Evans, 2000). Some examples of proximal processes that Bronfenbrenner provided, are playing with a young child, group or solitary play and reading or learning new skills.

In the theory, Bronfenbrenner also stressed the importance of relationships and the nature and quality of the interactions as well as the opportunity for the interactions themselves for the developing child (Hayes et al., 2017). Regarding relationships he spoke about the importance of regular reciprocal activities for development in his third proposition:

> "In order to develop --- intellectually, emotionally, socially, and morally --- a human being, whether child or adult,----- requires for all of them----the same thing: active participation in progressively more complex reciprocal interaction with persons with whom he or she develops a strong, mutual irrational attachment, and who, over time, become committed to each other's well-being and development, preferably for life. "
>
> (Bronfenbrenner & Evans, 2000, p. 122).

Again, he stresses the importance of the interactions occurring frequently. Bioecological theory places the developing child is at the centre of their unique ecosystem or environment which is divided into four interconnected and nested systems; the microsystem, mesosystem, exosystem and macrosystem. He defined the microsystem as "a pattern of activities, social roles, and interpersonal relationships experienced by the developing person in a given face-to-face setting with particular physical and material features and containing other persons with distinctive characteristics of temperament, personality and systems of belief" (Bronfenbrenner, 2005, p. 148). This microsystem is the immediate environment in which the child operates and within each microsystem, each member influences every other member (Bronfenbrenner, 2005). These are the parts of the environment that impact on the child's daily life. In early childhood the child is a member of many different microsystems including their home and their preschool.

Interactions between the various microsystems can vary, and when they are strong and regular, the microsystems reinforce each other (Jaeger, 2016; Bronfenbrenner & Morris, 1998). Bronfenbrenner called these interactions between the microsystems the 'mesosystem', when two or more of the microsystems interconnect and impact on the child. “The mesosystem comprises linkages and processes taking place between two or more settings containing the developing person…In other words, a mesosystem is a system of microsystems” (Bronfenbrenner, 1994, p. 40). An example is the parent choosing a preschool that has an emphasis on play, rather than an emphasis on academic activities such as learning the alphabet or numbers. The next layer is the exosystem which “comprises of linkages and processes taking place between two or more settings, at least one of which does not contain the developing person, but in which events occur that indirectly influence processes within the immediate setting in which the developing person lives (e.g., for a child, the relationship between the home and the parent’s workplace; for a parent, the relation between the school and the neighbourhood group” (Bronfenbrenner, 1994, p. 40). This layer is more distant from the child, yet things can happen in the exosystem that influence the child’s experience even if the child is not directly involved (e.g., the number of hours a parent works per week). The exosystem could also relate to conditions in the home (e.g. access to resources) that might have an influence on the child.

The macrosystem, the final layer, “consists of the overarching patterns of micro-, meso-, and exosystems characteristic of a given culture, subculture, or other extended social structure, with particular reference to the developmentally instigative belief systems, resources, hazards, lifestyles, opportunity structures, life course options and patterns of social interchange that are embedded in such overarching systems” (Bronfenbrenner, 2005, p. 101). The macrosystem includes the wider sociocultural influences (e.g., beliefs parents have about the value of play or education in their child’s development). The interactions that take place within and between the nested system or overall child’s environment is how the wider society influences a child’s learning and development. These interactions both directly and indirectly shape behaviour.

Bronfenbrenner suggested that the chronosystem encompasses change or consistency over time, not only in the characteristics of the person but also the environment in which that person lives (e.g., changes over the life course in family structure, socio-economic status, employment, place of residence, or the degree of hecticness and ability in everyday life (Bronfenbrenner, 1994, p. 40). An example of the chronosystem in practice is that currently Irish children are entitled to two years free preschool education (an increase in September 2018 from just one year). The chronosystem is influenced by both time and history (Hayes et al., 2017; Howard & McInnes, 2013; Tudge, 2008).

Process, Person, Context and Time (PPCT) Model

In his final development of the bioecological theory, Bronfenbrenner highlighted four interacting elements of development, which he named the Process, Person, Context and Time (PPCT) model. In this model, the active child engages in proximal processes with people, symbols and objects within their microsystem (e.g. engaging in painting or drawing), focusing on development within a context which involves both continuity and change over time. In this later writing Bronfenbrenner emphasises the role of the *Process* or processes in development, and how processes were the ‘engines of development’. Through interactions such as reading with parents at home, the child begins to make sense of their world (Hayes et al., 2017).

Next in the PPCT model, the *Person*, the child and their own personal characteristics enhance or inhibit development (e.g., parents of a very active and busy child may select a preschool that has lots of outdoor play time; Williams et al., 2013). *Context* refers to the many contextual influences on a child’s life both proximal (e.g., family context of mother working long hours) as well as more distal contextual influences (e.g., sociocultural beliefs about the importance of play and learning). Finally, *time* is represented by the chronosystem and impacts in three ways; *microtime* is what happens during an activity (e.g., parent has lots of time to read a bedtime story); *mesotime* which is when the activity of reading a bedtime story occurs regularly and finally *macrotime*, the historical context of the child growing up (Hayes et al., 2017).

Applying Bronfenbrenner to Understand How Children Learn and Play

As well as looking at the child and their relationships or interactions, this bioecological model provides a framework to examine the current area of interest, play and learning. The child is at the centre of a set of nested systems which are influenced by the home environment as well as by broader influences of culture and society. All of these influences are critical for development in early childhood (Sylva et al., 2011). During the early years, factors that affect development occur across multiple systems including the immediate or microsystem level, at an interactional level in the mesosystem and more distally at an exosystem and macrosystem level (Sheridan et al., 2010).

Bronfenbrenner believed that when children play, they are influenced by both their immediate environment, and their parents social or cultural beliefs which in turn influence learning. Specific skills such as literacy skills and concepts are practiced in play situations among children (Saracho & Spodek, 2007). Within the home environment and at a proximal level, parents have a critical role to play as their child's first teacher (Rodriguez & Tamis-LeMonda, 2011). Vélez-Agosto et al. (2017) recognises beliefs exist in the macrosystem at a cultural level but suggested that they can also exist at the individual or microsystem level.

When there are regular routines and activities in the home, such as reading and play, these provide opportunities for natural learning to occur and positive proximal processes can happen when the home environment is well-organized (Ferretti & Bub, 2014). Proximal processes are also theorized to have greater influence for cognitive, academic and social development in higher SES and stable environments

(Bronfenbrenner, 1994). Proximal processes refer as much to relationships as they do symbols and objects. The relationships a child creates with significant people in their life are critical for child development (Hayes et al., 2017). Through play, the child is active and contributing to relationships with others and the child experiences different roles which can be tried out in play. The reciprocal relation between people and the environment is achieved through the child's roles and relationships as well as through activities (Vickerius & Sandberg, 2006). Bioecological theory implies that both parental engagement in play and learning activities and other parental factors (e.g., parental education) are important and independent influences on development. For example, some research suggests that engaging in play and learning activities in the home may compensate for low parent education in academic outcomes (McCormick et al., 2020).

Figure 1 over illustrates the bioecological systems model of development applied to the current study on play and learning in the home.

Bronfenbrenner's bioecological framework has been used extensively in research across a range of research areas including families experiencing stress (Swick & Williams, 2006) and in examining school family relationships (Hampden-Thompson & Galindo, 2017). Ashiabi and O'Neal (2015) drew on bioecological theory to examine the effect of Bronfenbrenner's PPCT model on child social development. Using a large data sample, (n= 28,064), of six to eleven year olds from the National Survey of Childrens Health, they examined contextual influences (e.g., SES and family stress) and proximal processes (e.g., parent child interactions) on child developmental outcomes (e.g., positive and negative social behaviour). They found the influence of contextual factors and proximal process to vary as a function of person and development outcomes, where child characteristics of gender demonstrated increased levels of parent child interactions which increased boys' positive social behaviours and reduced girls' negative social behaviours (Ashiabi & O'Neal, 2015).

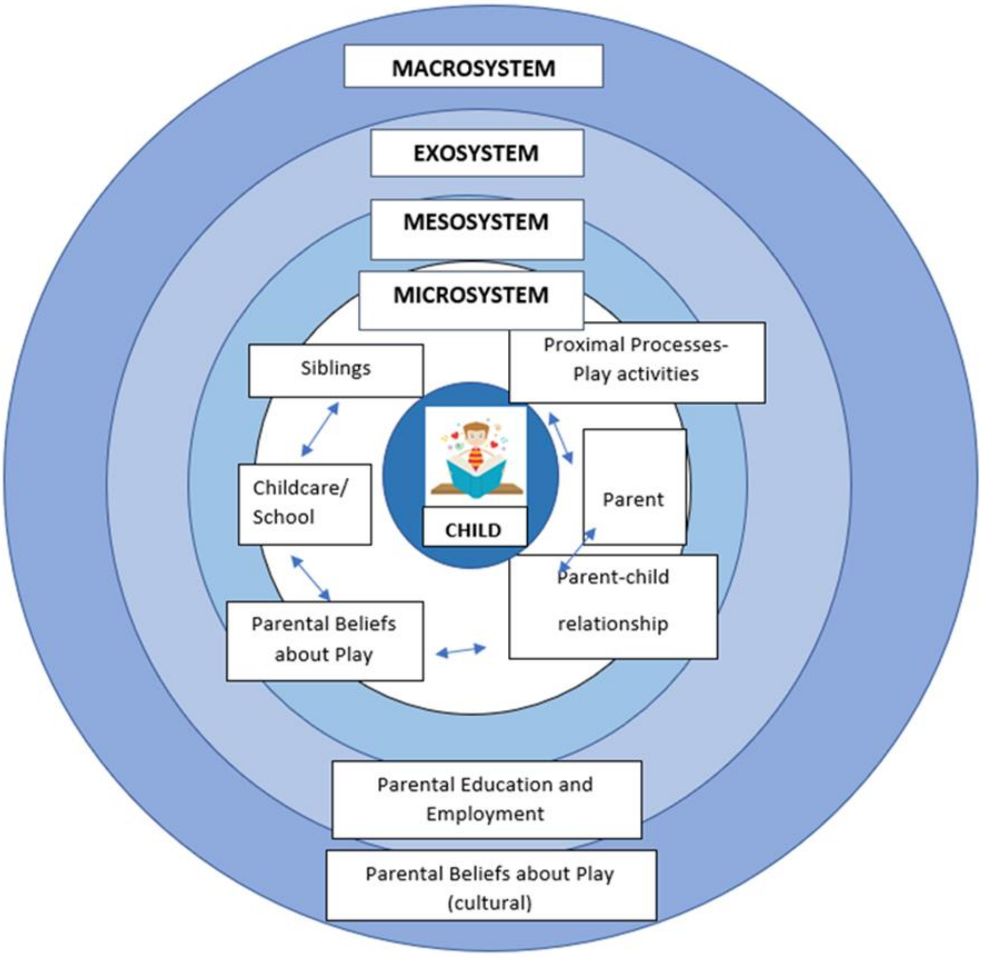

Figure 1. *Bioecological Systems Model of Play and Learning in the Home*

Other studies have used the framework to examine working with immigrant children and their families as well as children's language learning in preschool (Sheridan et al., 2017), risk taking in childrens play (van Rooijen & Newstead, 2017), and it is frequently applied to play in the early year settings (Hayes, et al., 2017; Swick & Williams, 2006). The home learning environment has been extensively examined in many other countries such as the UK, Germany, US and Australia, but is an emergent area of research in Ireland (Lynch, 2016). Additionally, few studies to date have applied Bronfenbrenner's framework to parental engagement and home learning environments. One that did, examined the importance of play and the environment around play (Vikerius & Sandberg 2006). As well as discussing the home and preschool environment, Vikerius and Sandberg (2006) also explored the social interplay between parents and children, and memories that parents had of play in their childhoods. Having introduced the bioecological framework which underpins the current study, we explore next the important role of the multiple relationships in a child's life for development, as well as other factors that play a role in development.

Other Factors that Influence Parental Engagement

There is a broad range of factors that influence parental engagement in play and learning in the home environment. Many of the variables of interest to this study are described above in Figure 1, in the context of the bioecological model. These include factors such as the parent child relationship, parents' education and employment, socio-economic background. The home environment is vital for development and contains important features such as positive caregivers, stimulating activities, play materials and objects and a safe and flexible space (Dauch et al., 2018). It includes access to play resources in a safe environment (Blaurock & Kluczniok, 2019; Fogle & Mendez, 2006; Haight et al., 1997). Previous research suggests children learn best when they are interacting with other people (Vygotsky 1978), and their surroundings (Vickerius & Sandberg, 2006), and when they have a variety of materials and toys suitable for their developmental level (Leibham et al., 2005).

Relationships are vital for development and these include the parent child relationship as well as relationships with siblings and peers (Bornstein & Putnick, 2012;

Gregory, 2001; McFadden & Tamis-LeMonda, 2013). Bronfenbrenner (1995) understood the importance of relationships and interactions between parent and child for development. Within the parent child relationship, sensitivity or responsiveness encourages healthy development and is important for physical and cognitive development, as well as socioemotional development (Bornstein, Britto et al., 2012). As well as responsiveness, parenting includes many other behaviours, such as educational behaviours (e.g., cognitive stimulation; McFadden & Tamis-LeMonda, 2013). When parents participate in play with their child, the child understands that their parent is fully engaged with them and it supports the parent child relationship (Ginsburg, 2007).

Parental education is a factor that has influenced whether parents believe play is important for development or not (Manz & Bracaliello, 2016). Structural characteristics such as education and income have been examined and have found associations with lower cognitive stimulation in the home (Rosen et al., 2019). Maternal work practices have been found to impact on time spent in engaging in activities with children and women who worked outside the home, with fewer children were found to spend more available time with their children and also provided higher quality learning environments for their children (Huston & Rosenkrantz Aronson, 2005).

Environmental factors such as socio-economic (SES) factors are also known to influence development outcomes (Davis-Kean, 2005). When examining family economic background, research has demonstrated that children from low socio economic status (SES) families, begin school at a disadvantage as they have less exposure to language in the home (Bojczyk et al., 2015; Hart & Risley 1995). Children from families with less income engage in fewer learning activities at home (Bradley et al., 2001). In contrast, Hartas (2011) found that with the exception of reading, parents have been found to engage similarly with various learning activities at home (e.g., alphabet) across socio-economic groups (Hartas, 2011). That study examined relationships between home learning and socio economic status in a sample of 15,600 five years olds from the Millennium Cohort Study (MCS) and was interested in the influence of activities on young children's language/literacy and socio emotional skills. Hartas (2011) believed it was over simplistic that frequent engagement in play and learning activities at home could offset the SES gap and found that SES factors had a stronger impact on language and literacy than on socioemotional skills, and also that parental education had a stronger effect than income on literacy and language outcomes (Hartas, 2011).

A number of studies have examined different factors in relation to either frequency of involvement in activities or child and family characteristics on parental involvement. One example is Kenney (2012), who examined the effect of a number of family and neighbourhood factors and the associated frequency with a number of activities. Their study examined 22,797 children in the US aged between one and five from the National Survey of Children’s Health dataset (2007). Activities included frequency that the child was read to, sung to/told stories, played with same-age children, and taken on family outings. They found that child variables of race, health, screen time and childcare were significantly related to the outcomes. Family variables of lower income, non-English speaking homes and lower education impacted on the frequency of being read/told stories, with children in poorer households with lower education, read to or told stories less than children in families with higher income and education.

However while this study examined patterns of play across a very large number of children, they focused on a limited selection of activities (i.e., reading, singing, going on outings and playing with peers). In addition they did not examine the influence of the activities on any measure of development(Kenney, 2012). Giallo et al. (2013) examined a range of child characteristics (e.g., temperament) and family characteristics (e.g., couple relationship and stress) that impacted on parental involvement in play activities in a sample of 841 children aged from birth to 4 years. They used Belsky’s model of parent behaviour and were interested in the effect of Parental Self-Efficacy (PSE) on parental involvement andfound that parents with high parental self-efficacy were more involved in learning and play activities. Similarily to Kenney (2012), while this study included a range of parent, family and child factors (e.g., mental health, quality of parents relationship and child temperament), they did not include any child outcomes in their study (Giallo et al., 2013). However, these studies highlighted the importance of parent values and attitudes to play, as well as family characteristics and other factors in influencing engagement. Any research examining the role of play and learning activities in child developemnt should consider the role of these factors also.

As well as environmental influences, resources in the home also have an impact on development outcomes. Parents have an important role organising the home environment. At home parents are responsible for providing time, materials, and co-players. "Adults can provide the play/learning environments, the supports, the rules, the safety, so that children can obtain the maximum, benefits from playing" (Woods, 2013, p. 7). They also play a role also in managing the availability of resources which can impact the learning environment which are observable in ecocultural studies (Pierce, 2000; Plowman et al., 2012). Home environments differ greatly with the availability of resources such as toys, games, books, screens and outdoor play equipment. Some families in homes with lower incomes have fewer resources (Bradley et al., 2001). Access to resources and play materials and the physical environment the child lives in is important as it is also linked to the frequency and quality of play activities as well as the type of play the child engages in (Roberts et al., 2017; Trawick-Smith et al., 2014).

Availability of literacy resources and reading material (e.g., books, the reading habits of the family members), as well as the frequency of library visits also vary within homes (Lyytinen et al., 1998). Children in home with lots of books have been found to benefit from three years more of school than children with no books (Evans et al., 2010).

Having toys to play with is important for development as toys improve, encourage, and maintain the quality of play (Trawick-Smith et al., 2014). Additionally, having access to larger outdoor play space at home was associated with increased outdoor playtime in preschool children (Roberts et al., 2017). The type of play activities that children engage may also be shaped by the child's environment. The Growing Up in Ireland study (GUI), found that children from households where mothers had lower education and lower incomes, usually participated in more unstructured physical play (free play) than their more advantaged peers (Williams et al., 2013).

Most research in this area suggest that when we examine the influence of other factors, that many factors have a direct influence on development outcomes. When parents are supportive of their children, they can have a positive effect on their child's development which can help diminish the effects of other factors (e.g., low SES or parental education; Department of Education and Skills, 2011). However, there are some mixed findings about the impact of some factors such as socio-economic status on development. Some longitudinal studies have found strong support for parental engagement in the early years that can supersede disadvantages of less income and parental education (Sammons et al., 2015). On the other hand, Hartas (2011) believed that frequent engagement in play and learning activities at home was not enough to compensate for the SES gap. We described in this section, the important role of the multiple relationships in a child's life for optimal development, (e.g., parent-child relationship) as well as some of the structural and environmental factors (e.g., parental education and SES) that play a role in development (e.g., Davis-Kean, 2005; Department of Education and Skills, 2011). In the next section we explore the role of the home learning environment and its role across development domains.

The Home Learning Environment

There has been extensive research on the effect of the home learning environment on both current and long term development (Melhuish, et al., 2008; Rodriguez & Tamis-LeMonda, 2011; Sammons et al., 2015). Lehrl, Evanglou et al. (2020) suggest that over the last thirty years, there is growing empirical evidence of the importance of the home learning environment as a predictor of academic, cognitive and social development. An optimal home learning environment has been described as one where parents promote learning and development opportunities and include behaviours that promote literacy activities, with supportive parent engagements, and availability of developmentally appropriate learning material and resources (Tamis-LeMonda et al., 2019). These include early experiences that help shape a child's development (Landry, 2014; Plowman et al., 2012; Son & Morrison, 2010).

A widely accepted definition of a good home learning environment is one that includes cognitively stimulating activities and interactions, and an environment that is emotionally supportive (Bradley, 1994; Bradley et al., 1988). This is similar to how Richter et al. (2016) describe a high quality learning environment with two elements: stimulation and warm interactions. The child understands that learning is an enjoyable activity when there is lots of stimulation in mathematics and literacy activities and it is accompanied by secure and warm interactions with caregivers (Richter et al., 2016). A high quality home learning environment will also include many activities as well as stimulating materials and resources (Kluczniok et al., 2013). This variety of activities in the home can foster a child's language and cognitive development (Klein et al., 2013) and children who grow up in a cognitively stimulating home have an advantage in learning (Rodriguez et al., 2009). Devine et al. (2016) describes the home learning environment as the degree to which informal learning and resources are available in the home. Overall, the various home learning environment definitions include positive interactions between parent and child, with some level of informal learning opportunities and access to resources.

The existing body of research on the home learning environment suggests that plenty of stimulation and a variety of activities in the home environment support positive developmental outcomes and academic success (Melhuish et al., 2008). Melhuish et al. found a large effect on literacy and numeracy outcomes when children were aged five, though the effect size reduced slightly when the child was aged seven. In general, there is high variation in the early home learning environments of families across structural characteristics (e.g., SES), educational beliefs and expectations that affect the quality of the home learning environment (Anders et al., 2012). However, Sylva & Pugh (2005) found the quality of the home learning environment promoted greater cognitive and socioemotional development regardless of the family's structural characteristic (e.g., parent occupation or education).

Recent studies have found long term effects for optimal early home learning environments. For example, Tamis-LeMonda et al. (2019) found that the early learning environment supports the emergence of pre-academic skills of receptive language, reading and mathematics and were stable over a ten-year study. They examined a range of literacy activities that included teaching letters, words, numbers and colours, as well as monthly visits to a museum. The home learning environment measure used was a composite score that included literacy activities as well as parent engagement and learning materials. Their focus was on a range of literacy activities that support learning though the interactions were based on observations of play-based interactions between parent and child. The findings however are correlational in nature, but they do suggest that a combination of literacy activities, interactions and resources develop cognitive skills (Tamis-LeMonda et al., 2019).

Another recent study found that the early home learning environment predicted later measures of the home learning environment into secondary school. Toth et al. (2019) reported that one in ten children experienced a poor home learning environment while four in ten children experienced a very good home learning environment. At age three they examined the home learning environment through the frequency of engagement in activities such as reading and library visits, while at age seven, they were interested in frequency of interactions such as educational visits and sports activities. They found that parents who created a good quality home learning environment in early childhood, continued it through to middle and later childhood (Toth et al., 2020). An earlier study of theirs had found that it was the home learning environment at age three that was the strongest predictor on later achievement irrespective of family SES and education (Sammons et al., 2015). Studies on the home learning environment have tended to focus on SES factors of, education, and income (Toth et al., 2020) and demonstrate ample support that the early home learning environment is a strong predictor of later academic success. They also find support that the quality of the home learning environments is maintained into later childhood.

It appears that many parents adapt the home environment to support their child's changing developmental needs (Orri et al., 2019; Son & Morrison, 2010). Son and Morrison (2010) demonstrated that parents improved their home learning environment particularly as children began the transition to school. In the study of over a thousand children, they observed changes between the ages of 36 and 54 months that indicated that most parents made modest changes and up to a third of parents in the sample, made substantial changes to their home environment in preparation for school. Orri et al. (2019) also found evidence of this. In a randomised controlled study, of an early intervention programme they compared 115 pregnant women in a treatment group with 115 women in a control group. They found that children in the treatment group benefited from a more stimulating home environment early in life.

Orri et al. suggested that parents adapt the home environment to the child's developing needs. They also found that parental engagement decreased as the child becomes more autonomous, thus needing less parental involvement. However, this study focused on families with low SES and may not be generalisable to other populations (Orri et al., 2019). In addition, other research suggests that not all parents are able to provide a good home learning environment. In their study, Reynolds and Heskeath (2012) study found that some parents have difficulties in providing an ideal HLE due to a lack of parental knowledge as to what the child need to support their learning potential as well as having less access to social resourses (e.g., the library). While this qualitative research had only interviewed 9 families at the time of publication, within the small sample there was great variation in the home learning environments they visited. For example all but one of the households had the television on in the background at all times and only four out of five households read regularly to their children (Reynolds & Hesketh, 2012).

Defining the home learning environment therefore, much like the definition of play, varies widely across studies (Lehrl, Evangelou et al., 2020). As described, the home learning environment suggests that lots of stimulating activities are important for development. However most current descriptions of the home learning environment focus on child participation in learning activities, the availability of learning materials and quality parent child interactions (Bradley et al., 2002) and a focus on learning rather than play. Previous research had examined the *home play environment* (Bishop & Chace, 1971). For example, Bishop and Chace (1971) explored parents conceptual systems to see if their attitudes and practices regarding playfulness in the home play environment differed due to their conceptual system. They also wanted to examine if play was related to the creative potential of the child. They found that mothers who were rated as more abstract had attitudes that suggested flexibility and encourages exploration and autonomy in the play environment. This parental attitude was found to increase the playfulness of the child's experience. However, despite Bishop and Chace's research, the home play environment description seems to have fallen out of use in research. In examining the literature, a similar term, *in-home play,* was found to be used by Emerson (2018) about the home environment, specifically in relation to play in the home but does not seem to be used in any other research, with little mention of *in-home play* in current literature.

To summarise, a number of studies demonstrate how the home learning environment influences developmental outcomes (e.g., Tamis LeMonda et al., 2019). Parents play an important role in supporting their child's learning and development, scaffolding learning for their child through interactions. However, reviewing the previous research, the focus is generally on learning for academic development. With the exception of a few studies (e.g., Orri et al., 2019) research focuses on academic skills rather than the wide range of social and emotional experiences that may equip help children develop other important skills (e.g., self-regulation) which may also support learning (Tamis LeMonda et al., 2019). Some sample sizes have been small (e.g., Orri et al., 2019: Reynolds & Hesket, 2012) with few using larger longitudinal datasets. Additionally, while research has used the bioecological framework to examine factors in early development, it has not examined the contribution of individual play and learning activities on child development, while controlling for the contribution of family and other influences.

The Current Research

Drawing on previous research it seems clear that studies on the home learning environment have primarily focused on the importance of the home learning environment for academic success (Bradley et al., 2002; Lehrl, Ebert et al., 2020; Shahaeian et al., 2018; Son & Morrison, 2010). Research on the HLE tends to emphasise activities that encourage learning and ultimately school success (Sammons et al., 2015) and the idea that practices at home are stimulating and high quality learning experiences for children is predominant across research (Richter et al., 2016). These studies examine play and learning activities and parental engagement in the home for its influence on lnaguage and academic skills (Hartas, 2011; McMullin et al., 2020). Fewer studies have looked at the importance and value of play in the home learning environment for the sake of play (Colliver, 2016). Added to this, the home is seen as a private domain, with limited research on play in the home in early childhood (Lester & Russell, 2010) in comparison to early year settings.

There is also a gap in the literature regarding how parents consider play in their early care and decision making (e.g., in selecting a preschool; Kane, 2016). Overall less research has considered the important role of the home play environment, that is, all of the various play and learning activities that take place in the home, how they interact, and the role of the family (e.g., child and parent relationships) and environmental factors (e.g., maternal education) that support play and learning in the home. Instead, the focus to date has been on certain aspects of cognitive development such as language, with less attention given to the effect of the home learning environment on other aspects of cognition or on socioemotional development.

Indeed, much of the research on play in the home focuses on describing play in the home between parent and child rather than examining the effect of play activities on development outcomes. Additionally, despite the knowledge of the importance of play for development, less is known about the effects of informal activities such as songs or games on either cognitive or socioemotional development. Roopnarine and Davidson (2015) also identify that most studies on developmental outcomes on play are correlational. While it is unlikely that parent child play alone would contribute to developmental outcomes, there are many other factors that may affect the role of parental engagement in play on developmental outcomes (Roopnarine & Davidson, 2015). The current research aims to examine some of these factors (i.e., family and other factors as well as the home environment and parental beliefs about play) and examine if individual play and learning activities have an impact on child development outcomes. The impact of the individual activities on development has been understudied also, with greater emphasis on the combination of activities within the home learning environment.

The aim of the current research is therefore to address some of the themes on play and learning in the home raised in this literature review. Firstly, it focuses on parental engagement in play and learning activities in the home and their contribution to cognitive development and to socioemotional development, using data from a large national cohort study, the Growing up in Ireland Study (GUI). Bronfenbrenner's bioecological framework is applied to examine the contribution of the proximal process of play and learning activities on child development, while controlling for family and other influences. It uses this framework to examine the impact of family and other influences and their contribution to both domains of development (e.g., the proximal process of parental engagement in play and learning activities; relationships in the microsystem).

The bioecological framework allows to us to look at the influence of family and other factors on the developing child. Some research to date has examined play and learning activities in the home learning environment but few studies have examined the independent effect of individual activities on child development, while acccounting for the influence of family and other factors on development. Overall, the aim of the present research is to examine factors that influence play and learning in the home environment including the contribution of family and other factors to early child development.

Chapter Three

Examining the Effect of Play and Learning Activities on Cognitive Development

"*What parents do with their children is more important than who parents are*".

Sylva et al. (2004, p. 4).

A rich home learning environment involving a variety of activities supports many aspects of development in early childhood, including cognitive development (Anders et al., 2012; Melhuish, 2010; Sénéchal & LeFevre, 2002), which has been the focus of research over the last number of decades (e.g., Bus et al., 1995). Research shows that a consistently supportive home learning environment supports the acquisition of skills that predict later academic achievement (Roberts et al., 2005; Tamis-LeMonda et al., 2019), with encouraging long term benefits (Rodriguez & Tamis LeMonda, 2011; Sammons et al., 2015). The home learning environment at age three, has been found to show positive effects on educational attainment into adolescence over and above the effect of the later home learning environment and other factors (e.g., socio-economic status and parents' qualifications; Sammons et al., 2015).

To date, much of the research has focused on the role of the home learning environment in particular aspects of cognitive development, for example vocabulary development (Rodriguez & Tamis-LeMonda, 2011) and language development (Son & Morrison, 2010). Other research has focused on the effect of the home learning environment for literacy skills (e.g., Evans et al., 2000; Hartas, 2011; Scarborough & Dobrich, 1994; Sénéchal & LeFevre, 2002), and more recently research has focused on the effect of the home learning environment for numeracy skills (e.g., Niklas et al., 2016a; Skwarchuk et al., 2014). A number of medium and large scale longitudinal studies have demonstrated that children's early literacy and numeracy skills are strong predictors of later academic success (e.g., Aunio & Niemivirta, 2010, Aunola et al., 2004; Claessens et al., 2009; Duncan et al., 2007; LeFevre et al., 2010, Melhuish et al., 2008). Children display varying levels of literacy and numeracy skills upon starting school, indicating that skills acquired through the home learning environment or through childcare, prior to starting formal education are important (e.g., Bakermans-Kranenburg et al., 2005; Melhuish, et al., 2008).

As well as examining the long term impact of the home learning environment, a recent study was one of the first to explore the effect of the home learning environment on non-verbal reasoning. Niklas et al. (2018) was interested in the home learning environment before formal school began to see if there was an association between the home learning environment and fluid reasoning. The sample consisted of 116, four year old children and their parents. In a non-intensive intervention, parents were given advice on the importance of the home environment as well as a one to one session introducing dialogic reading and principles of counting. The intervention was developed to improve both the home learning environment and childrens cognitive abilities. They used ANOVA to explore if the control and intervention group differed on the home learning environment and found significant gains in the quality of the HLE and in childrens fluid reasoning abilities for children in the intervention group, which were maintained on follow up months later. While the study design compared participating versus non-participating families which may have resulted in selection bias, to date this has been one of the only studies to examine the effect of the home learning environment on reasoning skills (Niklas et al., 2018).

Therefore, as described above findings from previous research (e.g., Sénéchal & LeFevre, 2002; Son & Morrison, 2010) demonstrate the positive effects of the home learning environment on language and literacy development, and more recently on numeracy development (e.g., Skwarchuk et al., 2014). Most of these studies are interested in how the home learning environment affects academic development and specific development outcomes (Lehrl, Ebert et al., 2020) or on the continued quality of the home environment (Toth et al., 2020). These descriptions imply that parents are more interested in learning for development and academic success rather than for creativity or building relationships with their children through play in the home, as few studies to date have focused on parent and child relationship factors and how they may influence development outcomes. With the exception of Niklas et al. (2018), comparatively less research has focused on the effect of the home learning environment on other aspects of cognitive development in young children, such as reasoning or problem solving skills.

Our goal therefore was to explore this area. In the remainder of this chapter, we discuss the importance of the home learning environment for multiple aspects of cognitive development. We then report the results of a study that examines the effect of different types of activities in the home learning environment on the cognitive development of young children and consider the implications of the findings.

Home Learning Environment and Cognitive Development

Cognitive skills relate to the ability to think, reason and understand, and involve a range of verbal and non-verbal complex processes, such as language development, reasoning, attention and memory. Children's cognitive development is influenced by many factors including parental involvement (Cano et al., 2019; Rosen et al., 2019;Tamis-LeMonda et al., 2004) and the home learning environment (Melhuish, et al., 2008;

Rodriguez & Tamis-LeMonda, 2011). Previous research shows that cognitive skills predict academic success (Bernal & Keane, 2011; Duncan et al., 2007; Mikus et al., 2020), and are supported by interactions with more experienced others, such as those interactions that occur regularly in the home learning environment (Niklas, Cohrssen & Tayler, 2018).

There is evidence that a home learning environment rich in activities supports cognitive development (Frumkin, 2013; Hindman & Morrison, 2012; ; Raikes et al., 2006). The home learning environment before children start school has an impact on later literacy and numeracy skills (Anders et al., 2012; Leventhal et al., 2004; Manolitsis et al., 2013; Niklas & Schneider, 2013a). A language rich, home environment contributes to later reading comprehension (Mendelsohn et al., 2018). For example, when parents adjust their language to the child's level either by repeating utterances, asking questions and using speech directed at the child, they engage in verbal scaffolding, an effective technique based on Vygotsky's (1978) framework (Mendelsohn et al., 2018). Having toys in the home, as well as reading books, is also linked to better language development and may result in children being less likely to need early intervention to support their development (Tomopoulos et al., 2006).

Sammons et al. (2004) also previously demonstrated the impact of the home environment on literacy and numeracy skills in preschool children. Part of a wider longitudinal study, the Effective Provision of Preschool Education (EPPE) project, this study followed 141 preschools across five UK regions and the current study had a sample of 2857 children. An additional 300 children who had never been to preschool joined the study at primary school entry. Their findings indicated that at age three year plus, alphabet teaching at home, library visits and playing with letters and numbers had significant positive impacts on language, pre-reading and number concept, compared with children whose parents said they never engaged in these activities. An increased frequency of singing songs and nursery rhymes also demonstrated a positive impact on language scores, while painting and drawing in preschool children had positive relationships with number concept (Sammons et al., 2004).

Skwarchuck et al. (2014), found that exposure to games with a numerical aspect contributed to numerical literacy. Parents of 183 children, who started kindergarten with a mean age of 58 months, completed a questionnaire on early home learning experiences. Results indicated that formal numeracy practises such as simple sums predicted symbolic number knowledge and informal shared home numeracy games (e.g., snakes and ladders) were found to predict non-symbolic maths skills (Skwarchuck et al., 2014). Similarly, Gasteiger and Moeller (2021) examined the effect of playing informal board games on numerical competencies by conducting an intervention study with 95 kindergarten children, with a mean age of 4 years and 11 months. The interventions study consisted of seven by 30 minute training sessions over 4 weeks with adult players (i.e., ten university students) who were to foster playing of the board games in a natural situation, similar to how they would play a board games at home. They found that playing board games with a traditional number dice benefitted counting skills and conceptual ability more that playing board games with a colour or non-numerical dice (Gasteiger & Moeller, 2021). Niklas et al. (2016), also described everyday activities in the home such as cooking and measuring as opportunities to include numeracy learning at home. Kleemans et al. (2012) used a parent report of home numeracy practices with measures of 89 children's (i.e., mean age of 6.1 years) cognitive, linguistic and numeracy skills as well as parental expectations. They found that home numeracy activities and parents expectations had a unique influence on early numeracy outcomes (Kleemans et al., 2012).

A single home learning activity can contribute to the development of a number of different aspects of cognitive skills including language. For example, learning nursery rhymes may help with memory skills, expand vocabulary, and benefit imagination as the child applies and looks for patterns or rhymes in words. This patterning in the rhymes can be considered the basis for reading and maths and help with other important skills such as learning the alphabet and counting (Kenney, 2005). These early rhyming abilities and vocabulary have been found too to predict later reading and spelling abilities (Bowman et al., 2001; Schatschneider et al., 2004). When applied to reading, these skills can aid with detecting rhymes, syllables, and phonemes, help children decode words and learn to read quicker (Bowman et al., 2001).

Previous research provides clear evidence of the role of the home learning environment on specific aspects of cognitive development, namely vocabulary (Rodriguez & Tamis-LeMonda, 2011), language (Son & Morrison, 2010) and literacy (Hartas, 2011) or numeracy skills and development (Niklas et al., 2016a). Fewer studies have explored other aspects of cognitive development (e.g., reasoning), although previous research specifically on the activity of reading suggests it may have role to play in supporting different aspects of cognition. For example, previous research supports the role of reading in the development of joint attention – implicated in the development of theory of mind (Tomasello et al., 1993), long-term memory processing (Kopp & Lindenberger, 2011), social referencing and word-object mapping (Baldwin, 1993). While reading appears to be beneficial for these aspects of cognitive development, less is known about the unique role of other play and learning activities in the home environment, such as games, songs, or rhymes, and on other aspects of cognition.

Different Types of Play and Learning Activities in the Home Environment

One distinction that has been made in relation to different types of activities in the home environment is between formal and informal learning activities (also referred to as direct and indirect teaching by LeFevre et al., 2009; Niklas, Nguyen et al., 2016; Sénéchal

& LeFevre, 2002; Skwarchuk et al., 2014). Niklas, Nguyen et al. (2016) suggest that both formal and informal learning in the home affects child cognitive development and this distinction seems to provide a good model for categorising activities in the home learning environment (Niklas, Nguyen et al., 2016; Sénéchal & LeFevre, 2002). Formal learning activities may be defined as those that serve the goal of encouraging learning. The purpose of these activities is to promote the acquisition of literacy and numeracy information, such as a parent teaching a child the alphabet, or how to count. In contrast, informal activities such as games, songs, painting or drawing may encourage literacy and numeracy skills through incidental learning during play. Shared reading with a child has also been described as an informal activity or indirect learning (Martini & Sénéchal, 2012; Niklas, Cohrssen & Tayler, 2016b).

Sénéchal and LeFevre (2002) described an independent effect of direct literacy activities such as teaching about letters, and indirect activity of shared reading. For example, phonological awareness and letter knowledge may be developed through the more formal teaching of the alphabet, whereas vocabulary and listening comprehension skills may be developed during reading to a child (Sénéchal & LeFevre, 2002). LeFevre et al. (2009) also proposed that there is a distinction between direct numeracy activities where parents facilitate numeracy skills directly by teaching (e.g., facts about arithmetic) or indirectly (e.g., measuring during cooking). LeFevre et al. (2010) suggests that some parents may engage in either direct or indirect activities, a combination of both, and neither. These different types of activities may have different effects on different aspects of the skills acquired. In numerical literacy, Skwarchuck et al. (2014) showed that children’s knowledge of the symbolic number system was supported by formal numeracy practices, but that their understanding of non-symbolic arithmetic was supported by informal exposure to games with a numerical aspect.

It seems therefore that different types of activities in the home learning environment may play different roles in different aspects of cognitive development, at least in relation to the development of literacy and numeracy skills. For example, when playing with a child or working on a jigsaw puzzle together, a parent is supporting cognitive skills by engaging with their interests and their participation (Landry et al., 2006). Listening to rhythm and intonation in infants and young children is important for later prosody and rhythm in language (Kuo et al., 2004). Similarly, the short sequences in nursery rhymes are easy to repeat, when a child is learning to put longer sentences together and can help in turn taking in conversations (Sprenger, 2013).

Added to the focus on language aspects of cognitive development, most studies have examined the home learning environment using a total score or home learning index rather than examining the effect of individual activities on any aspect of cognitive development (e.g., Melhuish et al., 2008; Melhuish, 2010; McGinnity et al., 2015; McMullin et al., 2020; Sylva et al., 2010; Toth et al., 2020). Many of these have examined the longitudinal effect of the home learning environment (Melhuish et al., 2008; Yu & Daraganova, 2015). The focus of these studies are on play and learning activities which are part of the microsystem and their effect on language or cognitive development.

For example, the Effective Pre-school and Primary Education project (EPPE) was primarily interested in preschool education and care but examined the role of the home learning environment on development outcomes (Melhuish et al., 2008). Melhuish et al. created a composite score of the home learning environment which measured the frequency of seven activities which parents rated on a scale of 0 to 7 (0 = not occurring, 7 = very frequent). They then combined them together to create a measure of the home learning environment index (HLE) with a higher score meaning a richer home learning environment. They also included the number of children's books in the home. Yu and Daraganova (2015) also looked at children's early home learning environments and learning outcomes using data from the Longitudinal Study of Australian Children (LSAC). The LSAC asked about the frequency (measured on a Likert scale of 0= none to 4 = everyday) of seven home activities which including reading to the child, telling stories (not from a book) songs or musical activities, playing indoor games, playing outdoor games, doing arts and crafts and doing everyday activities such as cooking or caring for a pet. In their home learning environment score, they excluded reading from the total. but included it as a separate independent measure.

Using the GUI dataset, McMullin et al. (2020) examined the role of home learning activities and the relationship between Socio-Economic Status and cognitive development. They used a composite measure of the home learning activities (e.g., reading, ABC's, numbers, playing games (e.g., board games, jigsaws, card games) and painting drawing or colouring) which included 9,793 three year old children in the total sample. They found little difference in the overall Home Learning Activities (HLA) score across class income and parental education. They found some socially structured differences in parental engagement in individual activities with higher percentages of professional reading more regularly to their three year old, than people in unskilled work or by those who never worked; they also found similar results across education levels, with higher daily reading reported by those with university degrees compared to those with lower secondary education.

They also found a contrasting effect for alphabet and counting with those with lower education and income resources engaged in greater frequency of alphabet and number activities. There were no differences for the activities singing/reciting rhymes or playing games based on social origin factors. While home learning activities explained a small part of educational differences in vocabulary, there were none for income or social class. They did find some evidence that activities may have greater benefit for children in lower income and class families in supporting cognitive development (Mc Mullin et al., 2020). While this research examined frequency of engagement in activities and compared them with class, income and parental education, it did not examine the effect of the activities themselves on cognitive outcomes.

Many play and learning activities (e.g., reading, songs, art and literacy activities) are regularly occurring activities that occur in the microsystem of most family homes around the world, including developed and developing countries. For example, Bornstein and Putnick (2012) used a measure of cognitively enriching activities in the home, in the Multiple Indicator Cluster Survey (MICS), an international survey. The (MICS) was developed by UNICEF to develop suitable interventions to inform policy. The United Nation works in 190 countries with the aim of improving the health and education of children and their mothers. The MICS is a very large survey with data from 127,000 families with children under 5, from 28 developing countries. The activities in the MICS that Bornstein and Putnick included as a measure of cognitive caregiving, were reading books, telling stories, naming, counting, and drawing (alpha =.68). What various studies demonstrate (e.g., Bornstein and Putnick, 2012; Melhuish et al., 2008; Mc Mullin et al., 2020; Yu & Daraganova, 2015) is that there are many play and learning activities that parents and children engage in at home, and that across studies many of the same play and learning activities are regularly examined. Table 1 below present some of the play and learning activities included in the above studies for comparison purposes.

Table 1 Comparison of Play Activities in Various Studies

	EPPE	LSAC	MICS
Reading	Read to child	Reading (included as an independent measure)	Reading books
Stories		Telling stories	Telling stories
Songs/music	Learning activities with songs/poems/nursery rhymes	Songs and musical activities	
Art activities	Painting or drawing	Doing arts and crafts	Drawing
Playing		Playing indoor and outdoor games	
Literacy activities	Learning activities ABC's		Naming,
Numeracy activities	Learning activities with numbers/shapes.		Counting

However, while these studies all demonstrate the positive effect of the home learning environment on cognitive outcomes, they focus on the total score or overall home learning environment. Furthermore, they do not examine the effects of activities on other aspects of cognitive development such as non-verbal reasoning. Recently however, research by Mikus et al. (2020) examined the effect of individual activities (reading, numbers, letter activities, teaching songs and painting) on cognitive development. They examined if taking part in organised activities such as sports and music, and parent promotion of activities explained later difference in cognitive skills. They found a relationship between enrolment in music activities and maths and reasoning skills. Although participation in music activities was related to growth in both maths and reasoning skills, they did not find enrolment in sports or daily reading to be associated with growth in either maths or reasoning skills.

Most previous research had found positive associations between Socio-economic Status (SES) and the home learning environment, but Mikus et al. (2020) suggests that it is because they examined home learning environments using total scores rather than looking at the impact of individual activities. They suggest that not all activities contribute to cognitive skill development to the same degree, and so examining the effect of individual activities is important to explore in relation to skill development in children. However, while the research by Mikus et al. (2020) is unique in that it examined the effect of individual activities, it was primarily interested in how parents support development of skills through parenting behaviours when the child was aged five. In addition to individual activities, there are many specific areas or domains that parents engage in such as literacy, numeracy and shared reading. Each of these different activities contribute differently to development outcomes.

Domain Specific Activities

Within the home, there are multiple activities that parents can engage in, some of which can be domain specific activities (e.g., literacy or numeracy activities). In the context of the home learning environment, much research has focused on the home literacy environment (Sénéchal & LeFevre, 2002), and more recently the home numeracy environment (Skwarchuk et al., 2014). For example, home literacy activities include shared reading and letters and alphabet activities (Sénéchal & Le Fevre, 2002), while home numeracy activities (e.g., counting and numbers) help with mathematical concepts

(Skwarchuk et al., 2014). Within these domains, activities can also be considered formal activities that require explicit teaching, or informal which are more playful activities (Lehrl, Ebert et al., 2020). A variety of activities including formal (e.g., teaching the alphabet) and informal activities (e.g., singing nursery rhymes) have been found to be beneficial for development (Melhuish, 2010: McMullin et al., 2020). Some informal activities can have both cognitive and socioemotional benefits for example, singing creates social and cognitive communication with caregivers, and reading can prompt close contact and positive emotion (Bornstein & Putnick, 2012). Niklas et al. (2016), found that the best fit model of a short measure of the home learning environment was a two dimensional model which included both direct teaching of formal activities of letters/alphabet and numbers and shapes and informal activities such as messy activities and playing music (Niklas et al., 2016).

Shared reading, when a parent reads to a child, has been defined as an informal activity in many studies, where the meaning of the story and not the letter recognition or print is emphasised (Martini & Sénéchal, 2012; Sénéchal & LeFevre, 2002). Informal numeracy activities include playing board games with numbers or measurement activities while cooking together (Skwarchuk et al., 2014). There are mixed findings to date on the effect of informal numeracy activities (Lehrl, Ebert et al., 2020) with some positive effects found for non-symbolic numeracy skills (Skwarchuk et al., 2014). Negative outcomes for informal numeracy have been reported also. For example, Huntsinger et al. (2016) found informal math activities negatively predicted math scores. More recent research has tried to establish cross domain effects, such as the effect of formal literacy on numeracy outcomes and vice versa. It may be that general stimulation of both language and numeracy activities suggests parental engagement in learning which has a positive influence on both literacy and numeracy domains (Lehrl, Ebert et al., 2020).

Previous research suggests that the various features of play and learning activities make different contributions to different child development outcomes. Formal literacy activities (e.g., teaching the alphabet) can aid with letter recognition (Lehrl, Ebert et al., 2020; Lukie et al., 2014). Other formal literacy activities can include teaching specific skills such as word reading (Evans et al., 2000) and letter knowledge and reading fluency (Lehrl, Ebert et al., 2020). Formal numeracy practices (e.g., counting and simple sums) can aid broader mathematical thinking (Niklas & Cohrssen, 2016a) or parents teaching their children about numbers or quantities (Skwarchuk et al., 2014).

Research to date has generally focused on specific skills such as literacy and numeracy. For example, the activity of reading is frequently examined to examine its impact on development (Niklas, Cohrsen, Tayler, 2016b). In their study of 104 Australian kindergarten children, they found reading to be associated with language and cognitive skills. In contrast, very few studies to date have investigated the effect of home learning activities on cognitive skills such as non-verbal reasoning. While the recent study by Niklas et al. (2018) included play and learning activities in the home, they were included as a composite measure of the home learning environment. This makes it difficult to ascertain if individual activities contributed to aspects of cognitive development such as reasoning. In the current research we are primarily interested in the effects of play and learning activities at age three, when the child is more influenced by proximal processes in the home. In the next section we explore how other factors in the ecological system also shape and influence development in early childhood. Where a lot of current studies are interested in the effect of screen activities (Beatty & Egan, 2020; McClure et al., 2018; Radesky & Christakis, 2016) previous studies focused on reading and before that the focus was on play (Lillard, 2015). While reading is an important activity with benefits across domains, it is also important to examine a range of play activities to see how they influence early development.

Effect of Family and Other Factors

Previous research shows that the home learning environment influences cognitive development. However, other research shows that family and other factors influence the home learning environment, and also cognitive development. Therefore, it is important to consider these factors also, drawing on Bronfenbrenner's bioecological systems theory. For example, McMullin et al. (2020) examined the relationship between home learning activities and SES. They used a composite measure of the home learning activities at age three (reading, ABC's, numbers, playing games (board games, jigsaws, card games) and painting drawing or colouring). They found some socially structured differences in parental engagement in individual activities with higher percentages of professional reading more regularly to their three year old, than people in unskilled work or by those who never worked.

McMullin et al. also found similar results across education levels, with higher daily reading reported by those with university degrees compared to those with lower secondary education. They found a contrasting effect for alphabet and counting with those with lower education and income resources engaged in greater frequency of alphabet and number activities. There were no differences for the activities singing/reciting rhymes or playing games based on social origin factors. While home learning activities explained a small part of educational differences in vocabulary, there were none for income or social class. They did find some evidence that activities may have greater benefit for children in lower income and class families in supporting cognitive development (Mc Mullin et al., 2020). While their research examined frequency of engagement in activities and compared them with class, income and parental education, it did not examine the effect of the activities themselves on cognitive outcomes.

Previous research has also demonstrated the positive effect of the adult child closeness on language and academic outcomes. A study that examined family and predictors of development, found that parent–child closeness was associated with school success. Morrison et al. (2003) also found that the positive quality of mother – child interactions accounted for academic success, over and above the role of demographic variables. Warmth and sensitivity are as important in helping to foster learning as they are essential for socioemotional development. Maternal sensitivity during parent and child play interactions (e.g., painting and drawing) are known to have links with later academic performance over and above maternal education (Downer & Pianta, 2006). When interactions between parent and child are warm and responsive, teaching behaviours may be more effective and better received (Mulvaney et al., 2006). In contrast a hostile parenting style is known to impact negatively on socioemotional development, which may indirectly influence academic outcomes in middle childhood (Hammer et al., 2018). While parent child relationship factors are present in everyday life and activities, a number of other factors are known to influence development too. There include factors such as the child's sibling relationships.

Child relationships with siblings and interactions with older siblings are known to promote development (Brody, 2004). Sibling relationships are important, and siblings close in age play a unique part in child development in their play and work together. An ethnographic study of sixteen families in London found that older siblings act as cognitive facilitators in play activities whereas younger siblings act as prompters in their play (Gregory, 2001) demonstrating that both older and younger siblings support each other. However, there is some evidence that being raised in a larger family may impact negatively on maternal responsiveness and cognitive outcomes (Mermelshtine & Barnes, 2016; Shin et al., 2019). McNally et al. (2019) also found a negative impact of family size on language outcomes at age three. Overall, research on siblings has found mixed results on whether sibling relationships have a negative or positive influence on cognitive development (McNally et al., 2019).

Another important influence on development in early childhood is attendance at childcare. Many children attend a formal childcare setting or are cared for by relatives. Whether a child attends a formal setting or not, childcare is a necessity for many working families. However, the findings from previous research are mixed as to whether attending childcare has benefits for achievement and behaviour, or the opposite effect (Lucas-Thompson et al., 2010). When a young child attends quality childcare, it has shown to be important for early child development and also benefits all children, regardless of their family background. The strongest effects are evident in children from disadvantaged backgrounds (Melhuish et al., 2015). Other research reported benefits for cognitive development (e.g., maths and reading) for children who attend childcare (Loeb et al., 2007; Sylva et al., 2011), as well as an optimal age at which to begin (Loeb et al., 2007). Loeb et al. (2007) found that children who attend centre based care have higher cognitive scores, with the greatest benefits to children who started attending when they were between two and three years of age. However, Melhuish et al. (2015) has stated that there can be negative effects for attending childcare, and that for children under three, that low quality childcare has either no benefits or negative benefits.

In contrast, McGinnity et al. (2015), examined the effects of different types of childcare (e.g., care by relative, care by non-relative, and centre based care versus parental care) on cognitive outcomes at age five. They found that children in non-parental childcare arrangements had higher expressive vocabulary scores at age five than those in parental care. However, when they took into account child and parental characteristics, and included a measure of the home learning environment (e.g., learning activities, number of books and grandparent care) there were no differences in vocabulary scores. Similarly, when they considered the same child and family factors, they found no differences between childcare type at age three and non-verbal reasoning scores at age five. They found that children regardless of parental care or childcare, performed the same in terms of their cognitive development (McGinnity et al., 2015). Overall, the findings in relation to childcare, suggest quality of childcare is important, particularly for children age three and under, regardless of family background. Findings also suggest that children who attend centre care tend to have higher cognitive scores, but only if they begin attending care after the age of two.

In addition to factors such as having siblings or childcare, research indicates that factors such as parents' income and education may also influence the frequency with which parents engage in particular activities with their child (Bradley et al., 2001). Socio-economic Status (SES) is generally measured by occupation, parental education, and income and is known to impact on cognitive development (Rindermann & Baumeister, 2015). Differences in both cognitive and educational outcomes among children, with evidence of a social gradient, have been observed in a large body research to date (see McMullin, et al., 2020 for a review). Bukodi and Goldthorpe (2013) found that each of the measures of SES; class, occupational status, and parental education, had an independent effect on their child's educational attainment and that they were not interchangeable. They used data from three cohort studies considering parents' education when their children were aged between ten and eleven. McMullin et al. (2020) also found evidence of the independent effect of education, income, and social class in their research.

McMullin et al. (2020) found families with lower parental education and income engaged in greater frequency of alphabet and number activities. They found some socially structured differences in parental engagement in individual activities, with higher percentages of professional parents reading more regularly to their three year old, than people in unskilled work or by parents who never worked; they also found similar results across education levels, with higher daily reading reported by parents with university degrees compared to those with lower secondary education. Findings such as these highlight the importance of considering family and other factors when investigating the role of various play and learning activities on cognitive development.

Variables included in previous GUI studies on language and cognitive development

A number of studies have previously examined the influence of play and learning activities in the home or the home learning environment on language or cognitive development using data from the Growing up in Ireland study (Hourigan & Quigley, 2017; Kent & Pitsia, 2018; Murray & Egan, 2014; McMullin et al., 2020; McNally et al., 2019). These studies generally included many factors though some shared the same variables (e.g., if mother had breastfed infant; Hourigan & Quigley, 2017; Murray & Egan, 2014; Mc Nally et al., 2019) or used four categories of education (Murray & Egan, 2014; McGinnity et al., 2015; McMullin et al., 2020; McNally et al., 2019).

Table 2 below includes the various variables that were included in these studies that used the GUI data in the current research area. For example, Hourigan and Quigley (2017), examined the influence of the home learning environment on expressive language at age three. They included infant predictors in blocks of infant variables (gender, gestational age and temperament), maternal predictors of age, breastfeeding and depression and finally the home learning variables of talking to the infant while busy, home learning practices and the number of books in the home. They also included number of books in the home and found that number of books was a strong predictor of expressive language at age three. The home learning practices demonstrated a direct effect on expressive language as did home learning activities and speaking to the infant while (Hourigan & Quigley, 2017).

Table 2 Variables included in previously published GUI studies focused on the Home Learning Environment (HLE)

	McMullin et al., (2020)	**McNally et al., (2019)**	**Hourigan & Quigley (2017)**	**McGinnity et al., (2015)**	**Murray & Egan (2014)**	**Kent & Pitsia (2018)**
Development outcomes measured	BAS Naming Vocabulary Age 3	BAS Naming Vocabulary Age 3	BAS Naming Vocabulary Age 3	BAS Naming Vocabulary Age 5 and BAS Picture Similarities Age 5	Age and Stages Problem Solving and Communication Age 9 months	No development outcomes measured
Age measures in GUI studies were included from	Age 9 month and 3 years and 5 years	Age 9 month and 3 years	Age 9 months and 3 years	Age 9 months, and 3 years and 5 years	Age 9 months	Age 9 months and three years
Analysis Technique used in study	Hierarchical Regression	Mediation Analysis	Hierarchical Regression	Hierarchical Regression	Hierarchical Regression	Factor analysis of home environment variables and frequencies of activities as well as descriptive statistics

% of Variance accounted for in final model/ Percentage mediated		Between 27 and 28% when vocabulary score with social class/income/social origin interacted with HLA's	Percentage mediated 78.9% in Naming Vocabulary scores	9.2% for Naming Vocabulary	10% for Picture Similarities and 31% for Naming Vocabulary	5% for Problem Solving and 8% for Communication	Not applicable
1. Home Environment	Reads to child	Not included	Number of days per week someone reads to child age three	Not included	Not included	Yes (SCG) Someone v no one at 9 months	Not included
	Books at home	Number of books in the home used in robustness check	4 levels, none or < 10, 10-20, 21-30, more than 30 at nine months	Yes	4 levels, none or < 10, 10-20, 21-30, more than 30 at age three	Not included	Not included
	Talking to the child when doing other things 9 months (PCG)	Yes	Never /rarely combined, 4 point scale	Yes	Not included	Yes (PCG) 3 point scale	Not included
	Home learning practices included?	Not included	Not included	Yes	Not included	Not included	Not included
	Showing pictures at 9 months	Not included	Not included	Not included	Not included	Yes (SCG) Someone v No one	Not included

	Contact with grandparents	Not included	Not included	Not included	Total frequency score age three	Not included	Not included
	Started school	Not included	Not included	Not included	Yes or no age 5	Not included	Not included
	Home Learning or other activities	Composite score age three of six items (reading, ABC’s, 123’s, games, painting and drawing)	Talk to child, read to child, number of books at 9 months	Talk to child, home learning practices, number of books at 9 months	Composite score age three of six items (reading, ABC’s, 123’s, games, painting and drawing)	Home learning practices (shared reading, talking to the infants, educational play and screen time and number of books in the home)	Frequency of five activities age three (reading, ABC’s, 123’s, painting and drawing). Games not included.
2. Parent child Relationship	Pianta positive	Not included	Not included	Not included	Not included	Not included	Not included
	Pianta conflict	Not included	Not included	Not included	Not included	Not included	Not included
	Consistency	Not included	Not included	Not included	Yes	Not included	Not included
	Warmth	Not included	Not included	Not included	Not included	Not included	Not included
	Hostility	Not included	Not included	Not included	Not included	Not included	Not included
3.Child Relationship	Siblings	Not included	Number of biological children at wave 1	Not included	Number of younger siblings at age 3	Only child, one sibling, 2+ siblings	Not included

	Childcare	Not included	Binary Yes/No at 9 months	Not included	Parental care only, relative care, non-relative care or centre care at 3 years	Parental care only, relative care, non-relative care or centre care at 9 months	Not included
4.Parent, Family and Environmental Characteristics	PCG Age	Not included	Age at 9 months (continuous variable)	Yes	Yes	Not included	Not included
	Parent's gender	Not included	Not included	Not included	Not included	Not included	Yes
	Depression (Only available at 9 months)	Not included	Not included	Yes	Not included	Not included	Not included
	PCG stress score	Not included	Not included	Not included	Yes	Not included	Not included
	Smoking	Not included	Yes/no	Not included	Not included	Not included	Not included
	Drinking	Not included	Yes/no	Not included	Not included	Not included	Not included
	Partner Status	Not included	Partner resident or not	Not included	Partner resident or not	Not included	Not included
	Household type	Not included	Partner resident or not	Not included	Not included	Not included	Lone parent or dual parent
	Education	PCG 4 categories (Lower secondary, upper secondary, third level non degree and degree)	4 categories	Not included	4 categories	Not included	4 categories

	Income	Quintiles	Equivalised median income €	Not included	Quintiles	Not included	Not included
	Class	Professional, never worked, unskilled, non-manual, managerial	Not included	Not included	Not included	Not included	Not included
	Parental employment status	Not included	Not included	Not included	Not included	Not included	Home maker, at work, student, unemployed, retired

Primary Care Giver (PCG), Secondary Care Giver (SCG)

Murray and Egan (2014) examined the impact of reading and other language based activities (showing the infant pictures, and how often the parent talked to the infant) on cognitive developemnt at nine months. They also included factors such as gestational age and breastfeeding. They found joint activities such as reading and always talking to the child to have positive influences on cognitive outcomes. Overall, they found that there were lots of parental engagment in activities with their infants though there was a significant number of parents, 19.5%, reported that they never read to their infant. This figure at nine months is much higher than similar studies in the US (Murray & Egan, 2014).

McNally et al., (2019) examined the effect of maternal education on expressive language at three years. The home environment variables they included were talking to infant while doing other things, reading to the child and the number of books in the home. This study also included a number of child characteristics at 9 months (e.g., gestational age, parity and birth weight). They found differences in book reading to be a significant mediator of educational association on expressive vocabulary scores. Mothers with third level education read to their three year old more days per week than did mothers in the lowest education group (lower secondary). Number of books was also found to be a stronger mediator on vocabulary scores with over 70% of mothers educated to third level reporting more than 30 books in the home. Overall, they found a significant difference of almost 6 points in expressive language between mothers with lower secondary and degree level qualifications (McNally et al., 2019).

Kent and Pitsia (2018) conducted secondary analysis of two studies, comparing the GUI and the Area Based Childhood (ABC) programme, which was designed to improve outcomes in socioeconomically disadvantaged communities. They constructed a home learning index of the quality of the home learning environment using factor analysis. The activities they included in both evaluations were reading to the child, helping the child learn the alphabet, teaching the child numbers or counting and songs, poems or nursery rhymes and child's drawing or painting. In contrast to many other studies, they excluded playing games. Additionally, they included household type (e.g., lone parent or dual parent household). However, they did not include development outcomes in their study but found frequency of daily reading to be significantly higher in the GUI sample than the Area Based Childhood sample. The number of parents helping with ABC's daily was significantly higher in the ABC sample compared to the GUI sample. The ABC sample had also higher percentages of never doing ABC's or numbers. Overall, they found greater parental engagement in home learning activities in the GUI families than families in the ABC programme and differences in environments that children in both samples experienced.

As already described, McMullin et al., (2020) examined the role of home learning activities and the relationship between social origin and cognitive development. They used a composite measure of the home learning activities at age three (reading, ABC's, numbers, playing games (board games, jigsaws, card games) and painting drawing or colouring). They also used educational resources or books in the home in their home learning measurement. In addition, they included child characteristics such as gender and language, as well as family class (e.g., professional or unskilled). They found little difference in the overall Home Learning Activities (HLA) score across class income and parental education (McMullin et al., 2020). While many of these studies and the review of them above have used a variety of variables, there is no consistent pattern of variables that have been used in previous research using the GUI data.

The Current Study

The current study has four main aims. The first aim was to explore the role of activities in the home learning environment in an area of cognition that has previously received little attention, namely non-verbal reasoning, in contrast to vocabulary, a language skill which has also been examined in previous studies (e.g., Ebert et al., 2013; Rodriguez & Tamis-LeMonda, 2011). Reasoning ability is the foundation of human cognition and also an important aspect of early childhood and lifelong development. It allows the facility to logically think and solve problems in a new situation independently of previously acquired knowledge (Ferrer et al., 2009). Non-verbal reasoning is an important cognitive skill which supports general fluid intelligence, as well as creative and learning capabilities (Richland & Burchinal, 2013). Reasoning skills and problem solving are critical skills, applied across domains including making sense of language (Taylor, 2005). Little is known about the role of the home learning environment in the development of non-verbal reasoning, although recent research suggests it may have a role to play (Niklas et al., 2018).

The second aim of the current study was to determine whether different types of learning activities had different effects on non-verbal reasoning in early childhood, in contrast with vocabulary development. Many studies examine the effect of the total home learning environment (Melhuish et al., 2008; 2010; ; Yu & Daraganova, 2015; McMullin et al., 2020) but do not focus on individual activities and their benefits (Niklas, Nguyen et al., 2016). Very few studies have examined the effect of individual activities on cognitive development (Mikus et al., 2020).

The third aim of the current study was to explore if the home learning environment activities still exerted an effect on the different aspects of cognitive development, even after family and other factors were accounted for. Previous research indicates that family and other factors may also influence play and learning activities and cognitive development (e.g., Lugo-Gil & Tamis-LeMonda, 2008; Rosen et al., 2019), and therefore underpinning this study is a bioecological approach to child development. (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 2006). The approach suggests there are multiple layers of influence as the child develops, with the child at the centre of a set of nested systems, influenced by culture and society. The home environment is critical for development, particularly in early childhood (Sylva et al., 2011).

The fourth and final aim was to examine if play and learning activities in early childhood have an influence on later cognitive development. There is some evidence that home learning activities encourage expressive vocabulary between the ages of three and five (McMullin et al., 2020) and this study wanted to examine if activities had a similar longitudinal effect on non-verbal reasoning.

In order to address these four aims, this chapter addresses the following research questions.

1. Do different types of play and learning activities contribute to cognitive development in early childhood, even after family and other factors are accounted for?

2. Do these play and learning activities in early childhood continue to exert an influence on later cognitive development?

Study 1: Do different types of play and learning activities at age 3 contribute to different aspects of cognitive development, even after family and other factors are accounted for?

The Growing Up in Ireland (GUI) study is a national longitudinal study of children and young people in Ireland. Initial funding of the study was by the Department of Children and Youth Affairs (DCYA), with subsequent funding from the Atlantic Philanthropies. It is managed by the DCYA and the Central Statistics Office. The study is conducted by a group of researchers guided by the Economic and Social Research Institute (ESRI) and Trinity College Dublin (TCD). The GUI study began in 2006 and follows two cohorts of children aged 9 months (Infant Cohort ’08) and aged 9 years (Child Cohort ’98). In the current study we are interested in the Infant Cohort ’08 and these children are currently around 13 years old. A fifth wave of the Infant Cohort ’08 is due in 2021. The sample was drawn from the Child Benefit Registrar and allowed for participant sampling from all socioeconomic backgrounds and family types living in Ireland (see Murray et al., 2019, for further information about the GUI methodology). The primary aim of the Growing Up in Ireland study is to inform policy about children, young people and their families.

Data from this longitudinal study offered insight into the factors the study was interested in, play and learning activities, parent and child relationship factors, child relationships and environmental factors. It allowed us to explore the effect of different types of activities on different aspects of cognitive development, including non-verbal reasoning. It also provided the opportunity to explore the relationship between each of these factors and developmental outcomes. In the studies that follow, analysis was carried out on the data collected when the children were aged three. Further longitudinal analysis was carried out exploring the impact of parental engagement in activities at age three, on developmental outcomes at age five. Using the GUI data, the first study aimed to examine if different types of play and learning activities at age three contributed to different aspects of cognitive development when we consider family and other factors.

Method

Participants

The sample consisted of 9,793, three year old children (50.7% males and 49.3% females) which make up the GUI infant sample. This is the second wave of data collected from the infant sample in the GUI study and represents an 88% retention rate from the first wave of data collected when the infants were 9 months old. The GUI infant sample was originally selected from the national Child Benefit Register which in Ireland has virtual universal coverage of the child population. Infants were selected based on a systematic random sample so as to be in their tenth month at the time of first interview (i.e., 9-months-old). Data for this study was from anonymised data file and participation of families in the GUI study was voluntary.

A number of changes were made across the GUI data file to summarise or remove specific details of individuals (e.g., dates of births and occupations) or information that applied to a small number of respondents only which might identify participants. For example, in the original questionnaire at age three, dates of birth for all members of the household were recorded. However, in the anonymised files available to researchers, these ages were recorded in age bands (e.g., 0-4, 5-9, 10 14 and so on) so that no family was recognisable. The total achieved sample for the first wave of data collection was 11,134, which represents a net response rate of 64.3%.[1]

Selection of variables for inclusion in the current studies

As described earlier, a review of the previously published literature that examined the home learning environment and child developmental outcomes using the GUI data was undertaken and a number of key articles were identified. These included Hourigan & Quigley, 2017; Kent & Pitsia, 2018; Murray & Egan, 2014; McGinnity et al., 2015; McMullin et al., 2020 and McNally et al., 2019. Each of these studies had used the GUI data to examine aspects of the home learning environment when children were aged 9 months, and/or 3 and 5 years old. The variables used by each of these studies were reviewed and the review focused primarily on the home learning environment, parent and child relationship variables, child relationship variables and parent, family and environmental factors.

This approach was used to structure the analysis of the data because we wanted to test the influence of proximal process (i.e., play and learning activities) and the different systems (i.e., micro, meso and exosystem's) on development, and consider the role of these variables according to Bronfenbrenner's nested model of development. Table 2, above, shows the main developmental variables that were included in the research in the review, which contributed to the selection of variables to be used in the final analysis. A more in-depth explanation for the selection of each of the variables follows.

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[1] The final sample compares well to the target population on several key socio-demographic variables: for example, 73.3% of mothers in the (unweighted) sample were born in Ireland compared to 74.7% in the population; similarly, 23.3% of the sample and 24% of the population were never-married mothers (Quail et al., 2011a). Boys made up 51% of the sample. The main informant was the Primary Caregiver (almost always the mother – and hence forward will be referred to as 'mothers'), and if the mother was living with a spouse/partner an interview was also sought with him (this person was nearly always the child's biological father). More information about the sample and the sampling method is available at Growing Up in Ireland Publications – Growing Up in Ireland.

Materials

Outcome Variable. *British Ability Scales (Elliott et al., 1996).* Cognitive development was measured at age three using the British Ability Scales (Elliott et al., 1996). Two scales of cognitive development were used from the British Ability Scales (BAS)– Naming Vocabulary (BAS-NV) and Picture Similarities (BAS-PS). Both measures were administered in the home by a trained interviewer. The Naming Vocabulary subscale measures a child's expressive language ability and consists of a series of 36 pictures of everyday items in a booklet which the child is shown one at a time. The pictures require the child to recall the words from long-term memory. The assessment is terminated if a child fails to recognise five successive items in the series.

The Picture Similarities subscale is a measure of problem solving and measures the non-verbal reasoning ability of a young child. There are four images on each page of a booklet and the child is given a card to place under the image that shares a concept with the picture on the card. For example, a child might be presented with a row of pictures and the child is given a card with an additional picture on it and asked to match the card with the picture which best matches the set. It allows the child to solve a problem by identifying important features in the pictures and attaching meaning to the picture. As the child progresses through the scale the test items become more difficult. The test stops when the child fails to correctly answer six items out of the last eight administered items.

The BAS is a direct assessment test rather than a parent self-report. The scale has good reliability, consistency, and has been used in other studies (UK Millennium Cohort Study (MCS) and the Growing Up in Scotland (GUS). The BAS authors reported alphas of.86 for Naming Vocabulary and.82 for Picture Similarities for children aged 3.0 – 3.5.

The analysis uses the age standardised t-scores for both expressive vocabulary and non-verbal reasoning. The mean score for Naming Vocabulary at age three was 50.89 (*SD* = 12.81) with a range of 20-80, while the mean score for Picture Similarities at age three was 53.12 (*SD* = 10.82) with a range of 22-80. Both subscale measures were included in the current study in order to contrast the impact of different types of learning activities on both a verbal cognitive ability associated with language that we can compare with previous literature (i.e., vocabulary), and on a non-verbal cognitive ability which has not previously been explored (i.e., non-verbal reasoning).

Predictor Variables. The predictor variables selected were the frequency of various play and learning activities in the home. These main predictor variables were the home-based activities that the parents reported the child engaged in in the Growing Up in Ireland Survey. Primary caregivers (PCG's) were asked how frequently (how many days per week) anyone in the home engaged in each of the following six activities: (i) read to the child, (ii) learned the ABC or alphabet, (iii) learned numbers or counting, (iv) learned songs, poems or nursery rhymes, (v) played games (i.e., board games, jigsaws, card games), and finally how often the child (vi) painted, drew, coloured or played with play-doh. The six activities selected are frequently used as a composite score to measure the home environment (see McMullin et al., 2020 or Melhuish et al., 2008 for an example). In this study, rather than examining the composite score, the researcher was interested in the effect of individual activities on development outcomes. Whitebread et al. (2012) categorised play and suggested it can be classed broadly into one of five types: physical play (e.g., rough and tumble play), play with objects (e.g., play doh and building and constructing), symbolic play (e.g., reading, writing, numbers, songs and painting), pretence/socio-dramatic play (e.g., make believe) and games with rules (e.g., board games). The activities examined in this research span multiple types of play, including symbolic play (e.g., abcs), games with rules (e.g., card games) and play with objects (e.g., play doh, jigsaws) (Whitebread et al., 2012).

Control measures/Co-variates

In order to investigate if play and learning activities exerted an effect on development independently of family and other factors, a number of control variables were considered for inclusion or exclusion in the current study. As Bainter et al. (2020) suggested, variables that demonstrate correlation with outcome variables are good selections for inclusion in regression models. They also suggest that appropriate predictors be based on strong theory (Bainter et al., 2020). The control measures that were considered in the current study, and that were available in the anonymised GUI data, related to the parent child relationship, measures relating to interactions with other children and measures relating to family and environmental characteristics. These were selected as they related to the influence of the different layers and systems in Bronfenbrenner's nested bioecological theory. In addition, selection of the control variables was guided by previous research. Analysis of variables and correlations with outcome variables also influenced whether they were included or excluded in the regression models in the current study.

Parent Child Relationship variables. In the GUI dataset, measures of a number of parent child relationship variables were asked, for example, the datatset at age three included five parenting child relationship variables (i.e., Pianta positive and conflict subscales as well as warmth, hostility and consistency from the Longitudinal Study of Australian Children (LSAC). The Pianta scale measure both positive and negative aspects of the parent-child dynamic (i.e., positive relationship and conflict). Also included were warmth, hostility and consistency, parenting subscales developed by the LSAC. However, few studies using the GUI data have examined the home learning environment have controlled for the parent child relationship to date. McGinnity et al. (2015) examined consistency, and Russell et al. (2016) examined warmth and hostility. McGinnity found consistency to be significant in the final model for expressive vocabulary but not for non-verbal reasoning. They had also examined warmth and hostility but excluded them in the final models as they did not reach statistical significance (McGinnity et al., 2015).

While Russell et al. (2016) found greater warmth and lower hostility in the parent child relationship to be associated with less difficulties and greater socioemotional skills they were primarily interested in the effects of non-parental childcare rather than the home learning environment on socioemotional development (Russell et al., 2016). Similarly, Beatty and Egan (2020) included the variable conflict in their study examining the effect of screen time on nonverbal reasoning, but their main focus was on screen time and screen activities rather than the home learning environment (Beatty & Egan, 2020). A previous study by McNally et al. (2019a) examined socioemotional development of five year olds and included parent child relationship factors, of positive relationship and conflict, maternal stress, attachment at 9 months, and gender. However, the main focus of the study was not the home learning environment, instead they were interested primarily in the development of language minority children.

Therefore, having considered previous studies in the research area that used the GUI dataset and examined the parent child relationship (Beatty & Egan, 2020; McGinnity et al., 2015; McNally et al. 2019a; Russell et al., 2016), there appears to be no pattern of parent child variables widely used. In addition to considering the variables used in previous research (e.g., consistency, conflict, warmth and hostility; Beatty & Egan, 2020; McGinnity et al., 2015; Russell et al., 2016), correlations were run between each of the parent child relationship variables on the outcome variables, to consider which variables were best for inclusion in the models.

The parent child relationship variables selected for the final regression models were those that demonstrated a responsive parenting style (e.g., warmth and Pianta positive relationship) as a responsive parenting style has been linked to both cognitive and socioemotional development (Bornstein, Britto et al., 2012; Landry et al., 2006; Russell et al., 2016). Hostility was also included as this has been included as a measure in previous longitudinal research (e.g., in Australia) and may also relate to the parent child attachment relationship (Greene et al., 2014). Russell et al. (2016) also included both warmth and hostility when they examined childcare and early education on socioemotional outcomes using the GUI data (Russell et al., 2016). The three variables selected for inclusion in the analysis (i.e., warmth, hostility and Pianta positive) demonstrated no multicollinearity and appropriate correlations (i.e., most were not too weak, <. 2 and none were > .7). These parent child relationship variables were considered sufficient for inclusion rather than including all available predictors which could result in competing for variance with the other variables (Bainter et al., 2018). Therefore, having considered both a theoretical and statistical approach for selecting variables, the three variables measuring warmth, hostility and positive parenting were included in the final regression models.

A number of previous studies have also included parent characteristics, such as their age, gender, stress level or depression level (only available at 9 months), and these variables were also considered for inclusion in the analysis. For example, McGinnity et al. (2015) included parent stress at age three when examining cognitive outcomes at age five. However, parental stress was not a significant predictor in their models (McGinnity et al., 2015). A review of previous research in Table 1 indicated that there is not a strong pattern of inclusion of these variables in previous GUI research relating to the HLE, with different variables being focused on in different studies. Therefore, the decision was made to focus on parent child relationships rather than parental characteristics and consequently no parent characteristics were included in the analysis. It is also important to consider that in any study that all aspects of a theory cannot be undertaken in one single inquiry (Ashiabi & O'Neal, 2015).

Siblings. One of the child relationship variables included in the regression models was if the child had siblings or not. This variable was of interest firstly to control if siblings had an effect on development outcomes. Secondly it was included to explore how sibling relationships influenced the child's environment, for example did they impact in resource dilution and have a negative association with developmental scores or might engagement with other children have a positive association with developmental scores. Research to date has found mixed results on whether having siblings has an influence on development outcomes (e.g., Shin et al., 2019), as has research on family dilution (e.g., Workman, 2017). In the GUI survey at age three, parents were asked if the study child had brothers or sisters. Responses were recorded as dichotomous yes/no.

There are two levels of access to GUI datafiles, the Anonymised Microdata File (AMF) and Research Microdata Files (RMF). Data in the current study is from the Anonymised Microdata File (AMF) from the GUI study which is quite readily available to researchers. The Research Microdata Files (RMF) are more difficult to get access to and subject to a strict and rigorous application under Section 20(c) of the Statistics Act (1993). In order to get access to the more detailed datafiles, the Research Microdata Files (RMF), the researcher has to be appointed as an Officer of Statistics which is a position that requires legal responsibilities (for a full description of the application process for the RMF data, see www.cso.ie). In the original GUI questionnaire, dates of birth were recorded for each member of the household and are available in the RMF datafiles. In contrast the AMF datafiles, have less identifiable personal information (Murray et al., 2013). For example, all family ages were recorded in age bands (e.g., 0-4, 5-9, 10-14 and so on) so that no family was recognisable.

A number of studies using the GUI data included number of siblings (McGinnity et al. 2015; Murray & Egan, 2014). McGinnity et al. included the number of younger siblings at age three, however they had access to the RMF data. Murray & Egan used the AMF data when the infants were 9 months old, but in this dataset older siblings exact ages were included which allowed the data to be easily coded to include if the child was an only child or had one or more siblings. McNally et al. (2019) previously included number of biological children at the time of the study child's birth rather than siblings per sae but did not consider the number of siblings at age three.

As described, the AMF datafiles had some variables removed or values banded together into larger groups so there was no risk of identification of participants. This meant that data such as sibling numbers or other children's date of births were removed from the datafile or banded together (see Murray et al., 2013 for a detailed explanation of the difference between AMF and RMF files). In a further attempt to consider the role of siblings, the researcher did try to manually recode information about ages of all family members using the ages given in the AMF file (i.e., birth-4, 5-9; 10-14; 15-19; 20-29 etc.). As the current study was interested in the child at age three, using this coding system was not exact enough to be clear if the study child had older or younger siblings. For example, the study child may have a sibling who was aged 2 or 4 who would be included in the category birth to four. After some consideration, this coding system was abandoned in favour of the inclusion of the binary sibling variable. The dichotomous variable was to examine if there was a broad influence of the study child having siblings or not and having siblings was recoded as 1 while having no siblings was recoded as 0.

To conclude, as the inclusion of siblings is not a primary variable of interest in the study, the additional coding and private information required seemed unnecessary. Instead, it seemed appropriate to control for the presence or absence of siblings using the information and dichotomous variable available in the AMF files. Overall, we wanted to broadly examine if the effects of play and learning activities were still present on early development, even after controlling for the presence or absence of siblings in the home environment.

Childcare. Similar to the inclusion of siblings in the model, the current research wanted to examine if any effects of play and learning activities were still present, when non-parental care in the child's environment was controlled for. When the child was aged three, parents were asked if their child attended any regular non-parental childcare (which included care by relatives, non-relatives, and centre based care) for 8 hours or more per week. Parents responded if the study child attended childcare or not. As described the GUI data did consider in detail the different types of childcare that families availed of. This included questions on the different types of childcare as well as the number of days and hours and the cost per week of childcare. While previous studies have considered the effects of quality and different types of childcare on development (e.g., relative, non-relative or centre care; McGinnity et al., 2015; McMullin et al., 2020; McNally et al, 2019; Russell et al., 2016, the current study aimed to control for the child having regular interactions with other children and/or caregiving adults rather than examining the quality of childcare. In addition, though there was a lot of information about the types of childcare and time spent in childcare, the current research did not have access to a reasonable variable that measured access to childcare. McNally et al. (2019) previously included a dichotomous variable of child's attendance at childcare when the study child was aged 9 months (McNally et al., 2019). Similarly, the regression models in the current study included a dichotomous yes or no response by parents for access to non-parental care. More than 8 hours per week in non-parental childcare was recoded as 1 and no childcare was recoded as 0. To conclude, childcare was included as a dichotomous variable to examine if there was a broad influence of child attending non parental care or not.

Maternal education. Maternal education was reported originally in the 3 year old GUI data as 13 categories, ranging from no formal education to doctorate level education. The highest level of education was reported by mothers at each wave of data collection. Many previous studies using the GUI data have included maternal education reduced to four categories (i.e., lower secondary, leaving cert or equivalent, cert or diploma and degree or higher (e.g., Kent & Pitsia, 2018; McGinnity et al., 2015; McMullin et al., 2020; McNally at al., 2019). In the current study, when the children were aged three, the original 13 levels are reduced to four categories in the regression models. This four-fold classification has been used in previous studies described, for example McMullin et al. (2020). The reference category of highest educational group degree or higher, a multinomial logistic regression component, is used throughout the models and compared with the other categories of education (i.e., lower secondary, leaving cert or equivalent, cert or diploma) (McNally et al., 2019; McMullin et al., 2020).

Family Income Equivalised Annual Household Income. Family income was selected for inclusion to explore if the broad effect of the environmental influence of income influenced development. Including family income also controls for the effect of resource dilution (Blake, 1981, 1989). Family income is measured in a number of ways in the GUI data, as equivalised annual income, deciles and quintiles. Socio-economic status, which includes family income, may affect resources and time that parents have available to the study child (McCrory et al., 2013). When choosing the income variable, selection was guided by previous research using the GUI dataset that used either quintiles for example, McMullin et al., (2020) or the net family income, for example, Mc Nally et al., (2019), which was a continuous variable. In the final selection of variables for analyses in the current study, the continuous variable of equivalised net household income was included. As it was positively skewed, the income variable was transformed to the natural log for inclusion in the analysis. A log transformation of income had previously been applied (McNally et al., 2019). Overall, of the GUI studies examining social origin, the variables of education and family income rather than class or household type were the variables most commonly used in previous research in this area (see Table 2 above for a review).

Procedure

Information for the Growing Up in Ireland Study was collected in face to face interviews with both parents in the home with a trained field interviewer when the child was aged three. In lone parent's households, the interview was with the single parent only (mainly mothers). Translated questionnaires were available to non-English-speaking participants. An independent research ethics committee approved all materials and procedures, and signed consent was collected from the primary caregiver (mainly the child's mother). A weighting variable was constructed and applied by the GUI study team based on the most recent Census and the Child Benefit Register. In the current research, all statistics are weighted unless otherwise specified.

Analysis

Hierarchical linear regression analysis was used to explore the effects of play and learning activities on cognitive outcomes while controlling for the effects of known covariates such as parent child relationship factors, siblings and childcare and family oncome and education on cognitive development. This analysis technique allows the researcher to separately examine particular aspects of the environment (e.g., play and learning activities), while accounting for the influence other variables (e.g., parent child relationship factors) (Russell et al., 2016). Similar to the GUI studies by McGinnity et al. (2015), McMullin et al. (2020) and Murray & Egan (2014), hierarchical regression was the analysis of choice in the current research as this method allowed the researcher to enter the variables in a certain order based on theory in this case, bioecological theory. This method also allowed the present research to identify predictors of early child development (e.g., environmental factors such as family income) that are indicated by bioecological theory (e.g., Bronfenbrenner), as well as past research (e.g., McMullin et al., 2020).

Selection of variables for inclusion in regressions is an important but difficult part of building regression models and a number of methods for selection of variables are regularly used (Ratner, 2009) for example, screening predictor and outcome variables, and including predictors with significant correlations in regression models is a regular practice (Bainter et al., 2020). Significant correlations are a measure of direct effect and determine the significance of the bivariate relationship between the independent and dependent variables (Nathans et al., 2012). Bainter et al. (2020) also note that relevant predictors in regression models are preferably founded on strong theory. Analyses was undertaken using IBM SPSS Statistics 26. The GUI infant cohort, Anonymised Microdata File (AMF) which was obtained from the Irish Social Science Data Archive (ISSDA) was used in the analysis.

As described, this study used hierarchical regression analyses to examine the effect of play and learning activities in the home on expressive vocabulary and on non-verbal reasoning. Separate ordinary least squares regressions were used to determine the extent to which each of the predictor variables, the six individual play and learning activities (e.g., reading, ABCs, numbers, songs, games, painting/drawing) predicted scores on the two outcome measures independently of the other activities and independently of the control variables, parent child relationship, child relationships and environmental factors (Blocks 2-4). See Table 3 on next page.

The play and learning activities were entered in the first block of the regression model. The second block of covariates in the regression were parent-child relationship factors. These examined the parent-child relationship and included three measures: warmth, hostility and positive parent-child relationship. In the third block, two child relationship factors were included. This block examined child relationships measures of whether they had siblings or not and if they attended childcare or not. The final block of covariates included maternal education and family income. Previous research analysing the GUI data has also used hierarchical regressions and grouped similar types of variables in blocks (e.g., Beatty & Egan, 2020; Hourigan & Quigley, 2017; Murray & Egan, 2014) in order to examine questions of interest. This approach is also adopted in other international research, such as by Melhuish, 2008; e.g., separate regression blocks for child characteristics, family characteristics and other characteristics).

Table 3 Hierarchical Linear Regression Model showing bioecological layers for GUI Cognitive and Socioemotional studies

Variables in each Block	**Corresponding System**	**Factors**	**Measurement**
Predictor variables- at age three Block 1- Play and Learning activities	Proximal processes in Microsystem	- Reading - ABC's - Numbers - Songs - Games - Painting and drawing	Parent report at age 3. Measured = no days per week to 7 = 7 days per week
Covariates- at age three Block 2- Parent-child relationship factors	Microsystem	- Warmth - Hostility - Closeness	Scores from GUI survey
Block 3- Child-relationship factors	Microsystem Mesosystem	- Siblings - Childcare	1 = yes, 0 = no
Block 4- Environmental factors	Exosystem	- Maternal education - Family income	From GUI Survey, recoded (0= up to lower secondary and 10= doctorate) Income measured in deciles

The variables in the current study were entered in blocks in this order, to mirror Bronfenbrenner's bioecological model, with parent child relationship factors entered in block 2, child relationship factors in block 3 and broader environmental factors entered in block 4. The first layer, the microsystem, is the home, the immediate environment in which the child operates. At the microsystem layer, we included relationships between parent and child for example, warmth. An example of the mesosystem layer is the inclusion of childcare. The next layer included was the exosystem, which though more external to the child, continues to have an impact on her development for example, family income and education. In the regression analysis, the predictor variables were play and learning activities in the home which are proximal processes. These were followed by the covariates, each entered in a block. Table 3 above, describes the regression models and the order that variables were entered in the models, in Studies 1 to 4. The sample characteristics of the sample at age three are included below in Table 4, using unweighted means, standard deviations or percentages for each variable.

Results

Sample Characteristics and Descriptive Statistics

Sample characteristics of the sample at age three are provided in Table 4 below and include descriptive statistics for the outcome and other variables at age three.

Table 4 Sample characteristics of the Sample at Age 3

		Mean (SD)	Unweighted
BAS (Age 3)	Expressive Vocabulary t-score	50.89 (12.81)	9179
	Non Verbal Reasoning t-score	53.12 (10.82)	9549
PCG education (Age 3)	Lower secondary or less	8.8%	867
	Leaving cert or equivalent	29.4%	2875
	Cert/Diploma	21.6%	2114
	Degree or higher	40 %	3918
Income € (Age 3)	Equivalised Household Annual Income	€18,246 (9767.39)	9260
Activities (Age 3)	Reads to child	5.57 (1.98)	9789
	ABC's	3.78 (2.38)	9788
	123's	5.16 (1.98)	9787
	Songs	5.26 (1.99)	9787
	Play games	4.38 (2.22)	9786
	Paint and draw	5.01 (1.96)	9789
Child Gender	Girl	49.3%	4967
Childcare (Age 3)	Non-parental care for 8 hours plus per week Yes	49.7%	4868
	No	50.3%	4925
Siblings (Age 3)	Yes	19.7%	7858
	No	80.3%	1932

An initial exploration of the data indicated that 57% of parents read to their child every day, whereas activities such as ABC's were only engaged in daily by 23% of parents. Other regular daily activities included 46% of parents singing songs with their child and 42% engaging in number and counting games daily. Conversely, 2.3% of parents said they did not read at all, while 12.9% of parents stated they never did ABC's and 6.8% did not engage in games with their child. Overall, there was good parental engagement with their child across the activities, more than 4 days per week: over 80% of parents read, 78% sang songs, 77% of parents engaged in 123's, while 75% painted or drew, 64% of parents said they engaged in games with their child and 52% engaged in ABC's and letter games, See Figure 2 below. Full details of percentage of parent's engagement in GUI activities at age three, are included in Appendix A.

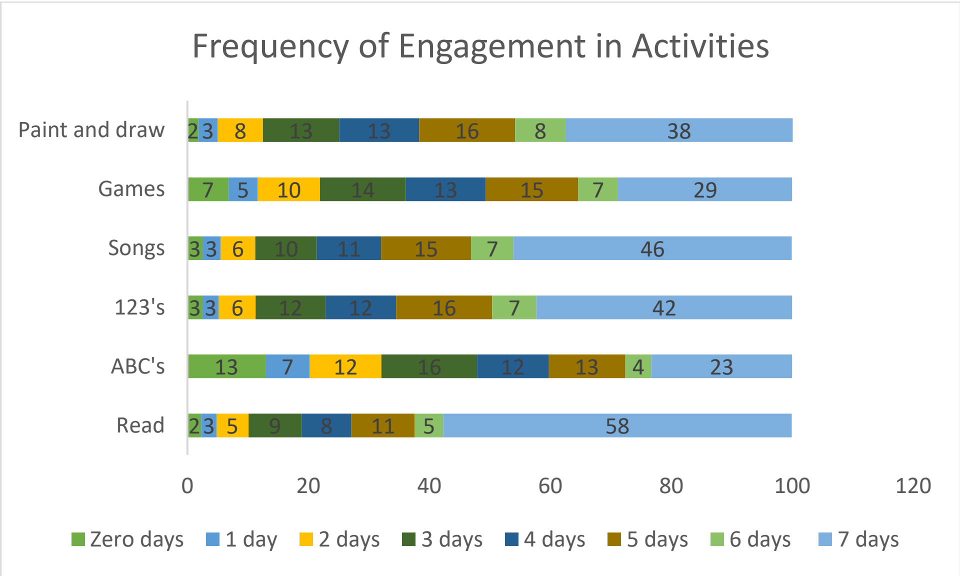

Figure 2. *Percentage of Parents Engaged in the Various Play and Learning Activities (number of days per week).*

The mean vocabulary and non-verbal reasoning scores were plotted against the number of days per week engaged in the various play and learning activities. As Figures 3 and 4 show, children seemed to benefit from a home learning environment rich in a variety of activities.

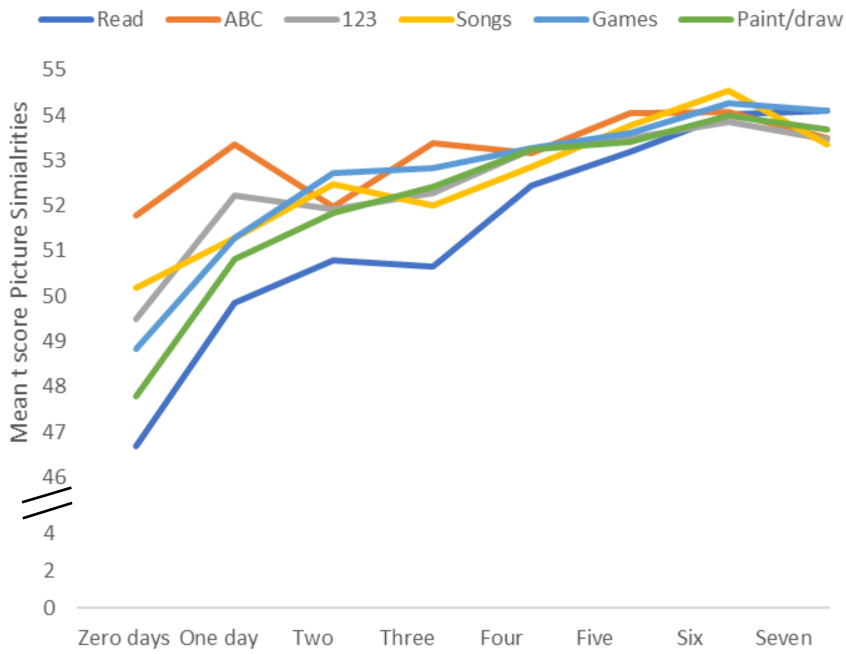

Figure 3. *Mean Picture Similarities t-scores Age 3 and Frequency in Parental Engagement in Play Activities*

Regular engagement in the various play and learning activities a number of days per week (i.e., reading, games, songs and painting) had a positive effect on both naming vocabulary and picture similarities scores, in contrast to children who did not engage in these activities. For example, children who were read to 7 days per week, in contrast to those who were read to 0 days per week, had picture similar scores approximately 7 points higher (54 vs 47 approximately) and naming vocabulary scores approximately 11 points higher (53 versus 41). Table 5 summarises mean cognitive scores for children that never engage in the various play and learning activities, versus engaging in them everyday.

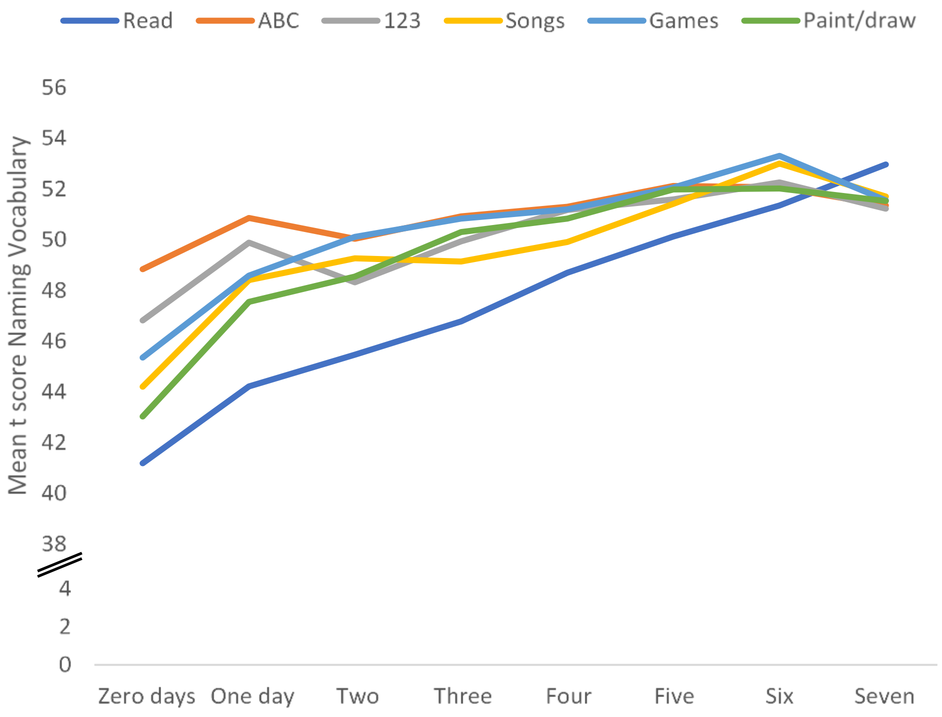

Figure 4. *Mean Naming Vocabulary t-scores Age 3 and Frequency in Parental Engagement in Play Activities*

Table 5 *Mean t scores for the Naming Vocabulary and Picture Similarities subscales at age three*

	Naming Vocabulary		Picture Similarities	
Activities	Zero days per week	Seven days per week	Zero days per week	Seven days per week
Read	41.18	52.95	46.68	54.09
ABCs	48.83	51.34	51.79	53.48
Numbers	46.81	51.21	49.5	53.48
Songs	44.2	51.7	50.18	53.37
Games	45.34	51.54	48.85	54.09
Paint	43.03	51.53	47.8	53.69

Correlational Analyses

Correlational analyses were conducted between the cognitive development scores, BAS- Naming Vocabulary and Picture Similarities and the predictor variables. Table 6 below summarises the Pearson product-moment correlation coefficients between the predictor variables and the cognitive outcome variables in GUI, at age three. All of the play activities are significantly positively related to both the cognitive measures. However, they are all weak correlations; the highest correlation is for reading and expressive vocabulary, r =.23, n= 9176, p = < .001.

Table 6 Intercorrelations for Scores on Covariates and Outcome Variables for Cognitive Development at age Three

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Read to child																	
2. ABC or alphabet	.19**																
3. Numbers or counting	.24**	.50**															
4. Songs, poems or nursery rhymes	.27**	.36**	.44**														
5. Play games	.26**	.25**	.25**	.28**													
6. Paint, draw, colour, or play with play-doh at home	.18**	.20**	.24**	.25**	.31**												
7. Warmth subscale	.08**	.16**	.18**	.19**	.12**	.12**											
8. Hostility subscale	-.11**	-.14**	-.13**	-.13**	-.12**	-.11**	-.29**										
9. Consistency subscale	.22**	.07**	.12**	.11**	.13**	.07**	.09**	-.28**									
10. PCG positive subscale	.10**	.10**	.11**	.12**	.08**	.13**	.24**	-.20**	.14**								
11. PCG conflict subscale	-.10**	-.09**	-.08**	-.08**	-.09**	-.08**	-.21**	.49**	-.24**	-.24**							
12. W2 siblings	.02*	-0.01	0.02	0.02	0.01	.03**	0.01	-0.02	0.02	0.01	0.00						
13. W2 Childcare 8 plus hours	0.01	-0.01	0.00	0.00	-0.01	-0.02	-0.01	0.00	0.02	0.00	0.00	-.10**					
14. PCG highest education	0.02	-0.01	-0.00	-.02*	0.00	0.00	-.02*	0.01	0.01	-0.00	-0.00	.02*	.26**				
15. Equivalised Household Annual Income	-0.01	0.00	.02*	0.01	0.02	0.02	0.01	-0.00	0.00	0.01	-0.01	0.01	0.02	.03**			
16. t-score for Naming Vocabulary age 3	.23**	.06**	.06**	.11**	.11**	.09**	.03**	-.06**	.15**	.11**	-.07**	0.01	-.02*	0.02	0.19**		
17. t-score for Picture Similarities age 3	.14**	.05**	.06**	.06**	.11**	.08**	.04**	-.06**	.10**	.10**	-.08**	0.01	-0.01	.02*	0.10**	.40**	

Examining the correlations between the cognitive outcomes and covariates found that many of the correlations were significant, with the exception of non-verbal reasoning and siblings and expressive vocabulary and siblings. However, all correlations between both cognitive measures and the covariates are weak correlations with all correlations less than r =.29, suggesting that multicollinearity was not present. There was a significant correlation between Picture Similarities and maternal education r =.02, n= 8468, p = .041, but none for Naming Vocabulary. There was a significant correlation between Naming Vocabulary and attending childcare r -=.02, n= 8153, p = .035, but none for Picture Similarities. All correlations for the covariates and cognitive outcomes are in Table 6 above. This table also includes other covariates which were considered for inclusion in the study (e.g., consistency, and conflict).

Regression Analysis

A number of hierarchical regressions were conducted to investigate the impact of the play and learning activities at age three on cognitive outcomes (e.g., non-verbal reasoning, measured using the BAS Picture Similarities score and expressive vocabulary measured using the BAS Naming Vocabulary score). The independent variables were entered in blocks to represent the nested layer and reflect the bioecological framework.

A visual inspection of P-P plots demonstrated that the assumption of normality was met for the analysis. The assumption of multicollinearity was met by examining bivariate correlations, and tolerance values greater than 0.1 and reciprocal VIF values less than 10 were observed for all variables (Field, 2018). The assumption of homoscedasticity was met and observed via visual inspection of a plot of standardised residuals versus standardized predicted values. Cases with standardised residuals greater than +/- 3.29 were removed as were cases that were two or more standard deviations from the mean. Outliers were checked by examining the Mahalanobis distances which indicated there were cases that exceeded the critical value (Field, 2018; Pallant, 2016) and these cases were removed from the analysis.

Non-Verbal Reasoning. A hierarchical regressions was conducted to investigate the impact of the play and learning activities at age three on non-verbal reasoning, measured using the BAS Picture Similarities score. The results indicated that at block 1, play and learning activities accounted for 2.3% of the variance in picture similarities scores, $R^2 = .023$, $F(6, 5541) = 21.28$, $p < .001$. An examination of the standardised B coefficients indicated that parental engagement in reading, playing games and painting and drawing, were significant contributors in the first model (See Table 7). After controlling for the influence of the covariates, (parent child relationship, child relationships and environmental factors), which explained 3.1% of variance in the model, the results showed that reading, painting, playing games, and songs significantly predicted scores on the BAS Picture Similarities at age three, $R^2 = .031$, $F(15, 5532) = 11.97$, $p < .001$. Singing songs which was not significant in the first model, appeared to reduce non-verbal reasoning scores. Overall, these findings demonstrate the effect of play and learning activities on an aspect of cognitive development that has received little attention to date.

Overall, three of the play activities, reading, painting and drawing, and playing games significantly and positively predicted BAS Picture Similarities after covariates were added. In contrast, singing songs at age three, reduced Picture Similarities scores, across the models. Comparing across the β values in the final model indicated that reading (β =.102) made the largest contribution to the final regression model, followed by level of closeness (β =.078), playing games (β =.052), painting and drawing (β =.049), and songs (β = -.031), all *p*'s < .05. P-P plots and scatter plots for both regressions are included in Appendix B.

Table 7 Hierarchical Regression Analysis predicting three year olds' Non-Verbal Reasoning Ability

Step and Predictor Variables	BAS- Picture Similarities t score - Age 3			
	Model 1 (β)	Model 2 (β)	Model 3 (β)	Model 4 (β)
Play Activities				
- Reading	0.106***	0.103***	0.103***	0.103***
- ABCs	0.010	0.007	0.007	0.007
- Numbers	0.010	0.006	0.006	0.007
- Songs	-0.027	-0.033*	-0.033*	-0.033*
- Play games	0.049***	0.050***	0.050***	0.050***
- Paint and draw	0.057***	0.048***	0.048**	0.048***
Parent-child relationship:				
- Warmth		0.006	0.005	0.006
- Hostility		-0.012	-0.012	-0.011
- Closeness		0.086***	0.086***	0.086***
Child relationship:				
- Siblings			0.016	0.016
- Childcare			-0.014	-0.014
Environmental factors:				
- Junior Cert or less (ref Degree or higher)				-0.006
- Leaving Cert or equiv.				-0.006
- Sub-degree				-0.006
- Income				-0.020
R^2 △	2.3%, p <.001	0.8%, p <.001	0.1%, n.s.	0.0%, n.s.
Total R^2 adjusted				2.9%, p <.001

**p* <.05, ***p* <.01, *** p <.001, *n.s* = not significant

Vocabulary. A second hierarchical regression was conducted to investigate the impact of play and learning activities at age three on the BAS Naming Vocabulary score. The results indicated that at block 1, play and learning activities significantly predicted scores, R^2 =.054, F(6, 5394) = 51.72, p <.001, accounting for 5.4% of variance in the vocabulary scores. An examination of the standardised B coefficients indicated that parental engagement in reading and painting and drawing, were significant contributors to the first model.

After examining the contribution of the covariates, (parent child relationship, child relationships and environmental factors) results showed that in the final model reading, painting and drawing and playing games, continued to significantly predict scores on the BAS Naming Vocabulary at age three, R^2 =.063, F(15, 5385) = 24.19, p <.001, (See Table 8). Comparing across the β values in the final model indicated that reading (β =.204) made the largest contribution to the final regression model (similar to the findings with non-verbal reasoning), followed by levels of closeness (β =.094), painting and drawing (β =.031) and playing games (β =.029), all p's < .05.

Table 8 Hierarchical Regression Analysis predicting three year olds' Expressive Vocabulary

Step and Predictor Variables	**BAS- Naming Vocabulary score - Age 3**			
	Model 1	Model 2	Model 3	Model 4
	(β)	(β)	(β)	(β)
Play Activities				
- Reading	0.206***	0.203***	0.204***	0.204***
- ABCs	0.005	0.003	0.002	0.002
- Numbers	-0.004	-0.006	-0.005	-0.006
- Songs	0.025	0.019	0.019	0.020
- Play games	0.027	0.029*	0.029*	0.029*
- Paint and draw	0.038*	0.032*	0.031*	0.031*
Parent-child relationship:				
- Warmth		-0.010	-0.011	-0.011
- Hostility		0.011	0.010	0.010
- Closeness		0.094***	0.094***	0.094***
Child relationship:				
- Siblings			-0.002	-0.001
- Childcare			-0.021	-0.019
Environmental factors:				
- Junior Cert or less				-0.005
- (ref Degree or higher)				
- Leaving certificate or equiv.				0.013
- Sub-degree				0.005
- Income				-0.008
R^2 △	5.4%, $p < .001$	0.8%, $p < .001$	0%. *n.s.*	0%, *n.s*
Total R^2 adjusted				6.1%, $p < .001$

**p* <.05, ***p* <.01, *** p <.001, *n.s* = not significant

Summary of Findings

Tables 7 and 8 above show the results of these analyses for Picture Similarities and Naming Vocabulary. By block 4 with all of the main predictors entered into each model, the findings indicate that reading to the child, playing games and engaging in painting and drawing independently contribute to higher vocabulary and picture similarities scores, and that singing songs has an independent significant effect on picture similarities but not on expressive vocabulary, with a reduction of non-verbal reasoning scores. Letter and number games do not independently contribute to an increase in either score. In the final model, the non-standardised Beta scores indicate that reading adds 0.60 to picture similarities score and 1.43 points to naming vocabulary. Games adds 0.25 points to picture similarities score and 0.17 points to naming vocabulary. Painting, drawing and play-doh adds 0.27 points to the picture similarities score and adds 0.21 scores to naming vocabulary. In contrast the activity, songs, reduces picture similarities by 0.18 points.

Between the three informal activities, they explained 2.3% of the variance for picture similarities and 5.4% in the naming vocabulary model (see Table 9). In the fully-adjusted final models, we note that only one of the control variables had a significant effect on both sets of cognitive scores. Parent-child closeness had a significant effect on both non-verbal reasoning and on expressive vocabulary. These findings highlight the role that individual play and learning activities play in different aspects of cognitive development at age three, including in an area which has not been studied before, namely non-verbal reasoning. Additionally, these play and learning activities exert a positive effect on cognitive development, independently of family and other factors.

Table 9 Percentage of Variance (R^2) in the BAS Outcome Variables at Age three Explained at each Block of the Regression Model

	BAS Naming Vocabulary Age 3	BAS Picture Similarities Age 3
Block 1: *(Predictor Variable)*	5.4%***	2.3%***
Block 2: *(Block 1 +Warmth, Hostility, Closeness)*	6.2%***	3.0%***
Block 3: (*Block 2 +Siblings and Childcare)*	6.3%	3.1%
Block 4: *(Block 3 +Maternal Education and Family Income)*	6.3%	3.1%

* p <.05, **p <.01, *** p <.001

Study 2: Do different types of play and learning activities at age 3 contribute to different aspects of cognitive development at age 5, even after family and other factors are accounted for?

The findings from Study 1, demonstrated the effect of play and learning activities on the development of non-verbal reasoning and vocabulary at age three. The aim of

Study 2 was to examine if these play and learning activities at age three continue to exert an effect on development at age five. While there is some evidence that home learning activities encourage expressive vocabulary between the ages of three and five (McMullin et al., 2020) little is known if a similar longitudinal effect is present for non-verbal reasoning development. The multiple waves of data collection in the Growing Up in Ireland Study enabled the investigation of this topic.

Method

Participants

The sample consisted of 9,001, five year old children (50.7% males and 49.3% females) which make up the GUI infant sample. This is the third wave of data collected from the infant sample in the GUI study and represents an 81% retention rate from the first wave of data collected when the infants were 9 months old.

Materials

Outcome Variable. Cognitive development was measured at age five using the British Ability Scales (Elliott et al., 1996) and just as at aged three, two scales of cognitive development were used from the British Ability Scales (BAS)– Naming Vocabulary (BAS-NV) and Picture Similarities (BAS-PS). The BAS authors reported alphas of .65 for Naming Vocabulary and .81 for Picture Similarities for children aged 5:0 – 5:11. The analysis uses the age standardised t-scores for both measures. The mean score for Naming Vocabulary at age five was 54.94 (*SD* = 12.47) with a range of 20-80, while the mean score for Picture Similarities at age five was 58.76 (*SD* = 10.69) with a range of 20-80.

Paired sample t tests were conducted between the Picture Similarities scores at age three and age five. There was a statistically significant increase in Picture Similarities scores between age 3 (M = 53.23, SD = 10.71) and age 5 (M = 58.81, SD = 10.60), t (8477) = 40.79, p < .001 (two-tailed). The mean increase was 5.58 with a 95% confidence interval ranging from -5.85 to -5.32. The eta squared statistic (.16) indicated a large effect size. Paired sample t tests were also conducted between Naming Vocabulary scores at age three and age five. There was a statistically significant increase in Naming Vocabulary scores between age 3 (M = 51.14, SD = 12.68) and age 5 (M = 55.94, SD = 11.66), t (8178) = 35.93, p < .001 (two-tailed). The mean increase was 4.79 with a 95% confidence interval ranging from -4.53 to -5.05. The eta squared statistic (.14) indicated a large effect size. These results indicate that children's cognitive scores increased between the age of three and five.

Play and Learning Activities and Control Measures. At age five, the predictor variables were the frequency of various play and learning activities in the home at age three, as described in detail in Study 1. The control variables were those measured and used in the previous regressions at age three and related to the same parent child relationship, child relationships and environmental factors.

Procedure

At age five, information was again collected in face to face interviews with both parents in the home with a trained field interviewer. In lone parent's households, the interview was with mothers only. In the analysis at age five, the covariates are the same covariates as at age three. The dependent variables are the measures of Naming Vocabulary and Picture Similarities which were administered by the interviewer in the study child's home when the children were aged five. In the current study, all statistics are weighted.

Analysis

Hierarchical regression analysis was once again used to examine the effect of play and learning activities in the home on expressive vocabulary and non-verbal reasoning when the children were aged five. As in the analysis at age three, separate ordinary least squares regressions were used to determine the extent to which each of the predictor variables, the six individual play and learning activities at age 3 (reading, ABCs, numbers, songs, games, painting/drawing) predicted scores on the two outcome measures at age five independently of the other activities and independently of the control variables, parent child relationship, child relationships and environmental factors (blocks 2-4). This analytic approach is similar to that adopted by McGinnity et al. (2015). They examined the effects of a number of variables (e.g., child characteristics, maternal and household characteristics, and home learning environment) at age three on cognitive outcomes at age five. Including factors from earlier waves follows best practice in longitudinal research when these factors are tested on outcomes in later waves (McGinnity et al. (2015).

The play and learning activities were entered in the first block of the regression model as in the previous regressions. The subsequent blocks of covariates were entered as they were at age three, to reflect Bronfenbrenner's bioecological model, with parent child relationship factors entered in block 2, child relationship factors in block 3 and broader environmental factors entered in block 4.

Results

Sample Characteristics and Descriptive Statistics

Table 4 described the sample characteristics for the three year olds in the sample in the previous study. The same covariates at age three were included in the current study. The table below describes the scaled/outcome measures at age five used in the current study.

Table 10 Descriptive statistics of scaled measures at age five

		Mean (SD)	Unweighted
BAS (Age 5)	Expressive Vocabulary t-score	54.94 (12.47)	8886
	Non Verbal Reasoning t-score	58.76 (10.69)	8924

Once again, the mean non-verbal reasoning and vocabulary scores were plotted against the number of days per week that parents engaged in the various play and learning activities. Figure 5 shows that mean scores increased with frequency of engagement in activities (i.e., reading, ABC’s, 123’s, games, songs and painting). Regular engagement at age three had a positive effect on Picture Similarities and Naming Vocabulary scores at age five.

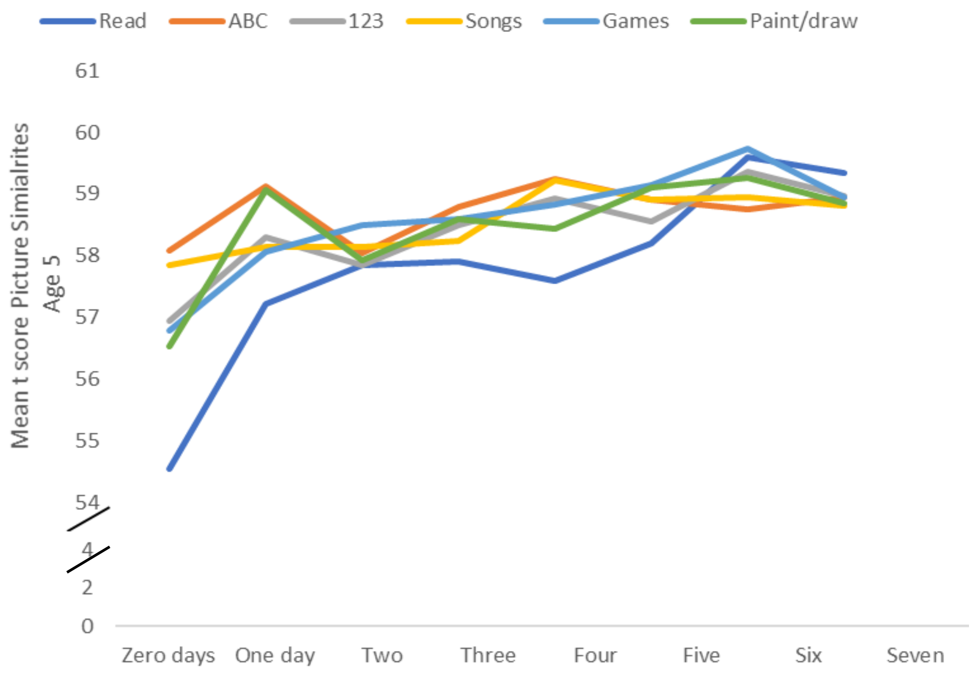

Figure 5. *Mean Picture Similarities t-scores Age 5 and Frequency in Parental Engagement in Play Activities*

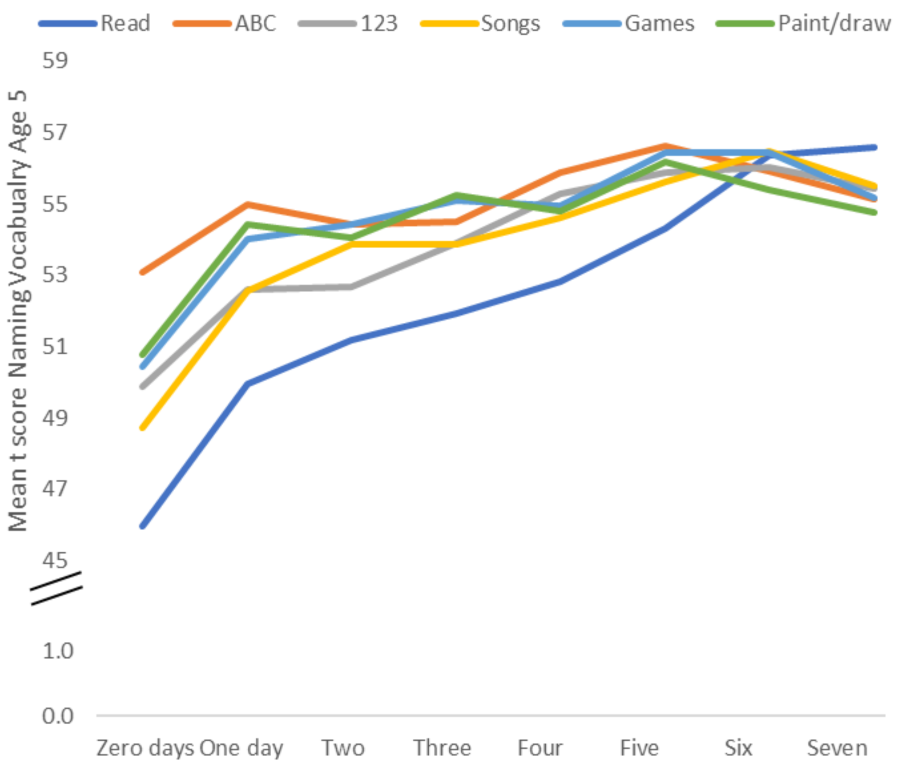

Figure 6. *Mean Naming Vocabulary t-scores Age 5 and Frequency in Parental Engagement in Play Activities*

Correlation Analysis

A similar pattern emerges in the correlations at age five between the cognitive measures and the family and other factors. Again, all correlations are weak with all values for selected variables less than r =.3, suggesting that multicollinearity between variables was not present. Many of the covariates at age three, continued to have an effect at age five. For example, the correlation for maternal closeness and non-verbal reasoning, r =.06, n= 8620, p = < .001, and maternal closeness and vocabulary, r =.10, n= 8564, p = < .001 were also significant. All correlations for the covariates and cognitive outcomes at age five are in Table 11 below.

Table 11 Intercorrelations for Scores on Covariates and Outcome Variables for Cognitive Development at Age Five

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.Read to child																	
2.ABC or alphabet	.19**																
3.Numbers or counting	.24**	.50**															
4.Songs, poems or nursery rhymes	.27**	.36**	.44**														
5.Play games	.26**	.25**	.25**	.28**													
6.Paint, draw, colour, or play-doh at home	.18**	.20**	.24**	.25**	.31**												
7.Warmth subscale	.08**	.16**	.18**	.19**	.12**	.12**											
8.Hostility subscale	-.11**	-.14**	-.13**	-.13**	-.12**	-.11**	-.29**										
9.Consistency subscale	.22**	.07**	.12**	.11**	.13**	.07**	.09**	-.28**									
10.PCG positive subscale	.10**	.10**	.11**	.12**	.08**	.13**	.24**	-.20**	.14**								
11.PCG conflict subscale	-.10**	-.09**	-.08**	-.08**	-.09**	-.08**	-.21**	.49**	-.24**	-.24**							
12.W2 siblings	.02*	-0.01	0.02	0.02	0.01	.03**	0.01	-0.02	0.02	0.01	0.00						
13.W2 Childcare 8 plus hours	0.01	-0.01	0.00	0.00	-0.01	-0.02	-0.01	0.00	0.02	0.00	0.00	-.10**					
14.PCG highest education	0.02	-0.01	0.00	-.02*	0.00	0.00	-.02*	0.01	0.01	0.00	0.00	.02*	.26**				
15.Equivalised Household Annual Income	.22**	-0.06**	-0.02	0.02	0.07**	-0.02	0.01	-0.01	0.16**	0.03**	-0.07**	0.03*	0.02	.08**			
16.t-score for Naming Vocabulary age 5	.19**	.05**	.08**	.09**	.07**	0.02	.021*	-.04**	.16**	.10**	-.08**	-0.01	-0.01	0.01	0.19**		
17.t-score for Picture Similarities age 5	.08**	.02*	.03**	0.02	.04**	.03*	.02*	-.04**	.08**	.06**	-.03**	-0.01	0.00	0.01	0.08**	.28**	

Regression Analyses

A number of hierarchical regressions were conducted to investigate the impact of the play and learning activities at age five on cognitive outcomes (e.g., non-verbal reasoning, measured using the BAS Picture Similarities score and expressive vocabulary measured using the BAS Naming Vocabulary score). As previously, the independent variables were entered in blocks to represent the nested layer and reflect the bioecological framework. A visual inspection of P-P plots demonstrated that the assumption of normality was met for the analysis. The assumption of multicollinearity was met by examining bivariate correlations, and tolerance values greater than 0.1 and reciprocal VIF values less than 10 were observed for all variables (Field, 2018). The assumption of homoscedasticity was met and observed via visual inspection of a plot of standardised residuals versus standardized predicted values. Cases with standardised residuals greater than +/- 3.29 were removed as were cases that were two or more standard deviations from the mean. Outliers were checked by examining the Mahalanobis distances which indicated there were cases that exceeded the critical value (Field, 2018; Pallant, 2016) and these cases were removed from the analysis.

Table 12 Hierarchical Regression Analysis predicting five year olds' Non-Verbal Reasoning Ability

Step and Predictor Variables	**BAS- Picture Similarities t score - Age 5**			
	Model 1 (β)	Model 2 (β)	Model 3 (β)	Model 4 (β)
Play Activities				
- Reading	0.051***	0.049***	0.049***	0.050***
- ABCs	0.007	0.006	0.006	0.004
- Numbers	-0.004	-0.004	-0.004	-0.004
- Songs	-0.017	-0.018	-0.018	-0.018
- Play games	0.039*	0.040*	0.040*	0.040*
- Paint and draw	0.024	0.021	0.021	0.020
Parent-child relationship:				
- Warmth		-0.018	-0.018	-0.019
- Hostility		-0.010	-0.010	-0.011
- Closeness		0.040*	0.040*	0.039*
Child relationship:				
- Siblings			-0.007	-0.005
- Childcare			-0.002	0.002
Environmental factors:				
- Junior Cert or less				0.017
- (ref Degree or higher)				
- Leaving certificate or equiv.				0.028
- Sub-degree				-0.010
- Income				-0.008
R^2 △	0.6%, p< .001	0.2%, p< .05	0.0%, n.s.	0.1%, n.s.
Total R^2 adjusted				0.09%, p< .001

**p* <.05, ***p* <.01, *** p <.001, *n.s* = not significant

Non-Verbal Reasoning. A hierarchical regression was conducted to investigate the impact of the play and learning activities at age three on the BAS Picture Similarities score at age five. The results indicated that at block 1, play and learning activities accounted for .6% of the variance in Picture Similarities scores, $R^2 = .006$, $F(6, 4959) = 5.14$, $p < .001$. An examination of the standardised B coefficients indicated that parental engagement in reading and playing games were significant contributors in the first model (See Table 12). After controlling for the influence of the covariates, (parent child relationship, child relationships and environmental factors), which only explained an additional 0.1% of variance in the model, the results showed that reading and playing games, continued to significantly predict scores on the BAS Picture Similarities at age five, $R^2 = .009$, $F(15, 4950) = 3.06$, $p < .001$.

Similar to Study 1, these findings highlight the independent effect, as well as the longitudinal effect, of play and learning activities on non-verbal reasoning in early childhood. Two of the play activities, reading and playing games, significantly predicted BAS Picture Similarities even after covariates were added. Comparing across the β values in the final model indicated that reading (β =.050) followed by playing games (β =.040) and parental closeness, (β =.039) contributed to the final regression model, all *p*'s < .05.

Table 13 Hierarchical Regression Analysis predicting five year olds' Expressive

Vocabulary

Step and Predictor Variables	BAS- Naming Vocabulary score - Age 5			
	Model 1 (β)	Model 2 (β)	Model 3 (β)	Model 4 (β)
Play Activities				
- Reading	.146***	.144***	.144***	.143***
- ABCs	.043*	.042*	.041*	.039*
- Numbers	.025	.025	.025	.027
- Songs	-.009	-.011	-.011	-.011
- Play games	.030*	.031*	.031*	.032*
- Paint and draw	-.028	-.031*	-.031*	-.032*
Parent-child relationship:				
- Warmth		-.018	-.018	-.020
- Hostility		-.003	-.003	-.003
- Closeness		.050***	.050***	.048***
Child relationship:				
- Siblings			-.001	-.001
- Childcare			-.013	-.012
Environmental factors:				
- Junior Cert or less				.049*
- (ref Degree or higher)				
- Leaving certificate or equiv.				.005
- Sub-degree				-.022
- Income				-.027
R^2 △	3.0%, $p < .001$	0.2%, $p < .001$	0%. n.s.	0.4%, $p < .005$
Total R^2 adjusted				3.3%, $p < .001$

**p* <.05, ***p* <.01, *** p <.001, *n.s* = not significant

Vocabulary. A second hierarchical regression investigating the impact of play and learning activities at age three on the BAS Naming Vocabulary score at age five was conducted. The results indicated that at block 1, play and learning activities significantly predicted scores, $R^2 = .030$, $F(6, 4945) = 24.47$, $p < .001$, accounting for 3.0% of variance in the vocabulary scores (See Table 13). An examination of the standardised B coefficients indicated that parental engagement in reading, ABC's and playing games, were significant contributors to the first model.

After examining the contribution of the covariates at age three, (parent child relationship, child relationships and environmental factors) results showed that in the final model that reading, ABC's and playing games, significantly predicted scores on the BAS Naming Vocabulary at age five, $R^2 = .036$, $F(15, 4936) = 12.40$, $p < .001$, accounting for 3.5% of variance in the model. Painting and drawing at age three, which was not significant in the first model, appeared to lower expressive vocabulary scores in the final model, at age five. Comparing across the β values in the final model indicated that reading ($\beta = .143$) made the largest contribution to the final regression model, followed by maternal education to junior cert, ($\beta = .049$), closeness ($\beta = .048$), ABC's ($\beta = .039$), playing games ($\beta = .035$) and painting and drawing, ($\beta = -.032$), all p's < .05. P-P plots and scatter plots for both regressions are included in Appendix C.

Summary of Findings

Tables 12 and 13 show the results of the analyses for Picture Similarities and Naming Vocabulary respectively at age five. By block 4 with all of the main predictors entered into each model, the findings indicate that reading to the child at age 3, contributed to picture similarities and higher vocabulary scores. Playing games predicted scores on non-verbal reasoning and expressive vocabulary at age five while ABC's at age three continued to predict score on expressive vocabulary at age five. In the final model, the non-standardised Beta scores indicate that reading adds 0.29 points to Picture Similarities and 0.93 points to Naming Vocabulary. Playing games adds 0.20 points to the Picture Similarities score. ABC's add 0.19 points to Naming Vocabulary score.

The play and learning activities, explained 0.6% for Picture Similarities and 3.0% of the variance in the Naming Vocabulary model. In the fully-adjusted final models, a number of the control variables had a significant effect on both sets of cognitive scores. Parent-child closeness had a positive effect on both non-verbal reasoning scores and expressive vocabulary. Maternal education had a significant effect on expressive vocabulary scores at age five, as children with mothers with lower secondary education scoring higher on expressive vocabulary compared to mothers with degrees or higher. Overall, these findings highlight that parental engagement in informal activities at age three continue to have an influence at age five, even when we control for other factors such as childcare and maternal education. In particular, reading, had a positive long term influence on both non-verbal reasoning and expressive vocabulary. Engaging in the formal activity, ABC's at age three, also appeared to have an influence on expressive vocabulary at age five.

Table 14 Percentage of Variance (R^2) in the BAS Outcome Variables at Age five Explained at each Block of the Regression Model

	BAS Naming Vocabulary Age 5	BAS Picture Similarities Age 5
Block 1: *(Predictor Variable)*	3.0%***	0.6%***
Block 2: *(Block 1 +Warmth, Hostility, Closeness)*	3.2%*	0.8%*
Block 3: (*Block 2 +Siblings and Childcare)*	3.3%	0.8%
Block 4: *(Block 3 +Maternal Education and Family Income)*	3.6%***	0.9%

* *p* <.05, ***p* <.01, *** p <.001

Discussion

This study aimed to determine if the home learning environment had an effect on the development of non-verbal reasoning in early childhood, as few previous studies on the topic have examined this aspect of cognitive development. The current findings highlight the significant effect of the home learning environment on the development of reasoning skills in young children and shows that reading and playing board games are important for the development of this critical skill. The results also indicated that other factors are important too, such as a positive maternal relationship. However, the home learning environment continued to impact on reasoning scores, even after these other factors were statistically controlled for.

The home learning activities also had a significant impact on vocabulary scores, consistent with previous research (e.g., Rodriguez & Tamis LeMonda, 2011; McMullin et al., 2020). The findings show that at age three, reading to the child, playing games and engaging them in painting/drawing, independently contribute to expressive vocabulary scores. Interestingly, play and learning activities had a larger effect on expressive vocabulary than on non-verbal reasoning, as demonstrated by the percentage of variance accounted for by the regression models. This was also illustrated by singing songs, which had an independent significant effect on non-verbal reasoning but not on expressive vocabulary, where singing songs at age three appears to reduce picture similarities scores.

This study also aimed to determine whether different types of play and learning activities had different effects on cognitive development, and the findings indicated that this was the case. These findings highlight the importance of activities in the home that are informal and playful rather than activities that are focused on learning the alphabet and number games and activities. We may have expected to find the learning activities of letter and number games would have a positive effect on the cognitive outcomes measured, however the data showed that these activities at age three had little independent effect on current reasoning scores. Engaging in ABC's at age three, however did appear to be associated with higher expressive vocabulary scores at age five. In contrast, the informal activities such as reading, games, painting or drawing did have an effect on both aspects of cognitive development.

There are some mixed findings in relation to the benefits of alphabet teaching. Sammons et al. (2004) and Senechal (2006), found among other home experiences, that alphabet teaching and playing with letters and numbers had a positive influence on language in preschool children. In contrast McCormick et al. (2020) found no effect for letter or numbers and shapes on academic skills when they examined the effect of activities on children aged approximately 4 and a half. They included six literacy activities (e.g., alphabet letters and sounds letters) which they named literacy constrained. They also had a group called math constrained (e.g., counting and learning shapes) which included 6 activities also. They found no association between either literacy constrained or maths constrained activities and language or maths outcomes.

Additionally, Manolitsis et al. (2013) found home literacy activities and letter knowledge, and home numeracy activities and counting correlated significantly when the child was beginning kindergarten. However, they suggested that because they were both weak correlations (r = .23 and .28) that there was limited impact of parental teaching these activities directly at home. Individual differences disappeared as soon as children were exposed to literacy and numeracy in school. In contrast to the current study, McCormick et al. (2020) examined groups of activities rather than individual activities so we cannot identify which of the activities had the greatest influence.

Overall, the current findings find some support for the findings by McCormick et al. (2020) and Manolitsis et al. (2013) which suggest that formal learning activities such as numbers or counting may not in fact be beneficial for three and four year olds, particularly for the development of non-verbal reasoning or vocabulary skills. The findings here suggest that while there is high daily engagement in reading (57%) there is also high engagement in games with numbers (42%), though less daily engagement in alphabet and letter games (23%). The finding that teaching letters and number games have little benefit for current development has implications for activities that educators engage with toddlers in preschools and for advice for parents on what activities they should engage in with their children at home. This study also confirms the importance of reading as an activity in the home, as reading was a contributor to both measures of cognitive development. Changing a single item in the home environment may only be effective for example if parental beliefs and resources also support the change (Burgess et al., 2002). However, it may be that a playful approach, with less emphasis on numeracy and literacy goals at age three, is having greater benefits for development.

Study 2 examined if there was a longitudinal effect of play at learning activities at age three on development outcomes at age five and demonstrated that reading continued to exert an influence on both non-verbal reasoning and expressive vocabulary. Playing games at age three also continued to influence non-verbal reasoning at age five. What emerged also was that one of the formal activities, teaching the alphabet at age three, exerted a significant effect on expressive vocabulary at age five. Knowledge of the alphabet is a strong predictor of later reading and academic ability and is known to be linked with internal factors such as cognitive ability as well as external factors (e.g., engagement in activities before beginning school; Heilman et al., 2018). At age three, we observed that there were no benefits of ABC's and numbers and counting on current development, but at age five, ABC's had a significant effect on expressive vocabulary. While numbers and counting were reportedly engaged in by parents with greater frequency than letters and alphabet activities at age three (e.g., ABC's were the least frequent of all the play and learning activities), number games had no influence on current or later development.

Looking then to family and other factors, the parent child relationship factors explored aspects of the parent child relationship and interactions between parent and child. There is a wide range of parental factors within the GUI data that could have been selected, for example, McGinnity et al. (2015) measured parental stress and consistent parenting. In this study we were interested in the parent relationship factors of warmth, hostility, and level of closeness. We selected two positive (e.g., level of warmth and level of closeness) and one negative (e.g., level of hostility) parent child relationship variables to examine if they predicted cognitive outcomes. They were included to consider if the effects of the play and learning activities were independent of a positive relationship, and interactions in the microsystem. The relationship variable that emerged as being most important for both non-verbal reasoning and expressive vocabulary was level of closeness as measured by the Pianta Scale. This finding suggests that the child's feeling of being valued is important for both non-verbal reasoning and expressive vocabulary and it may be that one of the aspects measured, open communication between parent and child, is having a positive effect on cognitive development. The effects from the close relationship at age three were still evident when the child was aged five, consistent with previous research.

For example, Morrison et al. (2003) also found that the positive quality of mother-child interactions accounted for academic success over and above the role of demographic variables. Other research has found that the parent-child relationship has been found to be highly predictive of short term language and cognitive skills as well as longer term academic performance (Sheridan et al., 2010). The Pianta Scale measures the positive aspects of the parent child relationship and measures how the parent gets on with the child as well as the parents' own feelings about their effectiveness as a parent (McCrory et al., 2013). It appears to relate to the parent child relationship where the child feels valued in the relationship rather than simply the physical tactile relationship between parent and child.

We also examined the child relationship factors of having siblings but found that they had no impact on either cognitive outcome at age three. Previous literature has described that when children have siblings, their language skills can be poorer, but there was no evidence of this in the current study. This is often explained as being due to resource dilution as parental resources are finite (Downey, 2001). (Downey, 2001). There may be other aspects of sibling relationships that could also contribute to cognitive or language outcomes. More recent research has also examined the role of sibling's sex in addition to the number of older siblings and found that having older sisters rather than older brothers was associated with better language skills (Havron et al., 2019). However, sibling sex was not included in the current analysis.

Examining the broad influence of childcare, this study found no association between attending non-parental childcare at age three and cognitive development at age three or five. Though attending childcare is reported in some studies to have benefits for cognitive development (Loeb et al., 2007; Sylva et al., 2010) other studies have found no benefits for childcare when other factors were controlled for (McGinnity et al., 2015). The influence of childcare in this study differs from McGinnity et al. (2015) who found after controlling for child and family characteristics and home learning environment that children in non-parental childcare at age three had higher expressive vocabulary scores at age five. However what needs to be considered is this study used a dichotomous variable of childcare. In contrast McGinnity et al. explored in detail the type of childcare attended (e.g., relative, non-relative care, centre care or none). The inclusion of childcare in the current study was to examine the broad influence of childcare rather than the quality of childcare per sae.

Environmental factors related to the exosystem accounted for little variance in the final models. There were no associations between family income at age three or five and either of the cognitive outcomes. However, maternal education when included in four categories, with maternal education to degree as the reference category, there were some association with one of the cognitive outcomes. At age five lower maternal education of junior cert or less at age three, was linked with an increased score for expressive vocabulary at age five, compared to the reference group of mothers with a degree or higher. With the exception of this finding, environmental variables at age three had few associations with non-verbal reasoning or expressive vocabulary. These findings are surprising and inconsistent with previous research which shows that SES and education have an impact on early development (e.g., McMullin, et al., 2020).

The current research provides clear evidence that different activities have different impacts on different aspects of cognitive development, independently of other factors. The findings also provide insight into the role of different activities the home learning environment in contributing to current and longer term cognitive development. This approach builds upon previous research, much of which has used a composite or sum score of activities or groups of activities, in the home learning environment (e.g., McMullin et al., 2020; Sylva et al., 2010). While there are benefits to using a composite score (e.g., see Melhuish, 2010) it is important to understand the unique contribution of individual activities too. Niklas, Nguyen et al. (2016) have also noted that no research to date had examined how individual activities support child development.

Overall, the analysis of this large, nationally representative dataset from the Growing Up in Ireland Study indicates that the home learning environment at age three has a significant role to play in child cognitive development, both for reasoning skills and for language development. Reading to the child emerged as a strong predictor of both aspects of cognitive development. Contrasting the formal and informal learning activities indicated that informal activities like playing games, doing jigsaws, painting and drawing are significant for cognitive development. However, the formal learning of numbers at age three, did not make unique contributions to the models and seem to be less important for the development of reasoning and language skills when other factors are controlled for such as the parent-child relationship. However, we also observed that the formal learning activity. ABC's, while not important to current development at age three, did significantly contribute to expressive vocabulary at age five.

The findings reported in the current study, relating to the role of family and other factors in cognitive development, are also consistent with developmental theorists such as Bronfenbrenner and Vygotsky. Using a bioecological framework, we examined how development is influenced by the child themselves, and also their environment and relationships. Examining the findings through the interaction between the various elements of development in the PPCT model (Bronfenbrenner, 1995), we found that many of the factors, including the activities in the home learning environment, contributed in some way to development. Vygotsky believed the parent had an important role in scaffolding their child in play, learning and thinking through rich language interactions (Vygotsky, 1978). The findings here suggest that when parents are actively engaging in reading and, playing games and allowing the child to paint and draw that they are aiding their child's development. There are many factors that influence child development, but the current research illuminates the important role of the closest and most familiar microsystem, the family and the role proximal processes have in early childhood. This has not been explored before in relation to the role of the home learning environment in the development of non-verbal reasoning skills and warrants attention in future research.

Conclusion

Many factors play a role in the cognitive development of young children. The current study provides evidence that a range of informal play activities in the home learning environment supports both expressive vocabulary and non-verbal reasoning in a nationally representative sample. It highlights the importance of informal activities, particularly reading as well as a mixture of more informal activities in supporting cognitive development. It also found that formal activities such as the alphabet and number games did not support either of the cognitive measures at age three but one of the formal activities (e.g., ABC's) supported expressive vocabulary at age five. These findings have implications for the activity's parents and educators in early childhood settings engage in with three year olds. In the next chapter we want to further explore if play and learning activities play a similar or different role in socioemotional development.

Chapter Four

Examining the Effect of Play and Learning Activities on Socioemotional Development

"In play it is as though he were a head taller than himself".

Vygotsky (1978, p.102).

A fundamental aspect of socioemotional development in infancy and early childhood is developing relationships with significant others (Keller, 2018) and parents have a critical role to play in their child's socioemotional development (Tan et al., 2020). Healthy socioemotional development in early childhood depends on early interactions with parents with lots of play (Nandy et al., 2020). Socioemotional development is defined by the Centre on the Social Emotional Foundations for Early Learning (CSEFEL) as the "developing capacity of the child from birth through 5 years of age to form close and secure adult and peer relationships; experience, regulate, and express emotions in socially and culturally appropriate ways; and explore the environment and learn—all in the context of family, community, and culture" (Yates et al., 2008, p.2).

Positive and responsive parent child relationships, as well as parental engagement in play activities, are known to influence socioemotional development (Fantuzzo et al., 2004). Play therefore is an important activity that encourages socioemotional development and learning, as self-regulation and prosocial skills develop through play. When children engage in frequent playful experiences, they develop confidence and trust in their ability to negotiate complicated and new situations with others as well as confidence and flexibility to work and collaborate with their peers (Leibowitz, 2020). Research suggests that positive social and emotional functioning is related to academic success, as children who have better interpersonal skills are good at following instructions and have the ability to regulate their emotions (Baker, 2014; Hartas, 2011). Research also indicates that when a young child has good self-regulation, is able to form friendships and demonstrate prosocial behaviour (e.g., helping or sharing), this can greatly ease the transition to school (Webster-Stratton & Reid, 2004).

However, while much of the previous research on the Home Learning Environment focuses on the positive effect of parental activities for children's attainment and language and literacy skills as they start school (Becker, 2011), less research has focused on the role of play and learning in the home on socioemotional development. We first consider previous research relating to the role of play in socioemotional development and the factors that influence it, before reporting the findings of a secondary data analysis on the infant cohort data set from the Growing Up in Ireland (GUI) study. The overall aim of this chapter is to examine the impact of different play and learning activities on different aspects of socioemotional development. As in the previous chapter this was investigated by conducting secondary analysis on the infant cohort data set from the Growing Up in Ireland (GUI) study. However, before we get to the analysis, we consider previous research relating to the role of play in socioemotional development and the factors that influence it.

Role of Play Activities in Socioemotional Development

Play activities in the home environment are known to support children's play and learning (Lynch, 2016), and previous research demonstrated their effect on language and literacy outcomes (Weisleder et al., 2016). According to Bronfenbrenner, in order for proximal processes to have developmental benefit, parents need to engage in play activities regularly and over an extended period of time (Bronfenbrenner & Ceci, 1994). A rich home play environment ideally contains multiple features that are important for play, which include stimulating activities, play materials and objects, positive caregivers, and a safe, flexible space (Dauch et al., 2018). When parents play with their child, they model social behaviour such as sharing and taking turns that young children can learn from, thus potentially supporting many aspects of socioemotional development (Nandy et al., 2020). For example, Nandy et al. (2020) recently observed the quality of free play sessions between parent and child and assessed socioemotional competence using the Bayley Scales of Infant Development (BSID) III. They found that when mothers engaged with toddlers and incorporated toy play, there were positive associations for socioemotional development when the contact was in the context of a supportive coparenting situation (Nandy et al., 2020).

An intervention that focused on positive parenting interactions (e.g., play and reading activities) found support for socioemotional outcomes in toddlers in low income families (Weisleder et al., 2016). Additional research has also shown that when parents are involved in specific activities (e.g., reading) in early childhood, it is associated with improved socioemotional behaviour (Aram & Aviram, 2009; Baker, 2013), which has long term benefits (McMunn et al., 2015). Using data from the UK Millennium Cohort Study (MCS), Kelly et al. (2011) examined the role of the home learning environment in early development. They found the home learning environment to be more important in explaining the socio-economic gradient in socioemotional development than it was for cognitive outcomes. In particular, daily reading was thought to have a beneficial impact on socioemotional behaviour (Kelly et al., 2011). A recent Irish study also found positive impacts for socioemotional development from infancy when infants were read to on a daily basis (O'Farrelly et al., 2018). This research found that infants who were read to daily at six-month-old demonstrated greater socioemotional competency (e.g., attention, compliance, mastery motivation, pro-social peer relations, empathy, play skills and social relatedness) as toddlers. Play is commonly believed to be important in supporting children's development of social and emotional skills such as self-regulation, sharing and planning and suggests some of these skills are helpful for later reading and mathematics understanding (Kane, 2016).

There are many play and learning activities that children engage in and previous cohort studies have examined these various everyday home play and learning activities such as reading, games and painting and drawing (e.g., the GUI, GUS, MCS, and EPPE studies), as described in the previous chapter. However, many of these previous studies focus on the importance of these activities for cognitive development (McMullin et al., 2020), with less emphasis if play activities impact on child socioemotional development. When the studies have examined the effect of the home learning environment on socioemotional outcomes, they have either examined it using a total score (Kelly et al., 2011) or focused on just one activity in the home (Nandy et al., 2020), often the activity of reading.

For example, Kelly et al. (2011) examined socioemotional outcomes using data from the Millennium Cohort Study, as in many other studies they used a composite measure of the home learning environment. At age three, the home learning measure included a total score for three questions on parents' literacy and numeracy skills, and six questions about learning activities in the home (e.g., reading stories, library visits, help with alphabet, numbers/counting, songs/rhymes, and drawing/painting). Similarly, while Nandy et al. (2020) observed parental engagement in play, it was specific to toy play and how it impacted on toddlers' socioemotional development. In comparison to studies on cognitive development, less research has examined the effect of play activities in the home on socioemotional development.

Role of Parents in Development

As described in the previous chapters, parents support learning and development in many ways; through the resources they provide, the roles they take on, as well as matching appropriate activities with the child's current developmental stage. As children spend most of their time at home, parents are responsible for the resources available to children and the activities that children are involved in (Plowman et al., 2012). Parents can engage in many different ways or roles with their child to support play and learning. Johnson et al. (1999), suggested that parents choose appropriate roles or strategies in different play activities based on their child's own skills and temperament. This could be encouraging an energetic child to play outside or a quieter child to read. Parent factors such as education could also influence the type of activities they engage in. For example, Blaurock and Kluczniok (2019) found evidence of a developmental gradient where more educated mothers arranged time with developmentally appropriate activities to match the child's developmental stage.

As well as supporting their child in different types of play activities, parents have a critical role in how they relate to their child. Parental engagement in play with their child is important for the development of interpersonal relationships including the parent child relationship (Konig, 2009). Positive parenting also has demonstrated benefits for development (Mendelsohn, et al. 2018; Weisleder et al., 2016; 2019). Play has the ability to nurture the parent–child relationship with benefits for both the parent and child (Coyl-Shepherd & Hanlon, 2013). It affords time for a parent to be fully involved and bond with their child as well as an opportunity to view the child's perspective of their world (Milteer et al., 2012). Playing also helps increase confidence with peers and social competence (Hirsh-Pasek et al., 2006). For example, a US study that targeted low-income families, found that positive parenting with preschool children which included five minutes of play activities such as reading aloud, playing, and talking to child, resulted in improved socioemotional skills (Mendelsohn, et al., 2018). Interventions such as those by Weisleder et al. (2016) demonstrate the effectiveness of positive parenting through low cost and modest interventions which supports positive socioemotional outcomes. Further research by Weisleder et al. (2019), also found that that parent child interactions in play and shared reading, improved child behavioural outcomes by fostering the relationship between parent and child.

In addition, parental playfulness is important for the development of the parent–child relationship as well as for socioemotional skills. Parents who introduce playfulness in their interactions have been found to have closer and more positive relationships with their child (Shorer et al., 2019). In 2007, the APA published reports on the importance of play for promoting healthy child development but also recognised the role of play in maintaining good bonds between parents and children. Some further examples demonstrate how play benefits the parent child relationship. Another study found links between play and communication skills. Yu and Daraganova (2015) found that building parent and child play into everyday activities, aided communication skills and allowed expression of positive feelings and shared understanding in the parent child dyad (Yu & Daraganova, 2015). El Nokali et al. (2010) also demonstrated positive effects when parents engage in play with their child. They found that children with very involved parents had greater social skills and less behaviour problems.

Overall, parent–child relationships are vital for healthy development, particularly in early childhood (Cabaj et al., 2014). “A relationship with a consistent, caring, and attuned adult who actively promotes the development of social and emotional competencies is essential (e.g., creating an environment in which children feel safe to express their emotions, being emotionally responsive to children, modelling empathy)” (Harper Browne, 2014, p. 6). The parent child relationship serves as a protective factor, associated with a child's positive social adjustment and includes warmth, responsiveness, and consistent discipline (Masten & Reed, 2002). Parenting style which measures parental responsiveness, has been found to predict positive outcomes across domains of social competences and psychosocial development, as well as behaviour (Darling, 1999).

Mc Nally et al (2019a) explored the socioemotional development of language minority children (n= 574) in a comparison study with their language majority (n = 8138) peers at age 5. They used the teacher rating of the SDQ and found that even when they considered poor vocabulary skills, that teachers rated social emotional skills of the language minority children more positively than language majority children with poor vocabulary skills. In addition to using the teacher report form of the SDQ Total Difficulties rather than the parent rating, they included a number of covariates. These included child gender, attachment at nine months, positive (e.g., positive aspects of the relationship) and negative qualities (e.g., conflict) of the parent child relationship at three years, maternal stress at three years, whether the child attended childcare and income and maternal education. While the language minority children demonstrated weaker English vocabulary skills, these children had better socioemotional development than their peers with limited vocabulary skills when other predictors such as positive and negative aspects of the parent child relationship were considered (McNally et al., 2019a). However, while this study examined socioemotional development of five year olds, and included parents' child relationship variables, it used teacher reports of development, they did not include play and learning activities and were primarily interested in the development of children of language minority children.

Parenting style also describes warmth and control which parents demonstrate in their interactions with their children (e.g., reacting to bad behaviour; Murray et al., 2014).

Maternal warmth has been found to be especially important in early development (Gibbs et al., 2018). Radin (1971) defined warmth as the use of physical or verbal reinforcement, discussion with the child and sensitivity to the child. Likewise, warmth has been described as the parent's expression of love (Baumrind, 1996). Bradley et al. (2001) found parental warmth was positively related to emotional regulation and Razza et al. (2012) found warmth to be related to positive social development. Additionally, when parenting style includes warmth, it has been associated with decreases in Internalising problems such as depression (Zubizarreta et al., 2019).

Zubrick (2014) highlights two other parental qualities in addition to warmth as important for development: hostile parenting and consistency (Zubrick, 2014). A hostile family environment was found to predict behaviour problems in children age four but was even stronger when early positive interactions were absent (Pettit & Bates, 1989). Consequently, hostile parenting can lead to a range of maladjusted behaviours in early childhood. Additionally, a quality that is considered an important feature in the parent child relationship is emotional connectedness. This connectedness or bond between parent and child has also been described as closeness (Clark & Ladd, 2000). Parent child engagement in play can create a feeling of closeness and well-being within families (Coyl-Shepherd & Hanlon, 2013).

As well as improved social skills and better behaviour, the positive parent child relationship extends to parents nurturing stimulating learning environments. When sensitive and responsive behaviour are present between parent and child, it creates an optimal learning environment where the child is seen as a capable individual which can boost self-efficacy. Additionally, the benefits of positive relationships are considered bidirectional. Sigel (1987) believed there was a reciprocal relationship between parent and child, as parents influence children, but children also motivated parents. These reciprocal and interactive exchanges between adult and child, form the foundation for a stimulating learning environment (Konig, 2009). As discussed, earlier in order to learn the child needs to take an active role (Piaget, 1973) and in doing so the child is also active in shaping his environment (Toth et al., 2020).

Bornstein et al., (2020) also demonstrated a bidirectional influence between language and the home learning environment. Even when they considered the effects of child gender, ethnic background, birth order and developmental risk they found a bidirectional relationship between language and the home learning environment. Children influenced their environment as much as their environment influenced them and this effect remained stable from infancy right through to adolescence. ‘Children who were more advanced in their core language skill stimulated a more sophisticated home learning environment at the next succeeding developmental wave’ (Bornstein et al., 2020). Lillard et al. (2013) in their review of the influence of pretend play on development, found support for the bidirectional influence of pretend play on language development (Lillard et al., 2013). Bronfenbrenner describes how development happens as a result of the interactions between all of the environments. Other theorists such as Sameroff (2009) would also describe how development is a transactional process where parents and children influence each other throughout time (Sameroff, 2009). Overall, the literature suggests that when parents actively engage with their child in play, there are clear developmental and learning benefits which are often bidirectional and also impact on the home environment.

Effect of Family and Other Factors

As well as the parent child relationship, there are other factors that may impact development such as the relationships the child has at home (e.g., siblings) and outside of the home (e.g., attending childcare). Additionally, other environmental factors may also impact on the child (e.g., parental education and income). From a bioecological context, development takes place through the close relationships and interactions that the child has with their parents in the home environment or microsystem (Murray et al., 2014), the system of microsystems (the mesosystem; e.g., childcare) as well the linkages that indirectly influence the child (the exosystem; e.g., education and income; Bronfenbrenner, 1994).

These other factors (e.g., having siblings and early childcare), may impact on socioemotional development in early childhood as well as structural characteristics of families such as parental education and income. Having siblings has been found to support socioemotional development. Siblings are an important influence with their changing roles as playmates, role models, partner in crime as well as having an effect on the wider family dynamic (McHale et al., 2012). It is common by middle childhood that there are often individual differences in relationships with siblings (Dunn et al., 1994). However, while McHale et al. (2012) describe siblings as the building blocks of families, having siblings can have a negative impact also, for example if one has the role as the favourite, and siblings can also dilute family resources.

The model of resource dilution (Blake, 1989; Downey, 1995) predicts that as family size increases, parenting activities with subsequent children decline. The family resources dilution paradigm, which assumes that family resources are limited, suggest that as family size increases, there are less resources available to each child. Children in larger families have lower grades as well as less academic encouragement even when family background is considered. This can result in poorer outcomes for children in larger families (Blake, 1981). However, Workman (2017) found that parental interpersonal investments (e.g., emotional factors and health), as well as parent child interactions were less susceptible to dilution than previous research had found. Jaeger (2009) also suggests that social and interpersonal resources are not as diluted by the presence of siblings as previously thought (Jaeger, 2009). While the model of resource dilution is useful, research in the area mostly examines the impact of resources on cognitive development with little known about the effect of siblings on socioemotional development. Additionally, having siblings is only one factor that may be associated with healthy socioemotional development as the child may be influenced by other environments outside the home such as childcare.

There is evidence that early childcare, especially when the quality is poorer, is related to poor socioemotional outcomes. Poor quality childcare has been linked with negative effects on early socioemotional outcomes and social behaviour (NICHD, 2003; Belsky, 2005). The National Institute of Child Health and Development (NICHD) study found that children were more likely to have insecure attachments, that mother child interaction were more likely to have conflict, and that children had higher levels of Externalising behaviours. While there were some benefits for linguistic functioning when children were in quality childcare settings, overall time spent in non-maternal care was found to significantly relate to poorer socioemotional adjustment up to the age of five (Belsky, 2005; NICHD, 2003). However, other research examining experiences of childcare on socioemotional development found no harmful effects of childcare in children aged up to three. Barnes et al. (2010) found evidence of benefits for children who attend childcare for an average of 35 hours per week. Mothers reported they had greater confidence in expressing themselves and they demonstrated sympathy for peers (Barnes et al., 2010).

As well as siblings and the quality of childcare, socio-economic variables including parent education and income have been found to influence socioemotional development (Palmer et al., 2013). Maternal education has demonstrated positive benefits for socioemotional development and is linked to quality maternal parenting (Sun et al., 2016). A recent study that revisited the NICHD data, found that families with higher income and maternal education and from a non-minority background had greater choice in selecting quality childcare settings. Being enrolled in a quality setting with caregivers who were responsive and sensitive, were found to predict later prosocial behaviour in children (Brownell & Drummond, 2018).

There are some mixed findings about how parents spend time with their children that are linked to income and education. Family income has also been found to have an independent impact on socioemotional development. One study that linked income to socioemotional problems was the Millennium Cohort study (MCS) which found that children from low income families exhibited greater socioemotional difficulties. Children in families from the highest income group were less likely to have socioemotional difficulties in contrast to children in the lowest income group at age three years (2.4% vs 16.4%) and age five years (2.0% vs 15.9%). This particular study demonstrates the importance of parenting involvement particularly in the lower income group (Kelly et al., 2011).

Generally, the time that parents spend with their children in a range of activities is thought to be important for development (Fiorini & Keane, 2014). A reported disadvantage of a lower SES background is that children of parents with lower income and education levels are reported to spend less quality time with their parents, especially in educational activities (Kalil & Ryan, 2020). One explanation for this was that higher SES mothers use their discretionary time with their children whereas lower SES mothers spend the spare time in household or leisure activities (Kalil & Ryan, 2020). Similarly, Craig (2006) examined maternal time in activities and its association with education. She concluded that mothers with university education spent more time daily with children in developmental activities such as reading, talking and playing than other less educated mothers (Craig, 2006). In contrast, Carneiro et al. (2013) observed that educated mothers though they worked longer hours, did not spend less time reading or in educational activities with their child, they merely had less leisure time (Carneiro et al., 2013).

Recently, Bastian and Lochner (2020) claimed that increased maternal working time does not appear to reduce the amount of time mothers in low and middle income families, spend in learning and developmental activities with their child (Bastian & Lochner, 2020). What appears evident in the literature is that families with higher income and education levels have more choice not just about the quality of the childcare setting, but also in how they spend their time with their child. In the previous chapter we examined the effect of play and learning activities on cognitive development, after controlling for family and other factors. In this chapter, we examine if the same play and learning activities in the home, including the same covariates (e.g., parent child relationship, siblings and childcare, education and family income), have an impact on socioemotional development. In the next section we explore how the home environment influences socioemotional development.

Effect of the Home Environment on Socioemotional Development

There is evidence that stimulating and rich home environments with regular activities have a positive impact on socioemotional development (Bradley et al., 2001; Razza et al., 2012). Jeon et al. (2014) found from parental reports that children in homes with stimulating environments experienced fewer socioemotional problems after accounting for family and neighbourhood risks, parental depression, and other covariates. Language rich home environments have also been found to support socioemotional development in children. When children have good communication skills, they are often associated with better social skills simply because being able to effectively communicate feelings can help a child negotiate social situations (Foster et al., 2005) even in infancy (O'Farrelly et al., 2018).

The home learning environment has been well researched in relation to language and literacy, but language and reading skills have also been associated with socioemotional development (Rose et al., 2018; Wirth et al., 2020). Rose et al. (2018) investigated long term interrelations between language skills and the home environment on a number of aspects of socioemotional development in children aged from three to eight. The measure for home literacy included number of books, frequency of shared reading and an observation of shared reading. The socioemotional competencies they measured were cooperation, aggression and self-regulation. When language and the home literacy environment were included in regression models at the same time, the home literacy environment predicted scores in cooperative and aggressive behaviour, while children's language ability was the best predictor of emotional self-regulation. However, the home environment had very little impact on emotional self-regulation at age three and only a small longitudinal effect. It seems that a rich home environment and early language skills are protective factors and help improve socioemotional competencies. While this study did not measure the overall home learning environment, the findings indicated that different activities support different aspects of socioemotional development (Rose et al., 2018).

Another recent study found an association between shared reading and socioemotional development that was mediated by the child's linguistic skills. Wirth et al. (2020) examined the effects of shared reading and a measure of the home literacy environment on three teacher reported socioemotional competencies (i.e., Entwicklungsbeobachtung und Documentation (EBD) Emotional scale, EBD Social scale and the Strengths and Difficulties (SDQ) Total Difficulties scale). Their sample included 131 children with a mean age of 37 months. The measure of home literacy included eight aspects of the literacy environment such as the number of adult's books, children's books, parents' frequency of reading, child frequency of looking at books, library visits, as well as three items assessing the value of reading in the home. When they controlled for children's language and characteristics (i.e., age, gender, intelligence), as well as family characteristics (i.e., SES- education, occupation prestige and income) they found that shared reading did not predict scores on any of the socioemotional measures. They did however find that socioemotional competencies were mediated by language skills, thus highlighting a strong relationship between early language and socioemotional skills. However, while these studies examined particular skills such as language and reading, they did not examine the overall role of the home learning environment on socioemotional development.

One recent study that did examine the home environment, examined its role on both cognitive and socioemotional development. Orri et al. (2019) found a positive impact of the intervention programme, Preparing for Life (PFL) on the home environment (Orri et al., 2019). PFL was a programme aimed at low income families that supported child development aiding parents from pregnancy through to 4/5 years old. However, despite participation in PFL, the researchers found no positive impact on cognitive or socioemotional development at age five. Pregnant women were randomly assigned to a treatment group that received home visits, baby massage and a parenting programme or to a control group.

Over the longitudinal study, they found a decline in parental engagement, though an increase in the use of learning materials (e.g., toys and books) and in the variety of activities across both treatment and control groups. The treatment group had more stimulating environments including more books, toys and activities at 6 months, but at three years the home environment differences had diminished between the groups. Though the children in the treatment group benefitted from more stimulating home environments, this did not result in improved child outcomes (Orri et al., 2019). Even though the researchers found no evidence of the effect of the programme on cognitive or socioemotional outcomes, it was one of the few studies to examine the effect of the home learning environment on socioemotional development.

Therefore, while a number of studies have examined the effect of language and shared reading on socioemotional development (Aram & Aviram, 2009: Rose et al., 2018; Schapira & Aram, 2020; Wirth et al., 2020), or vocabulary and other covariates such as positive and negative aspects of the parent child relationship (McNally et al., 2019a), less is known about the effect of other activities in the home learning environment, such as songs or painting and drawing. Overall, within the literature on the home learning environment, there seems to be mixed findings regarding the importance of the home learning environment for socioemotional development. It may be that the home learning environment may have greater impact in families with lower SES, or with lower levels of education or parenting skills (Melhuish et al., 2008). It is important therefore that factors such as these are considered in research on this topic.

The Current Study

The current study has four aims. The first aim of the current study was to investigate the role of the home learning environment on different aspects of socioemotional development. While a number of recent studies have examined the effect of particular activities on socioemotional outcomes (Rose et al., 2018; Wirth et al., 2020) and found support for language skills and reading for socioemotional development, there have been mixed results about the direct effect of other activities on socioemotional outcomes (Wirth et al., 2020). The current research aims to explore the role of the home learning environment across socioemotional domains.

The second aim was to explore if different types of play and learning activities had different effects on different aspects of socioemotional development. While research has examined the benefits of reading for socioemotional development (Kuo et al., 2004;

Rose et al., 2018; Vanobbergen et al., 2009; Weisleder et al., 2019), few studies have examined the effect of other play and learning activities (e.g., painting and drawing or playing games) on socioemotional outcomes. The third aim of the current study was to determine if play and learning activities in early childhood continued to have an effect on later socioemotional development. Some research has examined this recently (O'Farrelly et al., 2018; Rose et al., 2018) but it is an area that needs further investigation.

The final aim was to examine the multiple layers that influence a child's development using a bioecological approach (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 2006). Research to date has indicated that a number of factors such as warmth (Gibbs et al., 2018), having siblings (McHale et al., 2012) and environmental factors such as family income (Palmer et al., 2013) influence socioemotional development. We wanted to see what effect play and learning activities had when we controlled for the influence of a number of family and other factors. Considering these four aims, this chapter therefore addresses the following research questions:

1. Do different types of play and learning activities at age three contribute to different aspects of socioemotional development even after family and other factors are accounted for?

2. Do different types of play and learning activities at age three contribute to different aspects of socio-emotional development at age five, even after family and other factors are accounted for?

Study 3: Do different types of play and learning activities at age 3 contribute to different aspects of socio-emotional development, even after family and other factors are accounted for?

As in the previous chapter, this study used data from the Growing Up in Ireland Study, a nationally representative probability sample. The studies reported in this chapter involve a secondary analysis of the infant cohort datasets at age three. Socioemotional development was measured at age three using the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). The Strength and Difficulties Questionnaire (SDQ) is a parental report behaviour screening questionnaire for 3 to 16-year olds. The SDQ has been widely used (e.g., Hartas, 2015; Niklas et al., 2016), including by other longitudinal studies, for example the Millenium Cohort Study (e.g., Kelly et al., 2011). The SDQ allows measurement of a number of areas of socio-emotional development and is simple and quick to administer. In the previous studies we found that play and learning activities contribute to cognitive development when we consider family and other factors also. This study wants to explore if play and learning activities at age three, contribute to different aspects of socioemotional development, including the same family and other factors.

Method

Participants

The current study consisted of 9,793 children, age three (50.7% males and 49.3% females) which make up the GUI infant cohort at the second wave of data collection.

Materials

Outcome variable. (SDQ; Goodman, 1997). Socioemotional development was measured using the Strengths and Difficulties Questionnaire, a 25-item behavioural screening questionnaire designed to assess emotional health and problem behaviours The questionnaire is comprised of 5 subscales: the ‘Emotional Problems’ scale, the ‘Conduct Problems’ scale, the ‘Hyperactivity’ scale, the ‘Peer Problems’ scale, and the ‘Prosocial’ scale. All subscales contain 5 questions, which can be answered on a 3-point Likert scale, ‘Not true’, ‘Somewhat true’, and ‘Certainly true’, which are scored 0, 1 and 2 respectively.

Parents were asked to respond to a total of 25 items about child’s emotional health and well-being (e.g., ‘Generally obedient, usually does what adults request’). Each subscale includes five items that parents reply to on a Likert scale (0 = not true, 1 = somewhat true, 2 = certainly true). Scores range between 0 and 10 on each subscale. A higher score on any of the subscales (i.e., conduct problems, or peer problems or internalising and externalising subscales), with the exception of the Prosocial scale of the SDQ indicates a greater number of emotional and behavioural problems. A Total Difficulties score can be calculated by summing four of the subscales: Conduct Problems, Hyperactivity, Emotional symptoms, Peer Problems (Pro-social behaviour scores are not included). A score between 14 and 16 on the Total Difficulties subscale is classified as ‘Slightly raised’, a Total Difficulty score above 17 is classified as ‘High’ and between 20 and 40 is ‘Very high’.

The subscales can also be combined to measure Internalising problems and Externalising problems, which is the approach adopted in the current study. The Internalising subscale combines the emotional problems and peer problems subscales. The Externalising subscale combines hyperactivity and conduct problems subscales. Goodman et al. (2010) suggests that this approach is preferable to other socioemotional measures in community and low risk samples. We also used the Prosocial subscale as a measure of positive Prosocial development. Using the individual subscales or a five factor model may be better in high-risk populations (Goodman & Goodman, 2011; Sosu & Schmidt, 2017). No Cronbach's alpha is reported for the original SDQ; however, a recent study examined its psychometric properties. Husky et al. (2020) examined the SDQ across seven countries, they found internal consistency of between 0.60 to 0.85 for the parent report form of the SDQ. Within these ranges, the researchers reported significant cross country differences. In the GUI study, the individual items of the SDQ were not available in the data so it was not possible to calculate Cronbach's alphas for the subscales.

Predictor Variables. As described in the previous chapter on cognitive development, the primary caregiver was asked how many days per week anyone in the home engaged in the same six play and learning activities: (i) read to the child, (ii) learn the ABC or alphabet, (iii) learn numbers or counting, (iv) learn songs, poems or nursery rhymes, (v) play games (i.e., board, games, jigsaws, card games), and finally how often the child (vi) paints, draw, colour or play with play-doh.

Control Measures/Co-variates.

The measures of family and other influences that were described in Chapter Three were again used to consider the role of the home environment on socioemotional development and are described in detail in Study 1. These were measures of the parent child relationships (e.g., warmth, hostility and closeness); child relationship factors (e.g., if they had siblings or not and whether the child attended non-parental childcare for eight hours or more per week) and environmental influences (e.g., maternal education reduced to four categories and family income equivalised annual household income). As before, they were entered in blocks mirroring Bronfenbrenner's bioecological model, with parent child relationship factors entered in block 2, child relationship factors in block 3 and broader environmental factors entered in block 4.

Procedure

A trained field interviewer conducted face to face interviews with both parents in the home, or in lone parent households, with the primary caregiver only. A range of measures, including the measures of socioemotional development, were collected at each stage of data collection. In the current study, all statistics are weighted.[2]

Analysis

This study used hierarchical regressions analysis to examine the effect of play and learning activities in the home on three aspects of socioemotional development: Internalising, Externalising, and Prosocial behaviours. Separate ordinary least squares regressions were used to determine the extent to which each of the predictor variables, the six individual play and learning activities (i.e., reading, ABCs, numbers, songs, games, painting/drawing) predicted scores on the three outcome measures, independently of the other activities and independently of the control variables, parent child relationship, child relationships and environmental factors (blocks 2-4).

[2] Additional information about sampling, measures used and methodology etc. in the Growing Up in Ireland Study can be found at https://www.growingup.ie or see Murray et al., (2019) for additional information

Results

Sample Characteristics and Descriptive Statistics

In the previous chapter, Table 4 described the sample characteristics of the current study. Selection of the variables for use in the current study have also been described in detail in the previous chapter, including Table 2 and the same covariates described there were included in the current study. In addition, Table 15 below describes the scaled outcome measures in the current study.

Table 15 Descriptive Statistics of Scaled Measures at age three

		Wgt % or mean (SD)	Unweighted n
SDQ (Age 3)	Internalising scores	2.50 (2.19)	9788
	Externalising scores	5.29 (3.34)	9786
	Prosocial scores	7.95 (1.76)	9786

The descriptive statistics in the previous chapter revealed that there is good parental engagement across each of the six play and learning activities. Figure 2 indicated three quarter of parents reported painting, engaging in number and counting games, singing songs and reading more than four days per week. Two thirds of parents engaged in games and over half of parents engaged in teaching letter games more than four days a week. Additional descriptive statistics were run on the frequency of play and learning activities and child socioemotional outcomes when the child was aged three.

When we examined frequency of engagement in play and learning activities, we found that a rich home environment with a mixture of the play and learning activities had a positive impact across each of the socioemotional outcome measures as shown in figures 7, 8 and 9 below. Mean scores for the negative subscales of Internalising and Externalising behaviour decrease as frequency of engagement (days per week) increased.

On the contrary, Prosocial scores, a positive subscale, increase as frequency of engagement in the activity increased.

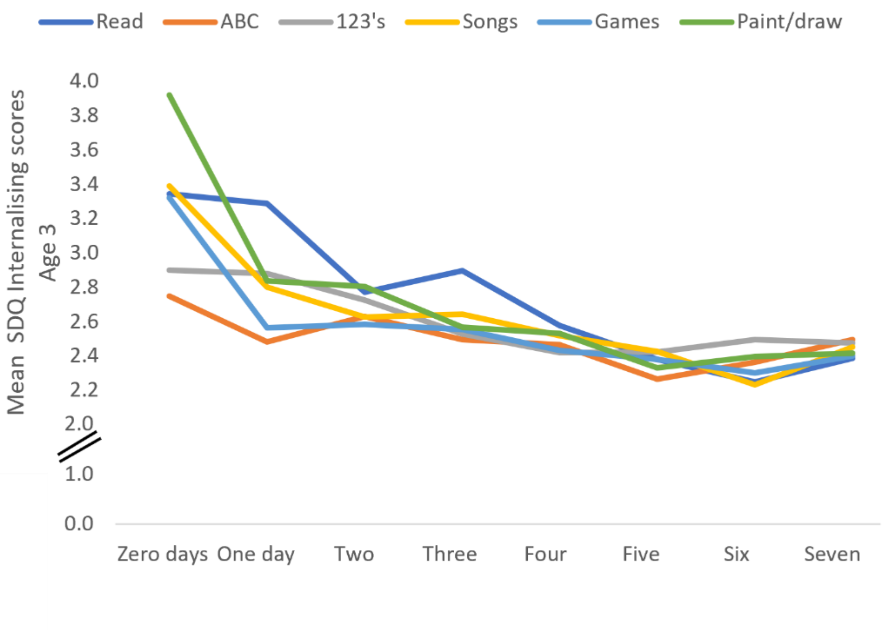

Figure 7 Mean SDQ Internalising scores Age 3 and Frequency of Parental Engagement in Play Activities

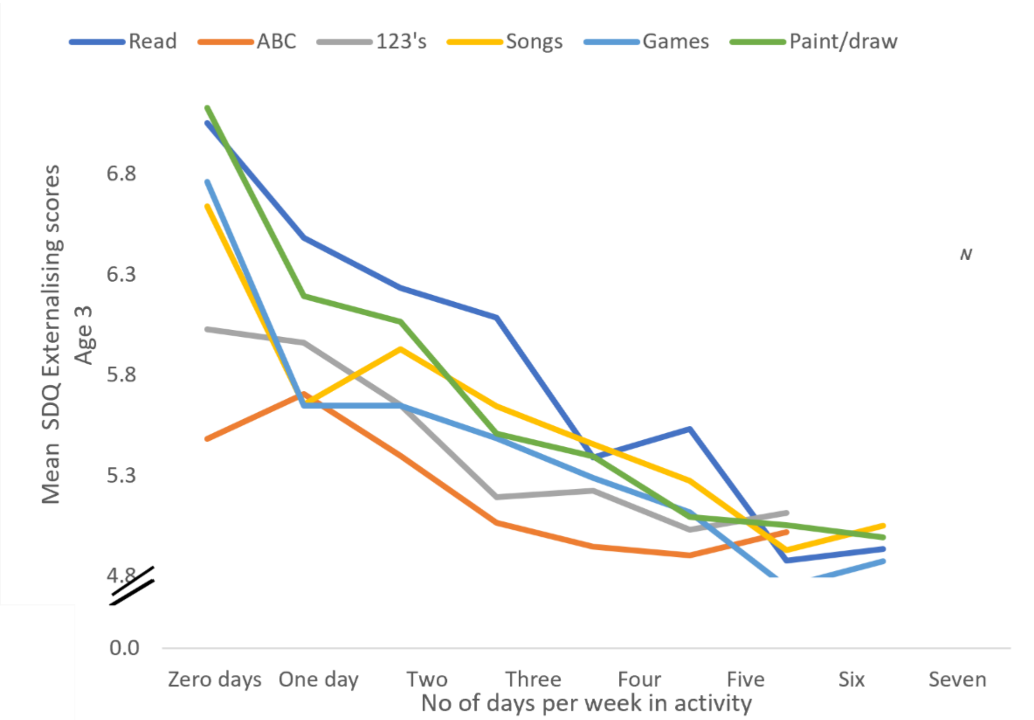

Figure 8 Mean SDQ Externalising scores Age 3 and Frequency of Parental Engagement in Play Activities

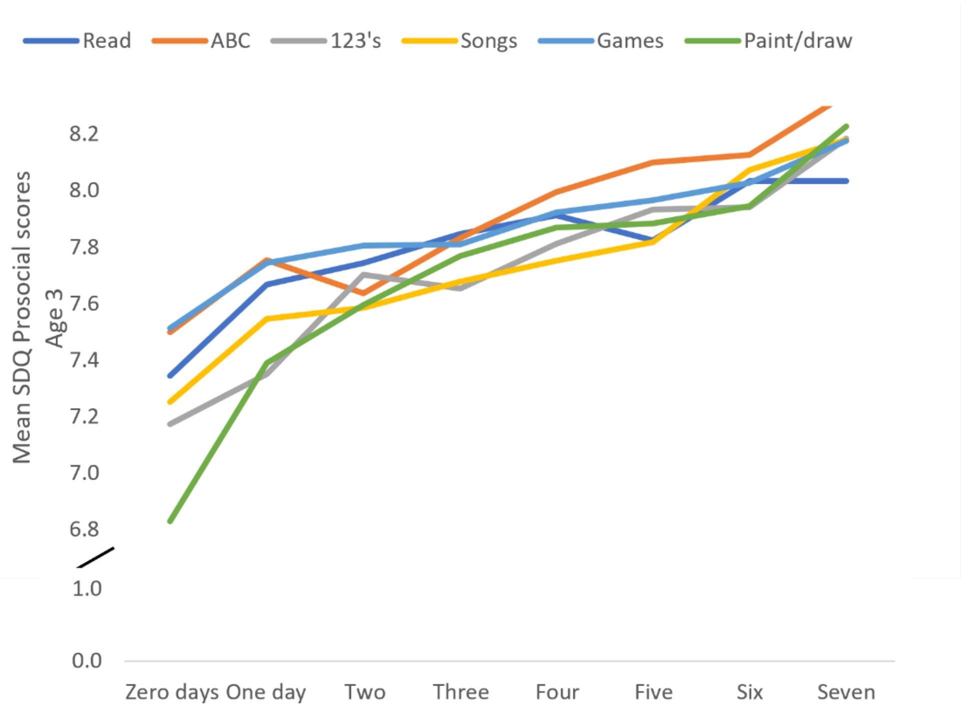

Figure 9 Mean SDQ Prosocial scores Age 3 and Frequency of Parental Engagement in Play Activities

Table 16 Mean scores for the SDQ scales at age three

	SDQ Internalising		SDQ Externalising		SDQ Prosocial	
Activities	0 days	7 days	0 days	7 days	0 days	7 days
Read	3.3	2.4	7.1	5.5	7.3	8.0
ABC’s	2.7	2.5	5.5	4.9	7.5	8.3
123’s	2.9	2.5	6.0	5.0	7.2	8.2
Songs	3.4	2.5	6.6	5.3	7.3	8.2
Play Games	3.3	2.4	6.8	5.1	7.5	8.2
Paint/Draw	3.9	2.4	7.1	5.1	6.8	8.2

Correlational Analysis

Correlational analyses were conducted between the socioemotional development scores, SDQ Internalising, Externalising and Prosocial scores, and the predictor variables. The results from these analyses showed significant correlations between most of the covariates and the outcome variables. The correlations were generally higher for Externalising than Internalising scores, for example, there was a significant negative correlation between reading and Externalising scores, $r = -.16$, $n = 9785$, $p < .001$ and a significant negative correlation between reading and Internalising scores, $r = -.10$, $n = 9787$, $p < .001$. Table 17 below summarises the Pearson product-moment correlation coefficients between the predictor variables and the socioemotional outcome variables in GUI, at age 3. These correlations also examined the covariates (e.g., child relationship covariates of siblings and childcare environmental covariates, as well as maternal education and usual situation regarding work and socioemotional outcomes). There were no significant correlations between the child relationship variables siblings and childcare and the socioemotional outcomes, with the exception of a small significant correlation between siblings and SDQ Prosocial scores, $r = .02$, $n = 8687$, $p = .038$. Table 17 below, summarises the Pearson product-moment correlation coefficients between the covariates and the socioemotional outcome variables at age three.

Table 17 Intercorrelations for Scores on Covariates and Outcome Variables for Socioemotional Development at Age 3

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.Read to child																	
2.ABC or alphabet	.19**																
3.Numbers or counting	.24**	.50**															
4. Songs, poems or nursery rhymes	.27**	.36**	.44**														
5.Play games	.26**	.25**	.25**	.28**													
6.Paint, draw, colour, or play with play-doh at home	.18**	.20**	.24**	.25**	.31**												
7.Warmth subscale	.08**	.16**	.18**	.19**	.12**	.12**											
8.Hostility subscale	-.11**	-.14**	-.13**	-.13**	-.12**	-.20**	-.29*										
9.Consistency subscale	.22**	.07**	.12**	.11**	.13**	.07**	.09**	-.28**									
10.PCG positive subscale	.10**	.10**	.11**	.12**	.08**	.13**	.24**	-.20**	.14**								
11.PCG conflict subscale	-.10**	-.09**	-.08**	-.08**	-.09**	-.08**	-.21**	.49**	-.24**	-.24**							
12.W2 siblings	.02*	-0.01	0.02	0.02	0.01	.03**	0.01	-0.02	0.02	0.01	0.00						
13.W2 Childcare 8 plus hours	0.01	-0.01	0.00	0.00	-0.01	-0.02	-0.01	0.00	0.02	0.00	0.00	-.10**					
14.PCG highest education	0.02	-0.01	0.00	-.02*	0.00	0.00	-.02*	0.01	0.01	0.00	0.00	.02*	.26**				
15.Equivalised Household Annual Income	.22**	-.06**	.02	.02	0.7**	-.02	0.01	0.16**	0.03**	-0.07**	-0.03*	0.02	0.02	.08**			
16.SDQ Internalising	-.10**	-.04**	-.04**	-.06**	-.08**	-.08**	-.13**	.24**	-.18**	-.24**	.30**	-0.02	0.01	-.022*	-0.01		
17.SDQ Externalising	-.16**	-.09**	-.08**	-.10**	-.14**	-.12**	-.17**	.46**	-.29**	-.24**	.55**	-0.01	0.00	-0.01	0.00	.33**	
18.SDQ Prosocial subscale	.07**	.16**	.14**	.14**	.10**	.15**	.25**	-.28**	.17**	.30**	-.27**	.02*	0.00	-0.01	0.02	-.26**	-.36**

* significant at .05 level (2-tailed), ** significant at .01 level (2-tailed).

Regression Analysis

A number of hierarchical regressions were conducted to investigate the impact of the play and learning activities at age three on socioemotional outcomes (e.g., SDQ Internalising, Externalising and Prosocial scores). The assumption of linearity was met for all variables. As for all the regressions, a visual inspection of P-P plots demonstrated that the assumption of normality was met for the analysis. The assumption of multicollinearity was met by examining bivariate correlations, and tolerance values greater than 0.1 and reciprocal VIF values less than 10 were observed for all variables (Field, 2018). The assumption of homoscedasticity was met and observed via visual inspection of a plot of standardised residuals versus standardized predicted values. Cases with standardised residuals greater than +/- 3.29 were removed as were cases that were two or more standard deviations from the mean. Outliers were checked by examining the Mahalanobis distances which indicated there were cases that exceeded the critical value (Field, 2018; Pallant, 2016) and these cases were removed from the analysis.

The covariates were entered into the regression model the same order as reported in the previous chapter, to represent the nested influences of Bronfenbrenner's model, with play and learning activities (e.g., reading, ABCs, numbers, songs, games, painting/drawing) entered at block 1, followed by the variables of parent child relationship (e.g., warmth, hostility and closeness) at block 2. In the third block, two child relationship factors were included: having siblings and attending childcare. The final block included environmental factors of maternal education, and family income. Each of the regression models had one of the SDQ Internalising, Externalising and Prosocial as the criterion variable. These three regression models are presented below.

SDQ Internalising. A hierarchical regression was conducted to investigate the impact of play and learning activities at age three on the SDQ Internalising score. The results indicated that at block 1, play and learning activities significantly predicted scores, $R^2 = .008$, $F(6, 5363) = 7.59$, $p < .001$, accounting for 0.8% of variance in Internalising scores (See Table 18). An examination of the standardised B coefficients indicated that parental engagement in reading and painting and drawing were significant contributors to the first model. After examining the contribution of the covariates, (parent child relationship, child relationships and environmental factors) results showed that in the final model reading, number games and painting and drawing significantly predicted scores on the SDQ Internalising subscale at age 3, $R^2 = .085$, $F(15, 5354) = 32.88$, $p < .001$ accounting for 8.4% of variance in the model.

Numbers, (β = -.046), which had not predicted scores at block 1 was significant in the second model, and β increased from .031 to .047 between block 1 and 2. Comparing across the β values in the final model indicated that higher levels of hostility (β = .192), followed by low levels of closeness (β = -.141), and maternal education to leaving cert (β = .082), numbers (β = .046), maternal education to certificate (β = .039), painting and drawing (β = -.032) and reading (β = -.035), made the largest contribution to the final regression model, all *p*'s < .05.

Table 18 Hierarchical Regression Analysis predicting three year olds' Internalising scores

Step and Predictor Variables	**SDQ- Internalising- Age** 3			
Weighted age 3yra	Model 1	Model 2	Model 3	Model 4
	(β)	(β)	(β)	(β)
Play Activities				
- Reading	-0.052***	-0.040**	-0.040**	-0.035*
- ABCs	0.008	0.025	0.023	0.020
- Numbers	0.031	0.047*	0.047*	0.046*
- Songs	-0.023	-0.004	-0.004	-0.004
- Play games	-0.023*	-0.014*	-0.015	-0.013
- Paint and draw	-0.061*	-0.031*	-0.031*	-0.032*
Parent-child relationship:				
- Warmth		-0.021	-0.021	-0.020
- Hostility		0.195***	0.195***	0.192***
- Closeness		-0.140***	-0.140***	-0.141***
Child relationship:				
- Siblings			-0.016	-0.012
- Childcare			-0.015	-0.006
Environmental factors:				
- Junior Cert or less - (ref Degree or higher)				0.009
- Leaving certificate or equiv.				0.082***
- Sub-degree				0.039*
- Income				-0.016
R^2 △	0.8%, p< .001	7.0%, p< .001	0.0%, n.s.	0.5%, p< .001
Total R^2 adjusted				8.2%, p< .001

**p* <.05, ***p* <.01, *** p <.001, *n.s* = not significant

SDQ Externalising. Next a hierarchical regression was conducted to investigate the impact of play and learning activities at age three on the SDQ Externalising score. The model indicated that at block 1, that play and learning activities significantly predicted Externalising scores, R^2 =.032, $F(6, 5629) = 30.94$, p <.001, accounting for 3.1% of the variance (See Table 19). An examination of the standardised B coefficients indicated that, similar to the internalising scores, parental engagement in reading, playing games and painting and drawing were significant contributors to the first model and associated with lower externalising scores. After controlling for the influence of the covariates (parent child relationship, child relationships and environmental factors) results showed that in the final model reading, games, painting and drawing and engaging in numbers and counting, continued to significantly predict 7scores on the SDQ Externalising subscale at age three, R^2 =.227, $F(15, 5620) = 110.04$, p <.001, with these covariates explaining 22.7% of variance in the model.

Engaging in numbers and counting was not significant in the first model but was significant in block 2, 3 and the final model. Numbers and counting appeared to be associated with increased internalising and externalising scores. Comparing across the β values in the final model indicated that high levels of hostility (β =.406) made the largest contribution to the final regression model followed by low levels of closeness (β = -.116), reading (β = -.072), playing games (β = -.056), painting and drawing (β = -.033), numbers (β =.038) and maternal education to leaving cert (β =.028). all *p*'s < .05.

Table 19 Hierarchical Regression Analysis predicting three year olds' Externalising scores

Step and Predictor Variables	**SDQ- Externalising- Age 3**			
Weighted age 3yra	Model 1 (β)	Model 2 (β)	Model 3 (β)	Model 4 (β)
Play Activities				
- Reading	-0.095***	-0.074*	-0.079***	-0.072***
- ABCs	-0.021	0.008	0.008	0.006
- Numbers	-0.005	0.038*	0.038*	0.038*
- Songs	-0.010	0.008	0.007	0.008
- Play games	-0.079***	-0.056***	-0.056***	-0.056***
- Paint and draw	-0.067***	-0.032*	-0.033*	-0.033*
Parent-child relationship:				
- Warmth		-0.021	-0.022	-0.022
- Hostility		0.406***	0.406***	0.406***
- Closeness		-0.115***	-0.115***	-0.116***
Child relationship:				
- Siblings			0.010	0.011
- Childcare			-0.017	-0.014
Environmental factors:				
- Junior Cert or less - (ref Degree or higher)				0.016
- Leaving certificate or equiv.				0.028*
- Sub-degree				0.000
- Income				-0.008
R^2 △	3.2%, p < .001	19.4%, p < .001	0.0%, n.s.	0.1%, n.s.
Total R^2 adjusted				22.7%, p < .001

* *p* <.05, ***p* <.01, *** p <.001, *n.s.*= not significant

SDQ Prosocial. Lastly, a hierarchical regression investigating the impact of play and learning activities at age three on the SDQ Prosocial subscale at age three indicated that at block 1, the activities accounting for 4.1% of variance in Prosocial scores, $R^2 = .041$, $F(6, 5591) = 39.34$, $p < .001$, (See Table 20). An examination of the standardised B coefficients indicated that parental engagement in painting and drawing, ABC's, numbers, songs and and painting and drawing were significant contributors to the first model. When the influence of the covariates was examined (parent child relationship, child relationships and environmental factors), results showed that in the final model, parental engagement in painting and drawing, songs and ABC's continued to significantly predict scores on the SDQ Prosocial scale, $R^2 = .160$, $F(15, 5582) = 70.83$, $p < .001$ and accounted for 16% of variance in Prosocial scores.

However, the effect of numbers and playing games were no longer significant in the final model. Comparing across the β values in the final model indicated that all the parent child relationship factors, low hostility ($\beta = -.195$), high levels of closeness ($\beta = .178$) and warmth ($\beta = .131$), followed by ABC's ($\beta = .055$), painting and drawing ($\beta = .041$), and songs ($\beta = .030$) made the largest contribution to the final regression model, all p's < .05. P-P plots and scatter plots for all three regressions are included in Appendix D.

Table 20 Hierarchical Regression Analysis predicting three year olds' Prosocial scores

Step and Predictor Variables	**SDQ- Prosocial- Age** 3			
	Model 1 (β)	Model 2 (β)	Model 3 (β)	Model 4 (β)
Play Activities				
- Reading	-0.014	-0.024	-0.024	-0.024
- ABCs	0.076***	0.054***	0.055***	0.055***
- Numbers	0.057***	0.024	0.023	0.023
- Songs	0.058**	0.030*	0.030*	0.030*
- Play games	0.038*	0.026	0.026*	0.026
- Paint and draw	0.077***	0.042***	0.042***	0.041**
Parent-child relationship:				
- Warmth		0.131***	0.132***	0.131***
- Hostility		-0.195***	-0.195***	-0.195***
- Closeness		0.178***	0.178***	0.178***
Child relationship:				
- Siblings			0.022	0.023
- Childcare			0.009	0.009
Environmental factors:				
- Junior Cert or less				-0.006
- (ref Degree or higher)				
- Leaving certificate or equiv.				0.002
- Sub-degree				-0.010
- Income				0.018
R^2 △	4.1%, p < .001	11.8%, p < .001	0.1%, n.s.	0.0%, n.s.
Total R^2 adjusted				16.0%, p < .001

* *p* <.05, ***p* <.01, *** p <.001, *n.s.*= not significant

Summary of Findings

Overall, the findings show that play and learning activities have a strong influence on current socioemotional outcomes. The results of the analyses for SDQ Internalising, Externalising and Prosocial scales are displayed in Tables 18 to 20 above. By block 4 when the main predictors are entered into each model along with the family and other factors, the findings indicate that painting and drawing, reading, and numbers and counting games, contribute to both internalising and externalising scores. However, number games contribute to higher internalising and externalising scores at age three, whereas the other activities reduce the scores. The play and learning activities also contribute to higher prosocial scores with the activities painting and drawing, ABC's, and songs contributing to prosocial scores. Overall, all of the significant play activities have a positive effect on the socioemotional outcomes with the exception of number and counting games which is associated with higher internalising and externalising scores.

Examining the fully-adjusted final models, we note that a number of the control variables had a significant effect on the three socioemotional scores. The parent child relationship factors hostility and closeness had a positive effect on all three socioemotional scores, while warmth also had a positive effect but only in on prosocial scores. Maternal education to leaving cert (i.e., in comparison to the reference category of degree or higher) was associated with both higher internalising and externalising scores but not for levels of education lower than junior cert. Maternal education to certificate/diploma was also associated with lower internalising scores than mothers with leaving certificate again in comparison to the reference category of degree or higher, though scores were lower than for mothers with leaving cert education. Finally, having siblings, attending non-parental childcare and family income had no associations with any of the socioemotional scores. Having examined the effect of play and learning activities on current development, we were also interested if parental engagement in play and learning activities using covariates at age three, influenced socioemotional development at age five.

Table 21 Percentage of Variance (R^2) in the SDQ Outcome Variables at Age three Explained at each Block of the Regression Model

	SDQ Internalising Age 3	SDQ Externalising Age 3	SDQ Prosocial Age 3
Block 1: *(Predictor Variable)*	0.8%***	3.2%***	4.1%***
Block 2: *(Block 1 +Warmth, Hostility, Closeness)*	7.8%***	22.6%***	15.9%***
Block 3: (*Block 2 +Siblings and Childcare)*	7.9%	22.6%	15.9%
Block 4: *(Block 3 +Maternal Education and Family Income)*	8.4%***	22.7%	15.9%

* *p* <.05, ***p* <.01, *** p <.0

Study 4: Do different types of play and learning activities at age 3 contribute to different aspects of socio-emotional development at age 5, even after family and other factors are accounted for?

The previous study demonstrated that play and learning activities have an effect on current socioemotional development, with play and learning activities having an effect on different aspects of current socioemotional developemnt (e.g., greater effect on Prosocial scores than Internalising or Externalising scores). It also demonstrated that the parent and child relationship contributed more to outcomes than the play and learning activities themselves. The current study aimed to explore if parental engagement in activities at age three continued to have an effect at age five even after family and other factors were accounted for. As in Study 2, the covariates included in the study were measured at age three.

Method

Participants

The sample consisted of 9,001 children, aged five (50.7% males and 49.3% females) which make up the third wave of the GUI infant cohort.

Table 22 Sample Characteristics and Descriptive Statistics

		Wgt % or mean (SD)	Unweighted n
SDQ (Age 5)	Internalising scores	2,47 (2.41)	8997
	Externalising scores	4.72 (3.35)	8996
	Prosocial scores	8.42 (1.66)	8997

As previously described, sample characteristics are the same throughout the studies. Descriptive statistics for the scaled /outcome measures in the current study are described in Table 22 above.

Materials

Outcome Variable. Socioemotional development was measured at age five using the same measure as at age three, the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). Parents were asked to respond to a total of 25 items about child's emotional health and well-being (e.g., Generally obedient, usually does what adults request). Each subscale includes five items that parents reply to on a Likert scale (0 = not true, 1 = somewhat true, 2 = certainly true). As before, the subscales were combined to calculate a score for Internalising difficulties and a separate score for Externalising difficulties. The third scale used in the analysis was the Prosocial scale.

Paired sample t tests were conducted between SDQ Internalising, Eternalising scores and Prosocial scores at age three and age five. There was no statistically significant increase in Internalising scores between age 3 (M = 2.48, SD = 2.16) and age 5 (M = 2.47, SD = 2.40), t (8703) = .282, p = .778 (two-tailed). However, there was a statistically significant decrease in Externalising scores between age 3 (M = 5.23, SD = 3.31) and age 5 (M = 4.7, SD = 3.35), t (8700) = 15.54, p < .001 (two-tailed). The mean decrease was .53 with a 95% confidence interval ranging from .462 to .595. The eta squared statistic (.03) indicated a small effect size. For Prosocial score there was also a statistically significant increase in scores between age 3 (M = 7.95, SD = 1.75) and age 5 (M = 8,42, SD = 1.66), t (8701) = -24.42, p < .001 (two-tailed). The mean increase was .46 with a 95% confidence interval ranging from -.50 to -.43. The eta squared statistic (.06) indicated a moderate effect size. Overall, there was no significant change in Internalising scores between age three and five. In contrast externalising score reduced between age three and five. Also significant was the increase in Prosocial scores.

Play and Learning Activities**.** The frequency of parental engagement in six play and learning activities at age three (described in Study 3) were again used to investigate the role of play and learning activities on socioemotional development at age five. Primary caregivers (PCG's) indicated how frequently (how many times per week) anyone in the home engaged in the activities with the child.

Control Measures/Covariates.

As in the previous analyses, the same measures of family and other influences were used to consider the role of the home environment on socioemotional development. As before, they were entered in blocks with parent child relationship factors entered in block 2, child relationship factors in block 3 and broader environmental factors entered in block 4 to imitate Bronfenbrenner's bioecological model.

Procedure

As described earlier, a trained field interviewer held face to face interviews with parents in their home. A range of measures including the measures of socioemotional development, were collected. In the current study, all statistics are weighted.

Analysis

This study used hierarchical regression analysis to examine the effect of play and learning activities in the home on three aspects of socioemotional development, Internalising, Externalising and Prosocial behaviours. Separate ordinary least squares regressions were used to determine the extent to which each of the predictor variables, the six individual play and learning activities (e.g., reading, ABCs, numbers, songs, games, painting/drawing) at age three predicted scores on the three outcome measures at age five, independently of the other activities and independently of the control variables, parent child relationship, child relationships and environmental factors (blocks 2-4).

Results

Descriptive Statistics

The mean socioemotional scores were plotted against the number of days per week engaged in various play and learning activities. As at age five, we found that a rich home environment with a mixture of the play and learning activities at age three, continued to have a positive impact across each of the socioemotional outcome measures as shown in figures 9, 10 and 11 below. Children seemed to benefit from a home learning environment with lots of activities with mean scores for the negative subscale of Internalising and Externalising decreasing with increased frequency of engagement (days per week). In contrast, Prosocial scores, a positive subscale, increase as frequency of engagement in the activity increased.

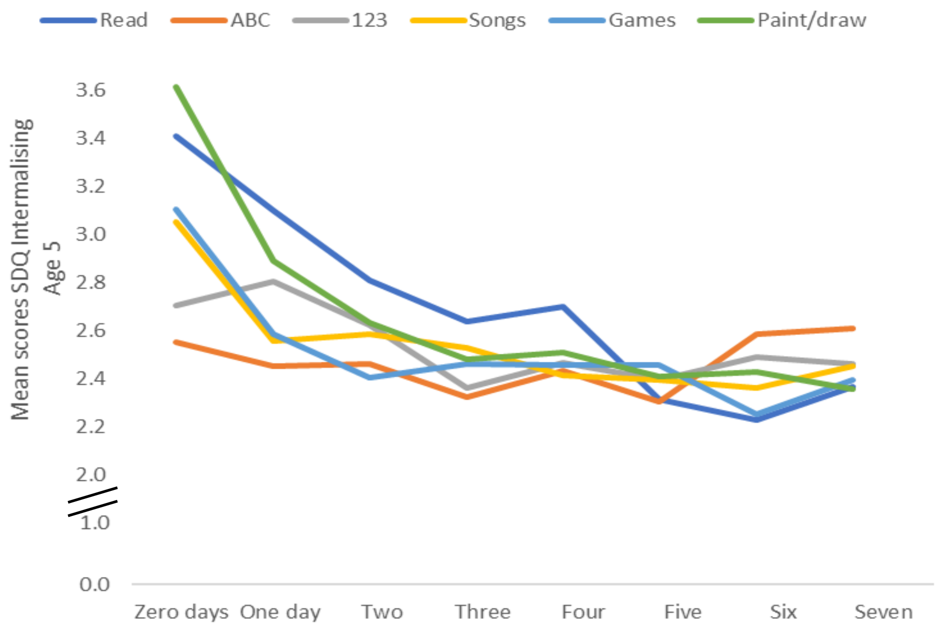

Figure 10. *Mean SDQ Internalising scores Age 5 and Frequency in Parental Engagement in Play Activities Age 3*

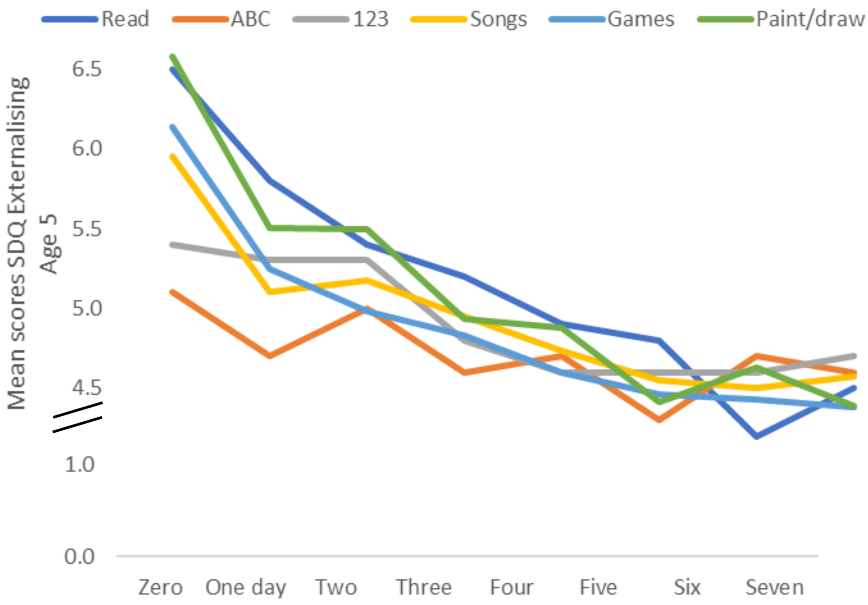

Figure 11. *Mean SDQ Externalising scores Age 5 and Frequency in Parental Engagement in Play Activities Age 3*

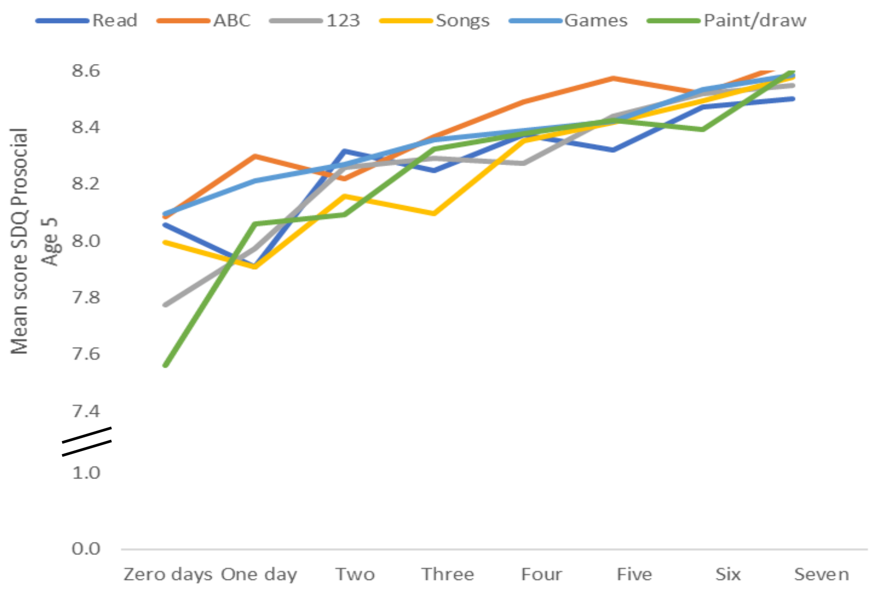

Figure 12. *Mean SDQ Prosocial scores Age 5 and Frequency in Parental Engagement in Play Activities Age 3*

Correlational Analysis

Pearson product-moment correlations were used to examine the relationship between the socioemotional development scores, SDQ Internalising, Externalising and Prosocial scores at age five and the predictor variables at age three. There were significant correlations between all the variables and the outcomes, except for letter and number games and Internalising scores. Correlations were weak between all socioemotional measures and the play and learning activities. The highest correlation for each socioemotional variable were Externalising and reading, a weak, negative correlation, r = -.13, n = 8703. p < .001. There was also a weak, negative correlation between Internalising scores and reading, r = -.08. n =8704. p < .001. The highest correlation for Prosocial scores was with songs, a weak, positive correlation, r = .12. n =8703. p < .001,

We also examined the relationship between the socioemotional scores at age five and the parent child, child relationship and environmental covariates at age three. Again, significant correlations were found between most of the covariates and the outcome variables. There was no significant correlation between siblings and SDQ scores or between childcare and the three socioemotional outcomes. All other correlations were significant. All correlations were weak, except for maternal hostility and Externalising scores, which observed a moderate positive correlation, $r = .32$. $n = 8701$. $p < .001$, See Table 23 below, for a summary of the correlations.

Table 23 Intercorrelations for Scores on Covariates and Outcome Variables for Socioemotional Development at Age 3

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.Read to child																	
2.ABC or alphabet	.19**																
3.Numbers or counting	.24**	.50**															
4.Songs, poems or nursery rhymes	.27**	.36**	.44**														
5.Play games	.26**	.26**	.25**	.28**													
6.Paint, draw, colour, or play with play-doh at home	.18**	.20**	.24**	.25**	.31**												
7.Warmth subscale	.08**	.16**	.18**	.19**	.12**	.12**											
8.Hostility subscale	-.11**	-.14**	-.13**	-.13**	-.12**	-.11**	-.29**										
9.Consistency subscale	.22**	.07**	.12**	.11**	.13**	.07**	.09**	-.28**									
10.PCG positive subscale	.10**	.10**	.11**	.12**	.08**	.13**	.24**	-.20**	.14**								
11.PCG conflict subscale	-.10**	-.09**	-.08**	-.08**	-.09**	-.08**	-.21**	.49**	-.24**	-.24**							
12.W2 siblings	.02*	-0.01	0.02	0.02	0.01	.03**	0.01	-0.02	0.02	0.01	0.00						
13.W2 Childcare 8+ hours	0.01	-0.01	0.00	0.00	-0.01	-0.02	-0.01	0.00	0.02	0.00	0.00	-.10**					
14.PCG highest education	0.02	-0.01	0.00	-.02*	0.00	0.00	-.02*	0.01	0.01	0.00	0.00	.02*	.26**				
15.Equivalised Household Annual Income	.22**	-.06**	.02	.02	0.7**	-.02	0.01	0.16**	0.03**	-0.07**	-0.03*	0.02	0.02	.08**			
16.SDQ Internalising	-.08**	0.01	-0.02	-.03**	-.05**	-.06**	-.08**	.18**	-.11**	-.16**	.24**	0.00	-0.01	-0.02	-0.01		
17.SDQ Externalising	-.13**	-.05**	-.06**	-.07**	-.12**	-.12**	-.11**	.32**	-.18**	-.18**	.36**	-0.01	0.01	-0.01	-0.01	.35**	
18.SDQ Prosocial subscale	.07**	.11**	.10**	.12**	.09**	.11**	.19**	-.21**	.13**	.24*	-.21**	0.00	0.01	-.03**	-0.01	-.24**	-.39**

* significant at .05 level (2-tailed), ** significant at .01 level (2-tailed).

Regression Analysis

A series of hierarchical regressions were conducted to explore if parental engagement in the individual play and learning activities at age three had a longitudinal effect on the socioemotional measures (e.g., SDQ Internalising, Externalising and Prosocial scores) at age five, while using covariates for the child, age three. The assumption of linearity was met for all variables. A visual inspection of P-P plots demonstrated that the assumption of normality was met for the analysis. The assumption of multicollinearity was met by examining bivariate correlations, and tolerance values greater than 0.1 and reciprocal VIF values less than 10 were observed for all variables (Field, 2018). The assumption of homoscedasticity was met and observed via visual inspection of a plot of standardised residuals versus standardized predicted values. Cases with standardised residuals greater than +/- 3.29 were removed as were cases that were two or more standard deviations from the mean. Outliers were checked by examining the Mahalanobis distances which indicated there were cases that exceeded the critical value (Field, 2018; Pallant, 2016) and these cases were removed from the analysis.

SDQ Internalising. Examining internalising scores first, the results indicated that at block 1, play and learning activities significantly predicted scores, $R^2 = .011$, $F(6, 4924) = 9.22$, $p < .001$, accounting for 1.1% of variance (See Table 24 below). An examination of the standardised B coefficients indicated that parental engagement in reading, ABC's, and painting and drawing were significant contributors to the first model. Childcare was a significant contributor in model 3 and 4, where attending non-parental care at age three was associated with a lower internalising score at age five.

After examining the contribution of the covariates (parent child relationship, child relationships and environmental factors) results showed that in the final model, the three activities, reading, ABC's, and engaging in numbers and counting at aged three, continued to significantly predict scores on the SDQ Internalising subscale at age five, R^2 =.042, $F(15, 4915) = 14.38$, p <.001, accounting for 4.2% of variance in the model. Childcare continued to be significant when education and income were controlled for. Comparing across the β values in the final model indicated that high levels of hostility (β =.136), followed by reading (β = -.063), maternal education to leaving cert (β = .061) ABC's (β =.055) low levels of closeness (β = -.054), and painting and drawing (β = -.048) and finally childcare (β = -.032), made the largest contribution to the final regression model, all p's < .05.

Table 24 Hierarchical Regression Analysis predicting five year olds' Internalising scores

Step and Predictor Variables	**SDQ Internalising score - Age 5**			
	Model 1 (β)	Model 2 (β)	Model 3 (β)	Model 4 (β)
Play activities:				
- Reading	-0.074***	-0.066***	-0.066***	-0.063***
- ABC's	0.052*	0.060**	0.058**	0.055**
- Numbers	0.004	0.017	0.019	0.018
- Songs	0.018	0.025	0.025	0.024
- Play games	-0.013	-0.005	-0.006	-0.005
- Paint and draw	-0.061***	-0.047**	-0.047**	-0.048**
Parent-child relationship:				
- Warmth		-0.011	-0.012	-0.012
- Hostility		0.139***	0.138***	0.136***
- Closeness		-0.054***	-0.053***	-0.054***
Child relationship:				
- Siblings			-0.015	-0.012
- Childcare			-0.040*	-0.032*
Environmental factors:				
- Junior Cert or less				0.014
- (ref Degree or higher)				
- Leaving certificate or equiv.				0.061*
- Sub-degree				-0.004
- Income				-0.018
R^2 △	1.1%, p <.001	2.5%, p <.001	0.2%, n.s.	0.4%, p <.001
Total R^2 Adjusted				4.2%, p <.001

**p* <.05, ***p* <.01, *** p <.001, n.s = not significant

SDQ Externalising. A further hierarchical regression was conducted to test the association between the play and learning activities at age 3 on the SDQ Externalising scores at age 5. The results of the analysis indicated that at block 1, play and learning activities significantly predicted scores on the SDQ Externalising subscale, R^2 =.025, $F(6, 4960) = 21.26$, p <.001, explaining 2.5% of variance in Externalising scores (See Table 25). An examination of the standardised B coefficients indicated that parental engagement in reading, playing games and painting and drawing, were significant contributors to the first model.

After controlling for the influence of the covariates, results showed that parental engagement in playing games, painting and drawing and reading at aged 3 three, continued to significantly predict scores on the SDQ Externalising subscale at age five, R^2 =.110, $F(15, 4951) = 40.68$, p <.001. Comparing across the β values in the final model indicated that high levels of hostility (β =.269) made the largest contribution to the final regression model followed by low levels of closeness (β = -.077), reading (β = -.068), painting and drawing (β = -.059), playing games (β = -.052) and maternal education to junior cert (β = .036), all p's < .05.

Table 25 Hierarchical Regression Analysis predicting five year olds' Externalising scores

Step and Predictor Variables	SDQ Externalising Score – Age 5			
	Model 1 (β)	Model 2 (β)	Model 3 (β)	Model 4 (β)
Play activities :				
- Reading	-0.083***	-0.068***	-0.068***	-0.068***
- ABC's	0.017	0.031	0.029	0.028
- Numbers	-0.007	0.017	0.017	0.018
- Songs	0.011	0.020	0.020	0.019
- Play games	-0.068***	-0.053**	-0.053**	-0.052***
- Paint and draw	-0.082***	-0.057***	-0.058***	-0.059***
Parent-child relationship:				
- Warmth		0.000	0.000	-0.002
- Hostility		0.274***	0.269***	0.269***
- Closeness		-0.075***	-0.075***	-0.077***
Child relationship:				
- Siblings			-0.009	0.009
- Childcare			-0.019	-0.017
Environmental factors:				
- Junior Cert or less - (ref Degree or higher)				0.036*
- Leaving certificate or equiv.				0.019
- Sub-degree				-0.005
- Income				0.004
R^2 △	2.5%, p <.001	8.3%, p <.001	0%, n.s.	0.1%,p <.001
Adjusted R^2				10.7%, p <.001

* *p* <.05, ***p* <.01, *** p <.001, *n.s.*= not significant

SDQ Prosocial. Lastly, a hierarchical regression investigating the impact of play and learning activities at age three on the SDQ Prosocial subscale at age five indicated that at block 1, the activities accounting for 2.1% of variance in Prosocial scores, R^2 =.021, $F(6, 4951)$ =17.94, p <.001, (See Table 26). An examination of the standardised B coefficients indicated that parental engagement in painting and drawing, ABC's, songs and playing games were significant contributors to the first model. When the influence of the covariates was examined (parent child relationship, child relationships and environmental factors), results showed that in the final model, parental engagement in ABC's activities at aged 3, continued to significantly predict scores on the SDQ Prosocial scale at age 5, R^2 =.088, $F(15, 4942)$ = 31.78, p <.001.

The activities songs, painting and drawing and playing games were no longer significant in the final model. Comparing across the β values in the final model indicated that all the parent child relationship factors, levels of closeness (β =.145) level of hostility (β = -.142), and warmth (β =.087), followed by ABC's (β =.042) made the largest contribution to the final regression model, all *p*'s < .05. P-P plots and scatter plots for all three regressions are included in Appendix E.

Table 26 Hierarchical Regression Analysis predicting five year olds' Prosocial scores

Step and Predictor Variables	SDQ Prosocial Score- Age 5			
	Model 1	Model 2	Model 3	Model 4
	(β)	(β)	(β)	(β)
Play activities:				
- Reading	-0.009	-0.017	-0.017	-0.016
- ABC's	0.058**	0.043*	0.043*	0.042*
- Numbers	0.030	0.004	0.004	0.004
- Songs	0.049**	0.030	0.030	0.030
- Play games	0.036*	0.029	0.029	0.029
- Paint and draw	0.047**	0.022	0.022	0.022
Parent-child relationship:				
- Warmth		0.085***	0.086***	0.087***
- Hostility		-0.142***	-0.141***	-0.142***
- Closeness		0.146***	0.145***	0.145***
Child relationship:				
- Siblings			0.012	0.013
- Childcare			0.000	0.003
Environmental factors:				
- Junior Cert or less (ref Degree or higher)				-0.007
- Leaving certificate or equiv.				0.023
- Sub-degree				0.016
- Income				-0.024
R^2 △	2.1% p <.001	6.5%, p <.001	0%, *n.s.*	0.1%, p <.001
Total R^2 Adjusted				8.5%, p <.001

* *p* <.05, ***p* <.01, *** p <.001, *n.s.*= not significant

Table 27 Percentage of Variance (R^2) in the SDQ Outcome Variables at Age 5 Explained at each Block of the Regression Model

	SDQ Internalising Age 5	SDQ Externalising Age 5	SDQ Prosocial Age 5
Block 1: *(Predictor Variable)*	1.1%***	2.5%***	2.1%***
Block 2: *(Block 1 +Warmth, Hostility, Closeness)*	3.6%***	10.8%***	8.7%***
Block 3: (*Block 2 +Siblings and Childcare)*	3.8%*	10.8%	8.7%
Block 4: *(Block 3 +Maternal Education and Family Income)*	4.2%***	11.0%	8.8%

* *p* <.05, ***p* <.01, *** p <.001

Summary of Findings

Overall, we found that play and learning activities at age three continue to have an influence on socioemotional outcomes at age five. Tables 24, 25 and 26, illustrate the results of the analyses for the three socioemotional outcomes at age five with the covariates at age three. When all the main predictors were entered into each model, the findings indicate that painting and drawing, ABC's and reading continued to predict internalising scores at age three in the final model. Painting and drawing, playing games and reading were the activities that predicted externalising scores whereas only ABC's predicted Prosocial scores in the final model.

All of the play and learning activities that predicted the socioemotional outcomes had a positive influence with the exception of ABC's. These had a negative influence on internalising scores as greater frequency of alphabet activities appeared to increase internalising scores. In contrast, parental engagement in alphabet activities had a small but significant positive influence on prosocial scores.

Play and learning activities explain 1.1% of variance in the SDQ Internalising model, 2.5% in the Externalising model and 2.1% of variance in the Prosocial model. When we examine the fully-adjusted final models, we note that a number of the control variables had a significant effect on the socioemotional scores. The parent child relationship factors hostility and closeness had a positive effect on all the outcomes and warmth also had a positive effect on prosocial behaviour. Attending childcare at age three appeared to have the effect of increasing internalising scores at age five. In contrast having siblings, appeared to have no impact on the outcomes. For internalising scores, maternal education of leaving cert or higher and for externalising scores, maternal education of junior cert or less (i.e., in contrast to the reference category degree or higher) resulted in increased scores for both outcomes.

The findings of the regression analyses conducted at both age three and age five highlight that play and learning activities were contributors to the three socioemotional outcomes, Internalising, Externalising and Prosocial behaviour. When we included the covariates of parent child relationship, child relationship and environmental factors, the parent child relationship contributes the greatest amount of unique variance to the outcomes. However, in all of the regression models some of the play and learning activities made significant unique contributions to predicting various in socioemotional outcome scores, even after the parent child relationship factors were accounted for. Details of the percentage of variance (R^2) explained by each block of the regression model on socioemotional outcome variables at age five are summarised in Table 27 above.

Discussion

The aim of the research presented in this chapter was to explore if the home learning environment had an effect on socioemotional development in early childhood in a nationally representative sample of three year old children. We also wanted to examine if there was a longer term effect of parental engagement in activities at age three on socioemotional outcomes at age five. The findings demonstrate that play and learning activities have a strong influence on current socioemotional outcomes and continue to have an influence when the child is aged five. The findings highlight that the home learning environment has a significant effect on the development of socioemotional skills in early childhood. A number of play and learning activities were found to have a different impact on different aspects of socioemotional development at age three. For example, painting and drawing benefitted Internalising, Externalising and Prosocial behaviours. Surprisingly, we also found that number games and counting had a negative influence on both Internalising and Externalising behaviour.

Our findings are consistent with Fantuzzo et al. (2004) who indicated that parental engagement in activities impacts positively on socioemotional development. At age three, painting and drawing and playing games, have an impact across the measures, though individual activities also had an influence. For example, reading benefitted internalising and externalising behaviour and teaching letters has a positive influence on Prosocial skills. We also found that parental engagement in play and learning activities at age three continue to have an impact for socioemotional development at age five. Engagement in the activities of reading, painting and drawing at age three, had a positive and long term impact for both Internalising and Externalising scores and painting and drawing also benefitted Prosocial scores. So too did teaching letters for Prosocial scores. An unanticipated finding was that teaching letters at age three had a negative impact on internalising scores at age five.

One of the aims was to examine if different types of play and learning activities had different effects on socioemotional development, and the findings indicated, as they did in the previous chapter, that this was the case. They also suggest that certain activities such as number games was generally associated with lower scores. The impact of formal play and learning activities, number and counting games at age three which demonstrated reduced scores of the on both Internalising and Externalising scores, was unexpected. However, at age five, when we included the covariates at age three, number games no longer had an impact. In contrast, we found that teaching letters at age three increased Prosocial behaviour scores and this effect continued at age five. Additionally, there was a surprising negative influence of engaging in letters games at age three with increased Internalising scores at age five when we controlled for family and other factors at age three. These findings were somewhat unexpected and suggest that three year olds may not be ready for formally learning numbers or that parents are engaging in activities that are not developmentally appropriate. Rose et al. (2018) found that different literacy and reading activities had a role in distinct aspects of socioemotional development. Our studies also observed this, for example, that reading appeared to have a current effect on internalising and externalising behaviour, and a long term influence on both internalising and externalising behaviour also, with a reduction in scores at both ages. These findings support the investigation of the effect of individual activities in socioemotional development.

While previous research suggests that socio-economic class in relation to family income has an impact on engagement in fewer activities (Bradley et al., 2001; Kenney, 2012), this factor was controlled for in the current research through the inclusion of education in four categories, as well as income in the regression models. However, we still found evidence of an independent effect of teaching numbers and counting on internalising and externalising scores. It may be the case that parents use a more didactic approach in these formal activities (e.g., teaching numbers) in contrast to the other activities (e.g., reading, songs, painting, drawing, colouring and play-doh and playing games) that are more playful rather than learning based. The nature of the interaction between parent and child as they engage in the activity, appears to exert an effect on socioemotional development in some way. What the findings suggest is that when parents engage in a good mix of informal activities at age three (e.g., messy painting and playing games), they are supporting socioemotional development. We also found a longitudinal effect at age five for engagement in many of the activities at age three. Overall, the findings suggest that a combination of informal play and learning activities support the development of a range of socioemotional skills and that number games and activities have the opposite effect for current internalising and externalising behaviour.

We then examined the effect of family and other factors on socioemotional outcomes. The parent child relationship factors that were included in the study were warmth, hostility and closeness which were consistently reported as essential for healthy socioemotional development (Bradley et al., 2001; Clark & Ladd, 2000; Razza et al., 2012; Shorer et al., 2019; Zubizarreta et al., 2019; Zubrick, 2014;). However, closeness rather than warmth appeared more significant for socioemotional outcomes. Closeness was measured by the Pianta Scale and mostly reflected how the child shared feelings and experiences verbally with parent whereas warmth mostly measured the physical or tactile relationship between parent and child. As with many parenting dimensions, there are often overlapping constructs that influence child development (Zubrick, 2014). Similar to the findings here, Razza et al. (2012) previously found that maternal warmth was not as important in children's socioemotional development as the parent dimension of showing affection as well as praising the child.

The parent child relationship factor that emerged as having nearly the same influence as closeness, was hostility (e.g., how often do you feel you are having problems managing the child?) and this effect was still present at age five. This parent child relationship factor was associated with increased SDQ subscales scores for Internalising and Externalising behaviour. For Prosocial scores it had a similar effect, with higher hostility in the relationship predicting lower Prosocial scores as it was a positive scale. Overall, the parent child relationship factors indicate that while hugging a child and having a warm and tactile relationship is important, when a child feels valued and can communicate general information as well as feelings to their parent, there are positive socioemotional outcomes. In contrast, when a parent feels overwhelmed and reports high level of hostility towards the child, it is having a detrimental effect on the child's socioemotional development.

However, what emerged across the studies was the overall significant effect of these parent child relationship (e.g., warmth, hostility and closeness) which accounted for the most variance in the final models. Significantly they indicated that parent child relationship covariates appear to have an even stronger effect than the play and learning activities, and a greater effect than they had on cognitive outcomes, as described in the previous chapter. In addition, these parent child relationship factors continued to have an impact on socioemotional development at age five, though somewhat to a lesser effect. In contrast to the effect of the parent child relationship, the child relationships, child relationships, siblings and childcare contributed very little variance to socioemotional development. The home learning environment continued to impact on socioemotional scores, even after these factors were statistically controlled for. Our correlations had not shown correlations between siblings and childcare or our outcomes with the exception of a positive correlation between having siblings and Prosocial behaviour. However, this did not occur in our regression analyses. As attending childcare did not appear to have any effect at age three or age five, it adds further support for the importance of the home environment on socioemotional development in early childhood.

Similarly, compared to the positive effect of parent child relationship factors, environmental factors which included maternal education in four categories, and family income, accounted for very little variance in socioemotional development scores also. Previous research by Kelly et al. (2011) found that parental involvement in activities was important for lower income families. In Study 3 we found that higher maternal education (i.e., to leaving cert) had a significant impact on SDQ internalising and externalising scores at age three, but not with maternal education to junior cert or less. While at age five it had a significant influence on internalising scores, again the effect was only present for mothers with education of leaving cert or less. In contrast, family income had no association with any of the socioemotional scores at age three or at age five.

Research has previously found associations between family income and socioemotional and behavioural outcomes in children with children from poorer households generally experiencing greater difficulties (Kelly et al., 2011; McNally at al., 2019a, Noonan et al., 2017). Hartas (2011) believed that it was how parents engaged with their child regardless of their socio-economic circumstances and not frequency of activities that was important. Hartas findings suggest that even when parents from a low

SES background are actively engaged with their children, it is difficult to reduce the barriers that exist and have the same opportunities for language and social development as families from higher SES backgrounds (Hartas, 2011). The findings here give support to bioecological theory, that children are influenced indirectly by their exosystem and that factors such as maternal education can indirectly shape the developing child (Bronfenbrenner, 1994). However, while maternal education did demonstrate an effect in the studies, it is surprising that family income did not emerge as associated with the socioemotional outcomes. It was maternal education rather than income that predicted socioemotional outcomes in the current study. Within maternal education there was no evidence of an obvious gradient as maternal education across any of the studies.

As we found in the previous chapter on cognitive outcomes, the research in this chapter provides clear evidence that different play and learning activities impact on socioemotional development independently. The current research provides insight into the role of different activities in the home learning environment and their contribution to both current and longer term development. To date, studies have tended to use a composite score rather than examining the independent effect of activities (e.g., McMullin et al., 2020; Sylva et al., 2010). While there has been some research on the effect on specific activities such as reading or toy play (Aram & Aviram, 2009; Nandy et al., 2020), few studies have examined the unique contribution of other individual activities on socioemotional development (Orri et al., 2019).

Exploring whether play and learning activities impact on socioemotional development was also important in considering a major transition in children's lives, when they go to school. Previous studies found mixed results on what qualities parents and teachers' value as important school readiness characteristics. Ring et al. (2016) found that Irish primary teachers put less emphasis on academic skills than did parents and early years teachers. Very few parents rated emotional readiness as important and were concerned with class size and social readiness (Ring et al., 2016). Another Irish study also found a mismatch between what parents believed was important for school readiness versus what teachers believed to be important. Teachers valued emotional maturity as the most important domain whereas parents valued physical health and wellbeing more (UCD Geary Institute, 2012). More recently, a study in the US found that both teachers and parents agreed that early school readiness included being healthy, happy and socially skilled as more essential than cognitive proficiency in the preschool child (Miller & Kehl, 2019).

The current research is important in light of the findings regarding the poor association between teaching numbers and counting at age three and letter teaching at age five on socioemotional outcomes. The divergence in parents' values or beliefs about what a child should know when they begin school or what a parent think they should do at home may have a negative impact on the child's current and long term socioemotional development. Considering the current findings that painting and games but not alphabet or number activities have an association with better socioemotional outcomes support what many educators already know. If parents' beliefs influence parents' behaviour, then the findings here are very important for families. It suggests that getting to know about parents' beliefs is an important area to study also.

Again, using the bioecological framework, we examined how development is influenced by the child and also their environment and relationships. Analysing the findings through the interaction between the various aspects of development in the PPCT model (Bronfenbrenner, 1995), we found that all of the factors in the home learning environment, contributed in some way to development. However, we found that the parent child relationship factors, rather than exosystem factors (i.e., income) were particularly significant for socioemotional outcomes. Parents who are warm and encourage emotional expressiveness and communication are in keeping with

Bronfenbrenner’s idea that the environment should not be too fluid or rigid for optimal development (Hayes et al., 2017).

Conclusion

Parental engagement in play activities, and particularly a positive parent child relationship, matter for early socioemotional development. The findings reported in this chapter indicate that a variety of play activities support a child’s socioemotional development. However, we also found that more informal activities such as painting and drawing and playing games are associated with better socioemotional outcomes. Additionally, parent child relationship factors, are essential and contributed more to the socioemotional outcomes than the play and learning activities themselves. Both these finding have implications as to what types of activities parents engage in at home but particularly in how parents relate to their child. The findings of this chapter on socioemotional development, and the previous chapter on cognitive development, demonstrated that informal activities including reading, support development, even when other factors such as the parent child relationship or family income is accounted for. However, previous research also highlights the importance of parental beliefs about play. Therefore, in the next chapter we want to explore if parents’ beliefs about play have an impact on the activities they engage in with their young child, and on their child’s cognitive and socioemotional development.

Chapter Five

Exploring Parental Play Beliefs

"If we love our children and want them to thrive, we must allow them more time and opportunity to play not less".

Professor Peter Gray (2017)

Overview

In the previous chapters we examined the important role of several play and learning activities on development. Using the GUI data, we found that individual play and learning activities have differing impacts on different aspects of cognitive and socioemotional development. Family and other factors also had an impact on development, particularly for socioemotional development. These family and other factors also had an impact on cognitive development but to a lesser extent. The parent child relationship had the greatest influence on socioemotional outcomes, while other factors had a lesser influence. The findings in Studies 1 to 4, from the GUI study, therefore, provide a strong foundation on which to explore additional factors in early childhood development. They also allow us to examine the effect of parental and child engagement in current play and learning activities, as well as parental beliefs about play. In this chapter we are interested in exploring the impact of these additional factors (e.g., parental beliefs about play) on development and on the home learning environment. We begin by examining associations between parental play beliefs and engagement in play and learning in the home, and then further explore if play and learning activities contribute to development when we account for parental beliefs about play.

Parental Beliefs about Play

Previous research indicates there is considerable variation in parent beliefs about play (Kane, 2016; O'Gorman & Ailwood, 2012) in relation to the home play environment. Parental beliefs about play are thought to affect how parents interact with their children, and these interactions are believed to impact on developmental outcomes (Fisher et al., 2008). If parents have a positive belief about play, they spend more time engaging in play with their child (Haight et al., 1997; Lin & Li, 2018) and model their beliefs in the home (Desforges et al., 2003). Beliefs about play may be evident, for example, when parents select the preschool their child will attend. If a parent values learning over play, they may select an academically centred preschool or vice versa, if they value play more, they may select a preschool with lots of outdoor play.

Beliefs about play can vary also from culture to culture. In western more technologically developed societies, parents tend to view themselves as play partners to children and adopt a view that play is important across development domains (Roopnarine, 2011). Beliefs about play can differ within families, for example mother and father beliefs can diverge (Warash et al., 2017). Some research on play beliefs has examined how mothers' beliefs about play fit different and distinct profiles (Roopnarine, 2011; Lin and Li, 2019). Generally, if beliefs about play are positive, they influence parental behaviour, and a parent may be more likely to encourage free play (Bornstein, 2016). Therefore, it is important to understand what beliefs parents have about the value of play and learning in the home to see if this influences how they engage with their children in activities at home, and if this influences developmental outcomes.

Understanding how parents' beliefs influence children's activities and play opportunities is important also to extend play as a strategy for growth and development (Coo et al., 2020; LaForett & Mendez, 2016). When children are at preschool age, they are more likely to engage independently in play on their own as their attention and self-regulation skills develop (Ruff & Capozzoli, 2003). Landry et al. (1997) found that a responsive parenting style where parents were sensitive to the child's interests, and did not control or restrict child behaviour, demonstrated greater rates of growth in cognitive, language and socioemotional development in children. Parental engagement may also be influenced by parents' own beliefs.

Research has also indicated that when parents hold positive beliefs about play, they engage more in their children's play. For example, Haight et al. (1997) in their study of 29 middle class European American couples, examined both parents beliefs about their toddlers pretend play. They found that when parents rated an activity as developmentally important (e.g., pretend play) they spent more time in pretend play with their child (Haight et al., 1997). While this was an in-depth study of children aged from 24 to 36 months, the small middle-class sample does not allow generalization to the wider population. Desforges et al. (2003) suggest that parents provide for acquisition of skills such as literacy and numeracy through playing word and number games. However, what has greater effect is when parents model beliefs and expectations by means of encouragement and support for the child as learner. It appears that a child internalises these beliefs and expectations as an 'educational self-schema' (Desforges, 2003, p. 51). In the next section we look at how parental beliefs affect play and learning in the home.

The Role of Play Beliefs in Shaping the Home Learning Environment

Over the last decades, there has been changes in children's play as well as a rise in structured activities in the home. As well as spending more time with their children, parents spend more money on activities and resources intended to enhance child development (Bassok et al., 2016). The Avon Longitudinal Study of Parents and Children (ALSPAC) found that as early as the age of 18 months, 70% of mothers reported that they taught the alphabet to their toddler. This was in comparison to 7% of mothers reporting that they taught their child songs (Culpin et al., 2020). Children currently are reported to have more limited time for play. Reasons for less time for play, include increases in structured learning and emphasis on academic type activities, as well as a drive for high grades (Sahlberg & Doyle, 2019). Additionally, greater parental engagement with preschool children in formal activities at home has also been described (Bassok et al., 2016). For children, play is an important part of childhood though it may not be valued by adults in the same way (Sahlberg & Doyle, 2019). The benefits of free play are considered especially important as children engage in more structured activities, than ever before (Coo et al., 2020).

In addition to an emphasis on formal learning at home, more structured activities for children and less time to play, there is great complexity and diversity within families about the importance of play for development and learning (O'Gorman & Ailwood, 2012; Paes, 2016). Haight et al. (1997) found parents believed different types of play offered different developmental opportunities. Paes (2016) found that parents considered play and learning to be two distinct concepts with little overlap, in a small in depth study of South Asian families living in the UK. These studies suggest a great range of beliefs about play among families. However, while behaviours of families are recognised as being closely related to the family's beliefs and values (Plowman et al., 2012), beliefs and values are difficult to observe. Different psychocultural schemas exist among parents that may be based on their own values (e.g., obedience or hard work) and this can have an effect on the way that parents rear and care for their children (Roopnarine, 2015). Parents' may also have positive beliefs about play but be nervous about their child playing outside or taking risks (Howard & McInnes, 2013).

As well as the diversity of beliefs that individuals hold about play and learning, beliefs may also be considered as part of the macrosystem, which indirectly influences child development. Parent's beliefs may also be affected by macrotime, as proximal process (e.g., play and learning activities) may be shaped by the time that development occurs (Hayes et al., 2017). An example of this in current macrotime is that many parents support structured and academic activities (Coo et al., 2020). Fisher et al. (2008) suggested that while individual belief systems may affect an individual's parenting style, parents are also influenced by broad cultural beliefs that influence parenting style at a societal level.

There are other factors too that are known to have a relationship with parental beliefs, such as parental education (Manz & Bracaliello, 2016) and SES (Lin & Yawkey, 2013). These factors may influence how an individual parent engages in activities with their child (Kelly et al., 2011; Mc Mullin et al., 2020). Manz and Bracaliello (2016) found that there was a significant relationship between parents' education and their beliefs about play. Their study of 202 toddlers aged between 2 and 3 years old, found that parents who had completed high school valued play as more important than parents who had not completed high school. They also found a relationship between beliefs about play and parental involvement, with a significant positive correlation between parents' play beliefs and their engagement in play (Manz & Bracaliello, 2016).

In addition to an association between beliefs and engagement, measures of socioeconomic status, such as parental education and income, have been linked to poorer home learning environments. Lin and Yawkey (2013) observed how family socioeconomic factors influenced parental engagement in their child's play. Their study of parents of 142 kindergarten children, aged 4 to 7, found parents perceptions of child's play was influenced by their education level and income, but found no effect for parents' age and occupation. Parents in the study with higher education and income had significantly more positive perceptions of child's play than parents with lower education and income levels in the sample (Lin & Yawkey, 2013).

Overall, there are many factors that can impact on parental engagement and their beliefs about the value of play. These include the noted decrease in unstructured play time and increase in structures and formal activities (Bassok et al., 2016; Sahlberg & Doyle, 2019), as well as the macrotime, and factors such as parental education and SES (Lin & Yawkey (2013). However, just as the home environment is well researched to support literacy or numeracy, play in the home environment and parental beliefs about play should also be researched as an end, given the importance of play to children and particularly considering the rise in structured activities in children's daily lives.

Factors influencing Parental Play

In an Australian context, O'Gorman (2008) found differences in parents' beliefs about play in their preparatory year at school. This small qualitative study of 26 parents of five year old children used inductive thematic analysis. They reported that some parents preferred a play based environment while others liked the emphasis on academics, saying that 'they get fed up playing' (O'Gorman, 2008, p. 54). Similarly, Kane (2016), found that parents of preschool children view play and learning in binary terms. Their sample consisted of 20 parents of preschool children aged 3 and a half to 5, who were registered on a play based summer camp, in the USA. Parents completed questionnaires comprised of ratings of characteristics of types of play which included unstructured indoor and outdoor play, as well as rating what criteria were important in selecting a preschool programme. There were also open-ended questions included to capture their perceptions about play. Parents appeared to value both play and learning but defined them as distinctly different activities. Because they perceived them as separate activities, they indicated that academic learning was more important than play (Kane, 2016).

While Kane's research was focused on parent's decisions about early childcare and education, it demonstrated that parents were focused more on literacy and numeracy, and not rather than play and peer interaction. While most parents rated play as very important in the survey, in the open ended responses, only half of the small sample (i.e., n=10), cited play as important. Kane suggested that parents valuing numeracy and literacy acquisition over play, compared to a child's need for play and peer interaction, was a social value that may inadvertently damage child wellbeing. This was based on their review of the literature and particularly on findings by Copeland et al. (2012), who emphasized numerous structural constraints to play in preschool. Overall, they found there was less time to play in early years settings, that pre-schoolers were largely sedentary, and that academic play was gradually replacing play for fun (Copeland et al., 2012).

Lin and Li (2018) examined how play beliefs affected engagement in parent child play at home, in 483 children aged from two to four. They developed a measure, the Chinese Parent Play Beliefs Scale (CPPBS), which assessed parental beliefs about play. Parents rated the developmental importance of 26 play activities ranging from 'not at all important' to 'extremely important'. Two factors emerged, Play for Learning (PL) and Play for Fun (PF). They also used a measure, the Parental Play Involvement Questionnaire (PPIQ) which measured the same activities as the CPPBS and indicated the frequency of parental involvement in each of the play activities with the child. They also used a questionnaire to rate the child's engagement in the play activities reported in the CPPBS.

In their research, Lin and Li (2018) found a significant association between parental beliefs about play and the frequency of play in the home. In addition, two practices of parental engagement emerged, the first was parents' involvement in play itself and the second was how parents planned the play environment. They also found that parents who valued play for fun, had increased engagement in organising the play environment, providing resources and activities such as play dates, rather than involving themselves in play with their child. In contrast, parents who valued play for learning, played more frequently with their child. They found parental engagement to be associated with Play for Learning and academic play. They also found that Play for Fun was associated with entertainment and fantasy play. When they explored this further however, they found that parental engagement completely mediated the effect of Play for Learning beliefs in academic related play but had no mediating effect on parental beliefs about Play for Fun. However, this sample was predominantly from an urban middle class sample and may not be generalizable across different classes or to western samples(Lin & Li, 2018).

As well as the CPBBS, a number of other measures have been created to examine the beliefs that parents have about play (Fogle & Mendez, 2006; Manz & Bracaliello, 2016; Parmar et al., 2004). One of the more widely used measures is the Parents Play Beliefs Scale (PPBS). Fogle and Mendez (2006) developed this measure based on a sample of young African American preschool children attending Headstart in the US (which Lin & Li, 2018, later adapted for a Chinese sample). The sample included 224 African American parents. Principal components analysis revealed two factors on the PPBS: Play Support (PS) and Academic Focus (AF). Parents who had higher scores on the Play Support subscale valued play over learning and those scoring higher on the Academic Focus subscale placed greater emphasis on academic learning than play. It appeared that parents who valued Play Support, structured their home environments to support play at home. With or without knowing, parents' beliefs may guide their role as playmates or teachers in the home (e.g., if they initiate play or if they approach play with an explicit learning goal). Additionally, Fogle and Mendez (2006) found that parents who had high levels of Play Support, revealed they enjoyed play but also saw play as a teaching opportunity. Parents with a high Academic Focus had a belief that play did not help to develop academic skills and preferred learning activities that involved numbers and letters.

Other studies have examined parental beliefs about play either by reviewing other research, or in interviews (e.g., Roopnarine, 2011; Roopnarine & Jin, 2012), or by developing other belief measures (Fisher et al., 2008; Lin & Li, 2019). Roopnarine (2011), in a review, considers how beliefs about play are different in different cultures.

He suggested parents' beliefs about play fall on a continuum, which on one side is prohibitive, and on the other is encouraging, with those in the middle being indifferent. He suggested that European Americans tended to fall on one end of the continuum, as they valued the educational benefits of play. An example of parents in the middle were African American and Latina mothers who liked the benefits of play but preferred academic activities. On the far side of the continuum, Yucatec Mayans mothers believed play to be frivolous. While within cultures there is variation, Roopnarine found that different nationalities tended to fall on one side of the continuum or the other (Roopnarine, 2011), highlighting the potential influence of the macrosystem.

Fisher et al. (2008) examined a range of beliefs on aspects of play and learning in American parents. Their sample included 1130 mothers with at least one child aged under five. To assess beliefs, they developed a survey, which evaluated parents' perceptions about child play behaviour and toy use. Participants identified the frequency they engaged in the activities, the degree of playfulness for each activity and they also rated each activity in relation to its academic learning value. Two factors of play emerged among the 26 activities they included in their survey, free unstructured play, and structured play. Unstructured play had 14 activities and were creative and imaginative activities that generally lacked rules (e.g., dress up and playing with blocks). Structured play consisted of 12 activities that had a goal orientated structure and included academic skills such as flash cards as well as activities like chores.

In addition to examining beliefs, Fisher identified three profiles of mothers (e.g., Traditional, All Play and Uncertain mothers), based on their pattern of responses, who had distinct beliefs about play. 'Traditional' mothers were very clear about differences between structured versus unstructured play. 'All Play' mothers considered both unstructured and structured play as being very playful. There were greater differences in how they rated play in the third group, which were labelled as 'Uncertain' mothers. Fisher et al. suggested that this third group viewed unstructured play as moderately playful, but structured play was rated as neither play nor non play. ‘All Play’ mothers engaged in the greatest frequency of unstructured play, followed by ‘Traditional’ mothers and then ‘Uncertain’ mothers. All mothers ascribed more learning value to structured, than unstructured play activities. Maternal beliefs about play impacted on the frequency of engagement in play with their children. ‘All Play’ mothers engaged in the greatest frequency of structured play, with ‘Uncertain’ mothers next and finally ‘Traditional’ mothers. The authors believed that as a result of maternal beliefs about the value of play or learning, that mothers may encourage particular activities they believe are fun or stimulating or structure their child’s play environment according to their beliefs. While this sample was a large diverse sample, mothers had to rate activities as playful or not rather than examining if they held positive beliefs about play (Fisher et al., 2008).

Lin and Li (2019) also identified three profiles of mothers based on their pattern of responses in relation to their play beliefs on the Chinese Parent Play Beliefs Scale (CPPBS; Lin & Li, 2018): traditional, contemporary and eclectic mothers. This sample included 168 mothers of children aged 2 to 4. ‘Traditional’ mothers had lower scores on play value and higher scores on pre-academics. ‘Contemporary’ mothers were the opposite, with higher score for valuing play and lower scores for pre-academics. The third group, ‘Eclectic’ mothers valued both play and pre-academics with high scores on each of the subscales. The mothers in the groups varied in their education levels, as well as the frequency of play and learning activities at home. However, after adjusting for sociodemographic factors, they found that children of ‘Eclectic’ mothers had higher cognitive development scores than ‘Contemporary’ mothers, as well as higher socioemotional development scores that ‘Traditional’ mothers. Mothers who valued both play and pre-academics highly and had a more balanced view of play and learning had children with the best developmental outcomes. As in their previous study (i.e., Lin & Li,

2018) this sample included no lower SES families and had a correlational rather than a causation design. As before, it is difficult to generalise their findings across more diverse samples(Lin & Li, 2019).

Studies suggest that beliefs that may originate because of culture may be linked with how parents engage in and promote play and learning in the home. Fisher et al. (2008) and Parmar et al. (2004) proposed that how a parent organised the environment at home was compatible with their beliefs. In their study, Parmar et al. (2004) interviewed 48 parents (i.e., 24 couples) of children aged between 3 and 6, as well as surveying parents using the Preschool Play and Learning Questionnaire (PPLQ). Parents also kept a record of their child's daily activities. They found three factors in the PPLQ: the importance of play in development, the importance of early academics in development and the importance of the role of parents. They were interested in cultural differences between Euro-American and Asian parents, and they found significant differences between the groups with Euro-American scoring significantly higher than Asian parents on the importance of play for development (Parmar et al., 2004). Additionally, Parmar et al. (2004), found parental beliefs about play and learning related to how the home environment was organised, with Euro-Americans providing more resources for play (e.g., toys) than Asian parents.

In summary, the research literature on play beliefs demonstrates there is variation in beliefs about play across cultural and income groups (Fisher et al, 2008; Fogle & Mendez, 2006; LaForett & Mendez, 2016; Lin &Li, 2019). A number of studies have also identified diverse profiles of mothers who attribute different values and hold clear views about the development value of play (Fisher et al., 2008; Lin & Li, 2019). The studies that have examined parental beliefs, highlight the role cultural and macrosystem factors have in shaping the home learning environment of children, and parental engagement in play activities. Additionally, these studies on parental play beliefs, though limited in number, suggest that the PPBS is a reliable measure and demonstrate that there are a range of parental beliefs that vary between cultures as well as within families (e.g., between mothers and fathers). However, despite the small number of studies that have examined parents' beliefs about play, they have been generally limited to one homogenous group for example Lin and Li (2018; 2019) whose sample were generally middle class or Fogle and Mendez (2006) who developed and validated their sample on African American mothers with children enrolled in Headstart (Fogle & Mendez, 2006). Exploring play beliefs in a broader Irish sample to date has not been done to date and would add to the literature in this area.

The Current Research

The research reported in this chapter has three broad aims. The first aim was to examine the role of parental beliefs about play in parent and child engagement in different play and learning activities. Play beliefs are potentially an important influence on parental engagement in play with their children. Parents are believed to organise their home based on their beliefs about play and learning (Fisher et al., 2008; Parmar et al., 2004; Roopnarine, 2011). When parents rated play as developmentally significant or recognised its importance for development, they were more likely to be involved in play and learning activities with their children (Haight et al., 1997; Manz & Bracaliello, 2016). Therefore, the current research sought to explore the association between parental beliefs about play and how parents create play and learning environments in their home.

In addition to examining parental engagement, this research aimed to examine if play and learning activities continued to contribute to development, even after accounting for parents' beliefs about play. With the exception of Lin and Li (2019) little research has examined the impact of play beliefs on cognitive and socioemotional development. Therefore, while the findings reported in the previous chapters largely demonstrated the effect of parental engagement in play and learning activities in the home, independent of other factors, the aim of this research was to further explore if play and learning activities would still have an effect on developmental outcomes, even after beliefs about play were accounted for. As few studies to date have studied play and learning activities in the home, with a focus on parental beliefs and developmental outcomes, we believed further research was necessary in this area.

The third broad aim was to examine child engagement in activities and if it had different effects on cognitive and socioemotional developmental outcomes. In the earlier chapters we examined the influence of parental engagement in play and learning on development outcomes. Much research to date has focused on parents' involvement in activities in the home learning environment (Kelly et al., 2011; Melhuish et al., 2008; McMullin et al., 2020), with fewer studies focused on child engagement in these activities at home. To address these aims, the current research set out to answer the following research questions:

1. Is there an association between parental beliefs about play, and parent and child engagement in play and learning activities?
2. Does engagement in different types of play and learning activities contribute to cognitive and socioemotional development in early childhood, even after parental beliefs about play are accounted for?

In order to address the research questions, we developed an online parent report survey to investigate factors not explored in the GUI study. The Play and Learning Early Years (PLEY) Survey included many items and measures that were used in the GUI study, such as the frequency of parent engagement in different play activities and the same measure of socio-emotional development (the Strengths and Difficulties Questionnaire).

This is similar to the way the GUI study examined parent engagement in activities with their child (i.e., how often you engage with your child in the various play activities. Additionally, we also measured parental beliefs about play, along with the frequency of child engagement in various play activities (i.e., how often your child engages in the various play activities), and also included a measure of the richness of the activities in the home environment. Furthermore, as noted in Chapter Three, few aspects of cognitive development have been explored in relation to the home learning environment beyond language and literacy, so we therefore included a parent report measure of attention to expand knowledge in this area. The PLEY survey is described in greater detail below.

Study 5: Is there an association between parental beliefs about play, and parent and child engagement in play and learning activities?

Method

Participants

Research participants for the study were the parents/guardians of children aged 6 and under. The final sample consisted of 276 participants. While an additional 37 individuals completed the demographic questions only, it was not possible to include them in further analyses.[3] Only one parent was invited to participate in the survey, and of participants who completed the survey, 96.4% (n=266) were mothers and 3.6% (n=10) were fathers. The mean age of participants was 37.99 (*SD* = 4.49). The participants' children aged from 6 months to 6 years and 11 months, with the mean children's age being 3.86 years (*SD* = 1.53). 53.6% of the children were male, and 80.4% had siblings (see Table 28 which follows for full descriptions). The majority of parents had a postgraduate degree (40%), or a third level degree (28%). 8.4% held a doctorate degree, while 23.5% were educated to secondary school or diploma level. The majority of parents also worked full-time (42.4%) or part-time (32.6%), with 25% looking after family or on leave or currently in studies or training. Along with the 262 Irish participants, there were a further 4 participants from South Africa, 4 from the UK and Northern Ireland, 3 from the Netherlands, 2 from the US, and 1 from Germany.

Materials

The Play and Learning Early Years (PLEY) Survey.

The Play and Learning Early Years (PLEY) online survey was developed to investigate play and learning activities in the home. The survey consisted of three main sections. The first section asked about demographic information. It gathered information from the parents, including factors that may influence the Home Learning Environment (HLE; e.g., age of parent, child, education levels which were adapted from the GUI study and the parent's usual situation regarding work). The second section asked parents about their child's play and learning, including time and resources for play and influences on the child's play. It asked questions regarding the frequency of child activities (e.g., reading, playing games, outdoor play), parental and child engagement in play and learning activities (adapted from the GUI study), influences on the

[3] In total 313 people participated in the survey. 37 participants (12%) completed the demographic section only. Another 45 participants (14%) partially completed the survey. In total, 231 participants (74%) completed the full survey.

child's play and learning activities (based on ecological systems theory, Bronfenbrenner, 1979) parental beliefs about play and learning (PPBS), and other barriers and supports to engagement in play (adapted from GUI study). It also included and measure of the richness of the activities in the home environment, which was adapted from the Emlen Rich Activities and Environment scale (Emlen, 2000). Much of the phrasing of these play related questions, and the response options available to parents, were drawn directly from the GUI study, or adapted as appropriate (e.g., the frequency of parent engagement versus child engagement in the various play activities). The third section of the PLEY survey included parental reports measures of child development. Further details of the measures included in the various survey sections are provided below and later in this chapter.

Play and Learning Activities. Parents were asked to indicate how frequently they engaged in the six-target play and learning activities with their child (i.e., reading, letter or alphabet learning, number and shape learning, play with toys and games, play with puzzles and jigsaws and paint, draw, play with slime/make models). These were similar to the activities that were asked in the GUI study and reported in the previous chapters (i.e., reading, learning ABC's or alphabet, numbers or counting, songs, poems**,** or nursery rhymes, playing games (board, jigsaws, card games) and painting, drawing, colour or play-doh) and measured on a 6-point Likert scale ranging from 'Never' to 'Everyday'. For each activity there was a separate item for parents to indicate how often their child engaged in the activity, and how often they as a parent engaged in the activity with their child. Parents were also asked about the frequency of engagement in other activities, such as screen use and outdoor play, but only the target activities as described, were used for analysis in the current research.

Parent Play Beliefs Scale. The Parent Playtime Beliefs Scale (PPBS; Fogle & Mendez, 2006) was used to examine parents' beliefs on the value of play and learning in the home and whether they valued the developmental significance of play. The PPBS has primarily been used to identify parental beliefs about play in low income families in the USA (Fogle & Mendez, 2016), adapted for use with Chinese parents (Lin & Li, 2019) or in ethnically diverse children (LaForett & Mendez, 2016). The two factor PPBS has 25 items on a 5-point Likert scale (ranging from 'Strongly disagree', to 'Strongly agree'), which are broken into two subscales: Academic Focus (8 items) and Play Support (17 items). An example of a Play Support item is 'My child will get more out of play if I play with him or her'. An Academic Focus example is: 'Playtime is not a high priority in my home'. Due to an administrative error one item from the Academic Focus subscale was omitted. The alpha scores reported by Fogle and Mendez (2006) were $\alpha = 0.90$ for Play Support and $\alpha = 0.73$, for Academic Focus. In the current study, the Play Support subscale had high internal consistency, $\alpha = 0.78$, while Academic Focus, with 7 items, had lower internal consistency, $\alpha = .44$. Fogle and Mendez (2006) report that scores on the PPBS are associated with other measures of play such as Penn Interactive Peer Play Scale (PIPPS; Coolahan et al., 2000; Fantuzzo et al., 1998). The Parent Beliefs Scale is included in Appendix F, and Appendix L in the PLEY survey.

Richness of the Home Play Environment (HPE). In the current study we adapted the Emlen Rich Activities and Environment Scale (Emlen, 2000) which was used in the GUI study to explore the richness of activities provided in a child's early years setting. This measure was adapted for use in the current study to assess parents view of the richness of the activities and environment of the home. For example, 'There are lots of creative activities going on' was adapted to 'There are lots of creative activities going on in our home;' 'Preschool was an interesting place for my child' was adapted to 'Our home is an interesting place for my child;' There are plenty of toys, books, pictures and music for my child' was adapted to 'There are plenty of toys, pictures and music for my child' and 'There are plenty of books for my child'. This original item was adapted into two separate items because the findings reported in the previous chapters suggested that reading may play a distinct role in aspects of child development, compared to playing with toys for example.

'In care, my child has many natural learning experiences' was converted to 'At home, my child has many natural learning experiences'. Finally, 'The caregiver provides activities that are just right for my child' was adapted to 'At home, activities are provided that are just right for my child'). The original Emlen Rich Environments and Activities Scale with 5 items was reported to have high internal consistency, $\alpha = 0.87$. The 5 items including 'There are plenty of toys, pictures and music for my child' in the current study also had high internal consistency, ($\alpha = 0.69$). This was also the case when the sixth item relating to books was included items ($\alpha = 0.68$). The Richness of the Home Play Environment (HPE) scale is included in Appendix G.

Procedure

Parents of children aged 6 and under were recruited in a number of ways, including through Irish primary schools, early childhood education centres and through social media platforms. In relation to recruitment through schools, in an effort to minimise sampling bias and access a representative sample, both urban and rural primary schools were approached. Principals of 7 primary schools were contacted (both face-to-face and by email) and were made aware of the study via an information pack, which included a letter of recruitment, the Information Sheet and Debriefing Sheet of the study, and online link to the survey (See Appendices H to K). The principal could then open the online link to access the survey and use the link to disseminate the survey, if they wished, via email or text message to the parents of their junior and senior infant pupils. The survey link was also shared across various social media platforms, with parent associations, early day-care centres, and parents of young children who are active on social media.

All respondents completed survey via on online link created on Qualtrics™ software (Qualtrics, Provo, UT, 2019). Participants were presented with the Information Sheet and Consent Form for the study once they clicked then link, and then completed the survey if they wished to proceed with the study. Participants were advised that their responses were confidential, that the survey was anonymous, and they had the right to withdraw from the survey at any time. The survey took approximately 20 minutes to complete. The recruitment phase lasted four months from late June through to late October 2019, after which the survey was closed, and the link made invalid. The PLEY study adhered to the ethical standards of the PSI Code of Professional Ethics, (4.2.7; PSI, 2010), and ethical approval was granted by the Mary Immaculate Research Ethical Committee (MIREC- A19-027).

Analysis

Hierarchical regressions were used to examine the effect of parent's level of education, their age and also the age of their child on parental play beliefs, Play Support and Academic Focus. Separate ordinary least squares regressions were used to determine the extent to which parental play beliefs predicted scores on parental engagement in activities and the home play environment.

Results

Sample Characteristics and Descriptive Statistics

Table 28 below, describes the sample characteristics of the sample. The mean scores for each of the outcomes used in the study as well as the percentages of mothers within each educational group. Also included are the percentages and numbers of Primary Care Givers, usually the mothers (96%). Usual situation regarding work, was that 33% of participants reported they worked part time., 43% full time, while 24% were at home or in other activities such as studying. Other descriptives related to the child's gender, the mean age (3.86, SD = 1.53), parents mean age and finally the relationship of the person competing the survey to the child.

Table 28 Sample characteristics of the PLEY Sample for Socioemotional and Cognitive Outcomes and other variables

		Wgt % or mean (SD)	Unweighted n
SDQ	Internalising scores	2.9 (2.52)	235
	Externalising scores	5.61 (3.51)	234
	Prosocial scores	7.45 (2.05)	234
Cognitive and Language	Attentional Focusing	31.87 (5.46)	238
	Language	14.07 (2.30)	236
PCG education	Leaving cert equivalent or less*	5.4%	15
	Cert/Diploma	18%	50
	Degree or higher	76%	210
PCG usual situation re work	At home/other	25%	68
	Part time	33%	90
	Full time	42%	117
Child Gender	Girl	46.4%	128
Siblings	Yes	80.4%	221
	No	19.6%	54
Child Age		3.86 (1.53)	
	0-2	24%	67
	3-4	38%	104
	5-6	38%	105
Parent Age		37.99 (4.49)	
Relationship to child	Mother	96%	266
	Father	4%	10
Play Activities	Reads to child	5.55 *(.84)*	272
	ABC's	3.43 *(1.45)*	268
	123's	3.60 *(1.38)*	269
	Play with toys and games	4.66 *(1.25*)	274
	Play with jigsaws and puzzles	3.77 *(1.26)*	273
	Paint and draw	3.74 *(1.22)*	271
Play Beliefs	Play Support	4.54 *(.32)*	242
	Academic Focus	1.59 *(.44)*	242

*The first two categories were collapsed to create a three level variable

Parent Play Beliefs. A paired-samples t-test showed a significant difference between parents Play Support and Academic Focus scores, t (241) = 71.93, p < .001. Mean scores were 4.53 for Play Support, and 1.60 for Academic Focus. The eta square statistic (.95) indicated a large effect size. When we examined the mean scores for play beliefs, Play Support was equal or higher than Academic Focus scores for every parent in the sample. Because of this we used the play belief scale variables rather than categorising participants as Play or Academic Focused, as previously studies had. A correlation between Play Support and Academic Focus demonstrated a small negative correlation, r = -.24, n = 242, p < .01 between the variables, suggestion that higher Play Support scores were associated with lower Academic Focus scores.

Parent versus Child Engagement. We examined parental engagement and child engagement in the various activities (i.e., how often the parent engaged with their child versus how often the child engaged in the various play activities). Preliminary analysis showed there were significant differences between the frequency of parent and child engagement in all of the play and learning activities except reading to the child, p =.128. With the exception of reading, parents reported that children engaged in the activities more frequently than they did with their parent, as might be expected. Figures 13 (i.e., 123's, ABC's and reading) and 14 (i.e., painting /drawing, jigsaws and toys and games) below display the frequency of parental engagement in each of the play and learning activities used in the analyses, ranging from 'never' to 'every day'.

A preliminary exploration of the data indicated that 72% of parents read to their child every day, whereas activities such as ABC's were only engaged in daily by 10% of parents. Other regular daily activities included 35% of parents playing with toys daily. In contrast, no parents said they did not read at all, while 11% of parents stated they never did ABC's and 7% did not engage in number activities with their child. Overall, there was good parental engagement with their child across the activities. For example, 88% of parents read, and 57% played with toys and games with their child more than 3 days per week. However parental engagement in other activities, more than 3 days per week, were lower in a number of activities, with just over a quarter of parents engaging more than 3 days per week in puzzles, number games, painting and drawing and alphabet and letter games (See Figure 14 below).

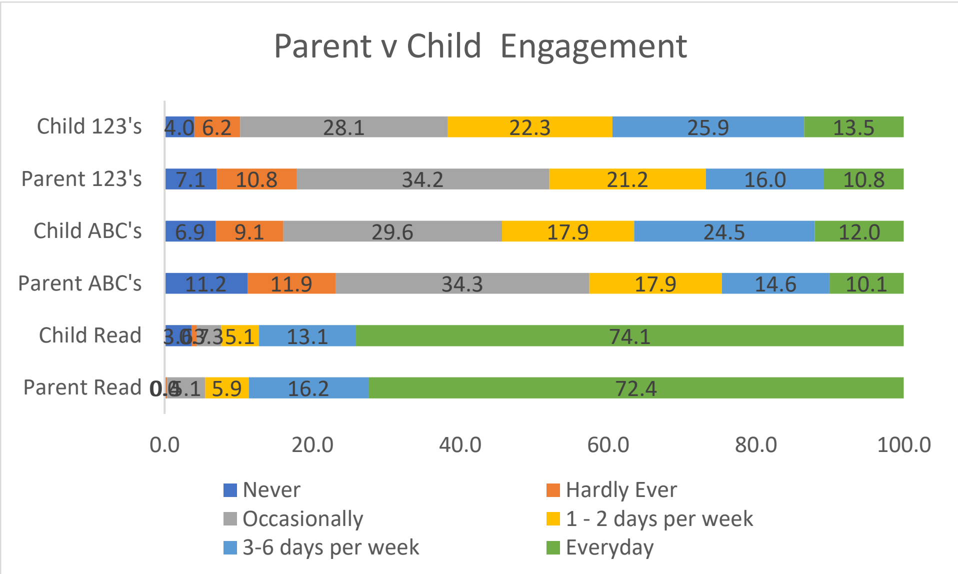

Figure 13. *Parent v Child Frequency of Engagement in 123's, ABC's and Reading*

An exploration of the data on child engagement in activities revealed that 89% of parents reported that their child played with toys and games daily, while 74% of parents reported that children read or were read to daily. In a similar pattern to parental engagement in activities, 13.5% of children were reported to engage in 123's and puzzles and jigsaws daily, 12% in ABC's, and 11% in painting and drawing every day. 3.6% of children were reported not to read ever, but the sample did include infants and children ranging up to age six and this may have impacted in engagement in more formal activities such as ABC’s and 123’s. The frequency of parent and child engagement in painting and drawing were the same for both parent engagement in activity with the child and child engagement in the activity, suggesting that parent and child engaged in this creative activity together. Parents also reported that children engaged in formal activities such as numbers (39%) and letter games (37%) more frequently than they did with parents (See Figure 12 above).

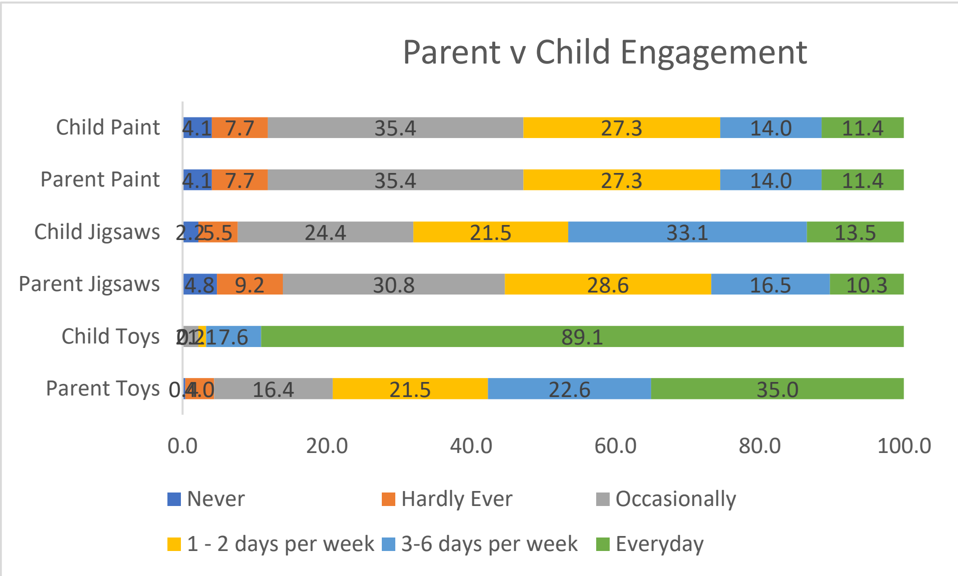

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Figure 14. Parent v Child Frequency of Engagement in Painting, Jigsaws and Toys

With the exception of playing with toys and games, there were large positive correlations between the frequency of parent engagement and the frequency of child engagement in all the different activities, ranging from r = .51 to r =.75 (See Table 29 below). These results demonstrate higher correlations between the frequency of parent and child engagement in more formal activities such as alphabet and number games than for reading or painting and drawing. This pattern was also evident when considering the range of ages of children in the study. See Appendix M.

Table 29 Means (Standard Deviations) and Correlations between Parental and Child Engagement in Activities

Activity:	Parental Engagement (i.e., how often parent engages with child) in:	Child Engagement (i.e., how often child engages) in:	Correlation
Reading	5.55 (.85)	5.46 (1.17)	.59**
Letters and ABC's	3.43 (1.44)	3.80 (1.41)	.75**
Number and shapes	3.61 (1.36)	4.00 (1.30)	.71**
Toys and Games	4.67 (1.24)	5.84 (.54)	.29**
Puzzles and Jigsaws	3.74 (1.27)	4.18 (1.23)	.73**
Paint and Draw	3.75 (1.24)	4.83 (1.11)	.51**

* significant at .05 level (2-tailed), ** significant at .01 level (2-tailed).

Correlational Analysis

Looking at the relationships between parent play beliefs, the richness of the play environment parents created, as well as parent and child's engagement in activities, highlighted a number of interesting patterns. Table 30 below shows the correlations between the parent's beliefs about play and their frequency of engagement in the individual play activities. All of the activities were significantly positively related with

Play Support, ranging from $r = .17$, $n = 239$, $p = .011$ for reading, to $r = .36$, $n = 241$, $p < .001$, for play with toys and games. With the exception of play with letters or alphabet, all of the activities were negatively correlated with Academic Focus. The negative significant correlations were for play with toys and games, $r = -.29$, $n = 241$, $p < .001$, and reading, $r = -.13$, $n = 239$, $p = .043$. Parent's focus on academic learning was significantly and negatively correlated with their total engagement in activities, $r = -.15$, $n = 236$, $p = .023$, but not significantly correlated with any other factors, all p's > .05. In contrast, there was a strong correlation between parents' beliefs in supporting their child's play activities and the parent's engagement in their child's play activities, $r = .38$, $n = 236$, $p < .001$.

There were also positive correlations between parents Play Support scores and the richness of the play environment in their home, $r = .22$, $n = 240$, $p < .001$, as well as their child's total engagement in play activities, $r = .18$, $n = 240$, $p = .005$. These findings highlight the associations between parent's beliefs about play, the richness of the home play environment they set up for their child, and parent engagement in play activities with their child. Correlations between frequency of child engagement in the individual play activities are also shown as well as intercorrelations between other covariates and outcome variables in Table 31 below for comparison.

Table 30 Intercorrelations for Scores on Predictor Variables, Covariates and Outcome Variables in PLEY study (Parental Engagement)

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.Read to your child	1																
2.Play letter or alphabet learning activities	0.12																
3.Play number and shape learning activities	.18**	.73**															
4.Play with toys and games	.21**	.23**	.42**														
5.Play with puzzles and jigsaws	.33**	.31**	.46**	.46**													
6.Paint, draw, play with slime/play-doh/make models	.27**	.39**	.45**	.43**	.48**												
7.PPBS Play Support Mean	.17*	.23**	.28**	.36**	.27**	.21**											
8.PPBS Academic Focus Mean	-.13*	0.04	-0.06	-.29**	-0.11	-0.10	-.24**										
9.Home Play Environment	.14*	.11	.08	.07	.20**	.30**	.22**	-.09									
10.Siblings	0.03	-0.07	0.09	.29**	0.07	0.05	0.10	-.18**	.03								
11.PCG highest education attainment	0.12	-.13*	0.01	-0.03	0.03	-0.07	0.07	-.21**	0.00	0.00							
12.PCG usual situation with regards to work	-0.11	0.07	0.02	0.00	-0.07	0.02	-0.09	-0.04	-0.06	-.03	-.20**						
13.SDQ Internalising Score	-0.04	-0.08	0.00	0.08	0.02	0.06	-.23**	0.02	-0.07	0.08	0.03	0.06					
14.SDQ Externalising Score	-0.08	-0.09	-0.12	-0.04	-.15*	-0.06	-.21**	0.05	-0.09	0.06	-.14*	0.01	.19**				
15.SDQ Prosocial	0.03	.23**	.20**	-0.03	0.05	0.07	.24**	-0.06	0.07	-.18**	0.01	0.03	-.19**	-.49**			
16.Total Attention	0.03	0.12	0.09	-0.04	.14*	.18**	.13*	-0.07	.34**	-0.08	0.13	-0.03	-0.11	-.45**	.25**		
17.Total Language	0.10	-0.05	-0.06	-0.08	-0.10	-0.07	0.05	0.00	-0.04	-0.04	0.04	0.10	-.15*	-0.09	.15*	0.10	
18.Parent Engagement in Activities	0.44**	0.71**	0.81**	0.67**	0.73**	0.73**	0.38**	-.15**	0.21**	0.11	-0.03	-.00	-0.01	-0.13	0.14*	0.13*	-0.80

* significant at .05 level (2-tailed), ** significant at .01 level (2-tailed).

Table 31 Intercorrelations for Scores on Predictor Variables, Covariates and Outcome Variables in PLEY study (Child Engagement)

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.Read to your child																	
2.Play letter or alphabet learning activities	0.17**																
3.Play number and shape learning activities	0.16**	0.65**															
4.Play with toys and games	0.18**	0.05	0.03														
5.Play with puzzles and jigsaws	0.30**	0.19**	0.29**	0.22**													
6.Paint, draw, play with slime/play-doh/make models	0.14*	0.34**	0.23**	0.17**	0.29**												
7.PPBS Play Support Mean	0.08	0.09	.136*	0.08	.22**	0.05											
8.PPBS Academic Focus Mean	-.13*	0.02	-0.05	-.16*	-0.08	-0.04	-0.24**										
9.Home Play Environment	0.16*	0.14*	0.04	0.22**	0.22**	0.37**	0.22**	-0.09									
10.Siblings	-0.02	-0.10	0.00	0.08	-0.04	-0.08	0.10	-.18**	0.03								
11.PCG highest education attainment	0.13*	-0.03	0.04	-0.02	0.08	-0.04	0.07	-.21**	0.00	0.00							
12.PCG usual situation with regards to work	-0.11	0.02	0.03	0.02	-0.09	-0.04	-0.09	-0.04	-0.06	-0.03	-.20**						
13.SDQ Internalising Score	-0.01	-0.09	-0.04	0.12	-0.11	0.00	-.23**	0.02	-0.07	0.08	0.03	0.06					
14.SDQ Externalising Score	0.02	-0.06	-0.06	-0.06	-0.06	-0.01	-.21**	0.05	-0.09	0.06	-.14*	0.01	.19**				
15.SDQ Prosocial	0.02	.20**	.15*	-0.09	-0.01	.15*	.24**	-0.06	0.07	-.20**	0.01	0.03	-.19**	-.49**			
16.Total Attention	0.10	.19**	0.05	.27**	.235**	.29**	.13*	-0.07	.34**	-0.08	0.13	-0.03	-0.11	-.45**	.25**		
17.Total Language	0.09	0.04	0.02	-0.07	0.01	0.07	0.05	0.00	-0.04	-0.04	0.04	0.10	-.15*	-0.09	.15*	0.10	
18.Child Engagement in Activities	0.53**	0.73**	0.72**	0.31**	0.63**	0.60**	0.18**	-0.11	0.30**	-0.06	0.05	-0.05	-0.06	-0.06	.15*	.29**	0.06

* significant at .05 level (2-tailed), ** significant at .01 level (2-tailed).

Regression Analysis

A regression analysis was conducted to investigate if play belief scores were predicted by the parent's level of education, their age and also the age of their child, but the model was not significant, $R^2 = .011$, F (3,235) = .898, $p = .443$. However, these variables were significant predictors of Academic Focus scores, $R^2 = .064$, F (3,235) = 5.37, $p = .001$. An examination of the coefficients indicated that maternal education level and the age of the child predicted Academic Focus scores. There was a positive relationship between the age of the child and the Academic Focus ($\beta = .153$), and a negative relationship with maternal education ($\beta = -.189$). See Appendix N.

Additional analyses also indicated that Play Support scores were a significant predictor both of the richness of the home play environment and of the frequency of parental engagement in play activities with their child. Play Support and Academic Focus scores were entered as predictors in a regression model and accounted for 14.3% of variance in parental engagement scores, $R^2 = .143$, F (2,230) = 19,16, $p < .001$. However, only Play Support was a significant unique contributor to the model, ($\beta = .362$), This finding remained even after parental education level, age and the age of the child were controlled for in the regression model, F (5,227) = 10.41, $p < .001$. A similar pattern was also present for the richness of the home environment, F (5,231) = 4.41, $p = .001$, with Play Support making a significant contribution to the model, ($\beta = .228$) even after parental education level, age and the age of the child were controlled for, while Academic Focus did not. Full details of the regression analysis are presented in Appendix N.

Summary of Parental Beliefs about Play and the Home Play Environment

Parental engagement and child engagement in the various play activities, were highly correlated for almost all activities and showed high levels of engagement in play in the home by both children and their parents. All parents had a higher Play Support score than an Academic Focus score and scores were negatively correlated. Examining the role of parent’s beliefs about play in the home play environment shows that their Play Support scores were significantly and positively correlated with their engagement in all of the play activities, and with the richness of the home play environment. In contrast, there was a small negative correlation between Academic Focus scores and certain activities (i.e., reading with the child and playing with toys and games). Overall, the findings highlight the relationships between parent's beliefs about play, the richness of the home play environment and parental engagement in play activities with their child.

Study 6: Do different types of play and learning activities contribute to different aspects of socio-emotional development, even after parental beliefs about play are accounted for?

The finding of the previous analysis reported above indicated that parent beliefs about play are associated with the frequency of their engagement in various play activities and the richness of the home play environment. The current study aimed to extend these findings by exploring if play and learning activities contribute to different aspects of socioemotional development (as found in Chapter Four), event after parental beliefs about play are controlled for. The current study included some of the factors that were described in Study 5 (i.e., the play and learning activities, and the Parent Play Beliefs Scale). We also included the Strengths and Difficulties Questionnaire, previously used in Studies 3 and 4 to measure three socioemotional outcomes: Internalising, Externalising and Prosocial behaviour. We continued to examine the effect of individual play and learning activities on development, as we did in the previous chapters, with some minor adaptions, and again through a bioecological lens.

Method

Participants

Research participants for the study were the parents/guardians of children aged 6 and under and the final sample consisted of 276 participants.

Materials

Outcome Variable. Socioemotional development was measured in the PLEY survey using The Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). As described in the previous chapter the SDQ is a 25-item behavioural screening questionnaire designed to assess emotional health and problem behaviours. Again, we used the parental report measure and the three-factor model that consists of Internalising (i.e., emotional problems and peer problems), Externalising (i.e., hyperactivity and conduct problems) and Prosocial scales. The SDQ is a widely used questionnaire in assessing the socioemotional development of children and individual subscales and demonstrates Cronbach alpha coefficients of between 0.65 - 0.85. In the current study, individual subscales had alpha coefficients between .56 and .73, while the Internalising subscale had $\alpha = .65$, the Externalising subscale, $\alpha = .77$ and the Prosocial subscale, $\alpha = .75$. As in the previous studies, a higher score on the subscales (i.e., internalising and externalising subscales), with the exception of the Prosocial scale of the SDQ indicates a greater number of emotional and behavioural problems.

Play and Learning Activities. Like the studies in the previous chapters, the predictor variables were the frequency of play and learning activities in the home. Parents indicated how often they engaged in the six-target play and learning activities: reading, letter or alphabet learning, number and shape learning, play with toys and games, play with puzzles and jigsaws and paint, draw, play with slime/make models. These were measured on a 6-point Likert scale ranging from 'Never' to 'Everyday'.

Control measures/Covariates. In addition to the predictor variables (i.e., the play and learning activities), other measures were entered in blocks to imitate Bronfenbrenner's bioecological model. The Parent Playtime Beliefs Scale (PPBS; Fogle & Mendez, 2006), as described in Study 5, was used to examine parents' beliefs on the value of play and learning in the home and whether they value the developmental significance of play. The child relationship factor, if the child had siblings or not was included and recoded (i.e., 1 = yes, 0 = no). As in the studies in earlier chapters, environmental factors were included also. These included maternal education (i.e., ranging 0 to 9 where 0= no formal secondary education and 9 = doctorate) and the usual situation regarding work (i.e., 1= working full time, 2 = part time and 3 = other). However, in contrast to the four categories of maternal education used in the studies in earlier chapters, maternal education was entered as a continuous variable (i.e., ranging 0 to 9 where 0= no formal secondary education and 9 = doctorate) as most of the sample, 76%, was educated to degree or postgraduate level. Usual situation regarding work was included in three groups with working full time as a reference group, as there was a greater spread of the sample across each of the situations regarding work.

Procedure

As described in Study 5 parents of children aged 6 and under were recruited through Irish primary schools, early childhood education centres and through social media platforms. The PLEY study adhered to the ethical standards of the PSI Code of Professional Ethics, (4.2.7; PSI, 2010), and ethical approval was granted by the Mary Immaculate Research Ethical Committee (MIREC- A19-027).

Analysis

The current study used hierarchical regression analyses to examine the effect of play and learning activities on socioemotional outcomes of Internalising, Externalising and Prosocial behaviours as measured by the Strengths and Difficulties Questionnaire, similar to the previous chapter. However, parental play beliefs, Play Support and Academic Focus, were entered as covariates at block 2. As in the previous studies, separate ordinary least squares regressions were used to determine the extent to which each of the predictor variables, six individual play and learning activities (e.g., reading, ABCs, numbers, puzzles and jigsaws, play with toys and games, and painting/drawing) predicted scores on the three outcome measures independently of the other activities and independently of the control variables, parent play beliefs (Block 2), child relationships (Block 3) and parental education and employment (Block 4). See Table 32 below. As in the previous regression models, the variables were entered in this order to reflect Bronfenbrenner's bioecological model. While play beliefs can be viewed as both a microsystem or macrosystem factor, we entered them here in the second block, to understand the impact of them on the contribution of play activities to development, before including the other factors.

Table 32 Hierarchical Linear Regression Model showing Bioecological Layers for Developmental Outcomes in the PLEY Study

Steps and Variables in each Block	**Corresponding System**	**Factors**	**Measurement**
Predictor Variables- Block 1 Play and learning activities	Proximal processes in Microsystem	- Reading - ABC's - Numbers - Play with toys and games - Play with puzzles and jigsaws - Painting and drawing	Parent report Measured 1 = Never to 6 = Everyday
Covariates- Block 2 Parent Play Beliefs	Microsystem/ Macrosystem	- Play Support - Academic Focus	Scores from PPBS
Block 3 Child-relationship factors	Microsystem Mesosystem	- Siblings	1 = yes, 0 = no
Block 4 Environmental factors	Exosystem	- Maternal education	Measured 1 = No formal education to 9 = Doctorate
		- Maternal work situation	Measured 1 = working fulltime. 2= part time, 3 = other Reference category: working fulltime = 0

Results

Sample Characteristics and Descriptive Statistics

Table 28 above, describes the sample characteristics for Study 5, 6 and 7. In addition to the sample characteristics, mean scores for both parent and child engagement in play and learning activities as well as mean scores for play beliefs are included, and described in Table 29 above. Descriptive statistics relevant to the current study are also described in detail in Study 5 above.

Correlational Analysis

Correlational analyses were conducted between parental engagement in activities and socioemotional outcomes. Similar to the findings in the previous chapter there were weak correlations between the activities and socioemotional outcomes. In contrast with the findings in the previous chapter however, there were few significant correlations, due perhaps to the much smaller sample size. However, there was a significant positive relationship between letter and alphabet activities and Prosocial scores, r = .23, n= 229, p < .001. There were also significant positive correlations between number and shape learning activities and Prosocial scores. For a full description of correlations between the variables in Study 6, see Table 30 above.

Regression Analysis (Parental Engagement)

A number of hierarchical regressions were conducted to investigate the impact of the play and learning activities on parental engagement in socioemotional outcomes (e.g., SDQ Internalising, Externalising and Prosocial scores). As before, the independent variables were entered in blocks to represent the nested layer and reflect the bioecological framework. A visual inspection of P-P plots demonstrated that the assumption of normality was met for the analysis. The assumption of multicollinearity was met by examining bivariate correlations, and tolerance values greater than 0.1 and reciprocal VIF values less than 10 were observed for all variables (Field, 2018). The assumption of homoscedasticity was met and observed via visual inspection of a plot of standardised residuals versus standardized predicted values. Cases with standardised residuals greater than +/- 3.29 were removed as were cases that were two or more standard deviations from the mean. Outliers were checked by examining the Mahalanobis distances which indicated there were cases that exceeded the critical value (Field, 2018; Pallant, 2016) and these cases were removed from the analysis.

SDQ Internalising. Parental engagement in the play and learning activities was entered in block 1 of the regression model. The results indicated for SDQ Internalising scores, that at block 1, play and learning activities did not significantly predict scores, $R^2 = .026$, F(6, 209 = .945, $p = .464$ (See Table 33). After controlling for the influence of covariates, (i.e., parent beliefs, siblings, and environmental factor) results showed that Play Support and parental engagement in playing with toys and games predicted Internalising scores, $R^2 = .154$, $F(12, 203) = 3.08$, $p = .001$, with 15.4% of variance explained in the final model. Play with toys and games appears to be moderated by parent beliefs as it became a significant contributor in the third model. Comparing across the β values in the final model indicated that Play Support (β = -.329), followed by working part time (β = .193), and maternal education (β = .143) made the largest contribution to internalising scores in the final regression model, all *p's* < .05.

***SDQ Externalising*.** A second hierarchical regression was conducted to investigate if play and learning activities predicted SDQ Externalising scores, and a similar pattern of findings to Internalising scores was evident. At block 1, the results indicated that play and learning activities did not significantly predict Externalising scores, $R^2 = .022$, $F(6, 210) = .78$, $p = .58$ (See Table 34 below). After controlling for the influence of covariates, results showed that the final model was significant and predicted Externalising scores, $R^2 = .096$, $F(12, 204) = 1.80$, $p = .05$, with Play Support ($\beta = -.226$) making the only significant contribution to the final regression model, with 9.6% of variance explained in the final model, all *p's* < .05.

Table 33 Hierarchical Regression Analysis predicting SDQ Internalising scores (Parent)

Step and Predictor Variables x	**SDQ Internalising- PLEY- Parental Engagement**			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Play activities:				
- Read to child	-0.076	-0.054	-0.051	-0.098
- ABC's	-0.160	-0.132	-0.125	-0.082
- Numbers	0.100	0.120	0.117	0.110
- Play with toys and games	0.095	0.176*	0.151	0.156
- Play with jigsaws and puzzles	-0.072	-0.066	-0.062	-0.074
- Paint and draw	0.052	0.043	0.047	0.075
Parent Beliefs:				
- Play Support		-0.313***	-0.315***	-0.329***
- Academic Focus		-0.042	-0.034	-0.025
Child Relationships:				
- Siblings			-0.082	-0.097
Environmental Factors:				
- Education				0.143*
- Work : (ref fulltime work)				
- Part-time Work				0.193*
- At home/Other				0.038
R^2 △	2.6%, n.s.	7.7%, $p < .001$	0.6%, n.s.	4.4%, n.s.
Total R^2 adjusted				10.4%, $p < .05$

* *p* < .05, ***p* < .01, *** p < .001, *n.s.*= not significant

Table 34 Hierarchical Multiple Regression Analysis predicting SDQ Externalising scores (Parent)

Step and Predictor Variables	**SDQ Externalising-PLEY-Parental Engagement**			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Play activities:				
- Read to child	-0.065	-0.041	-0.036	-0.043
- ABC's	-0.031	-0.015	-0.004	0.005
- Numbers	-0.048	-0.26	-0.031	-0.033
- Play with toys and games	0.015	0.083	0.051	0.046
- Play with jigsaws and puzzles	-0.100	-0.096	-0.089	-0.091
- Paint and draw	0.063	0.054	0.060	0.060
Parent Beliefs:				
- Play Support		-0.238**	-0.241**	-0.226**
- Academic Focus		0.000	0.010	-0.003
Child Relationships:				
- Siblings			0.108	0.097
Environmental Factors:				
- Education				-0.069
- Work : (ref fulltime work)				0.101
- Part-time Work				
- At home/Other				-0.011
R^2 △	2.2%, n.s.	4.8%, $p < .05$	0.1%, n.s.	1.6%, n.s.
Total R^2 Adjusted				4.2%, $p < .05$

* $p < .05$, **$p < .01$, *** $p < .001$, *n.s.*= not significant

SDQ Prosocial. A third hierarchical regression was conducted to examine the impact of play and learning activities on SDQ Prosocial scores. The results indicated that at block 1, play and learning activities did not significantly predict Prosocial scores, R^2 = .052, $F(6, 209) = 1.91$, p = .08, but accounted for 5.2% of variance in Prosocial scores (See Table 35). After adding the covariates to the model (parent beliefs, siblings and environmental factors) the results showed that in the final block no activities significantly predicted Prosocial scores, R^2 = .154, $F(12, 203) = 3.08$, $p < .001$, although the final model accounted for 15.4% of variance in scores. Playing with toys and games was significant in the second model (β = -.168) but was no longer significant in the third model. Comparing across the β values in the final model indicated that Play Support (β = .242) followed by siblings (β = .207) were significant contributor to the final regression model, all *p's* < .05. P-P plots and scatter plots for each of the regressions are included in Appendix O.

Table 35 Hierarchical Regression Analysis predicting SDQ Prosocial scores (Parent)

Step and Predictor Variables	**SDQ Prosocial – PLEY- Parental Engagement**			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Play activities:				
- Read to child	0.031	0.004	-0.005	0.017
- ABC's	0.138	0.134	0.117	0.095
- Numbers	0.123	0.094	0.104	0.109
- Play with toys and games	-0.093	-0.168*	-0.108	-0.115
- Play with jigsaws and puzzles	-0.058	-0.070	-0.081	-0.072
- Paint and draw	-0.019	-0.020	-0.029	-0.46
Parent Beliefs:				
- Play Support		0.222**	0.229**	0.242***
- Academic Focus		-0.078	-0.096	-0.099
Chid Relationships:				
- Siblings			0.199**	0.207**
Environmental Factors:				
- Education				-0.076
- Work : (ref fulltime work)				-0.073
- Part-time Work				
- At home/Other				0.008
R^2 △	5.2%, n.s.	5.6%, $p < .05$	3.6%, $p < .05$	1.0%, n.s.
Total R^2 Adjusted		.		10.4%, $p < .05$

* $p < .05$, ** $p < .01$, *** $p < .001$, *n.s.*= not significant

Summary of **Socioemotional Findings related to Parental Engagement**

Tables 33 to 35 above demonstrate the results of the analysis for the three socioemotional outcomes, Internalising, Externalising and Prosocial scores. In the fully-adjusted final models, Play Support had a significant effect on all three socioemotional outcomes. These findings indicate that parental beliefs about play may be important for socioemotional development, over and above the play and learning activities themselves. Having a play support belief, had a similar effect across each of the three socioemotional measures, Internalising, Externalising and Prosocial scores, as the standardised regression coefficients demonstrated. Having a higher play support belief predicted lower scores for both Internalising behaviour (β= -.329) and Externalising behaviour (β= -.226). The same supportive play belief increased Prosocial scores (β= .242). Table 36 below summarises the percentage of variance for parental engagement in the socioemotional outcomes at each block of the regression models. An interesting finding also is that having siblings increased prosocial scores. Also, children with mothers with higher education and mothers who worked part time, compared to full time, had increased internalising scores. Overall, the results demonstrate that parent play beliefs are having a significant effect across the three socioemotional outcomes, over and above play and learning activities and other factors.

Table 36 Percentage of Variance (R^2) for Parent Engagement in the PLEY Socioemotional Variables Explained at each Block of the Regression Model

	SDQ Internalising	SDQ Externalising	SDQ Prosocial
Block 1: *(Play Activities)*	2.6%	2.2%	5.2%
Block 2: *(Block 1 + Parent Play Beliefs)*	10.4%***	6.9%*	10.8%**
Block 3: (*Block 2 + Child Relationships)*	11.0%	8.0%	14.4%**
Block 4: *(Block 3 + Environmental Factors)*	15.4%	9.6%	15.4%

* $p < .05$, ** $p < .01$, *** $p < .001$

The findings reported in the study thus far provide insight into the role of parental beliefs about play in influencing parental engagement in play and socioemotional development. However, as noted in the previous chapter it is important to consider the distinction between parental engagement in play activities with their child, versus the child’s engagement in those same activities. The aim of the next set of analyses was to examine if child engagement in the various play and learning activities had an impact on socio emotional development, and to contrast this with the findings related to parental engagement reported above.

Regression Analysis (Child Engagement)

To explore child engagement in play and learning, a number of hierarchical regressions were conducted to investigate the impact of the play and learning activities on socioemotional outcomes (e.g., SDQ Internalising, Externalising and Prosocial scores). As before, the independent variables were entered in blocks to represent the nested layer and reflect the bioecological framework. The assumption of linearity was met for all variables. A visual inspection of P-P plots demonstrated that the assumption of normality was met for the analysis. The assumption of multicollinearity was met by examining bivariate correlations, and tolerance values greater than 0.1 and reciprocal VIF values less than 10 were observed for all variables (Field, 2018). The assumption of homoscedasticity was met and observed via visual inspection of a plot of standardised residuals versus standardized predicted values. Cases with standardised residuals greater than +/- 3.29 were removed as were cases that were two or more standard deviations from the mean. Outliers were checked by examining the Mahalanobis distances which indicated there were cases that exceeded the critical value (Field, 2018; Pallant, 2016) and these cases were removed from the analysis.

SDQ Internalising/Externalising. Child engagement in play activities significantly predicted internalising scores in the first model, $R^2 = .060$, $F(6, 207) = 2.19$, $p = .046$. In the final model, play activities explained 12.6% of the variance, $R^2 = .126$, $F(12, 201) = 2.42$, $p = .006$ (See Table 37 below). After controlling for covariates, Play Support ($\beta = -.178$) and child engagement in puzzles and jigsaws ($\beta = -.174$) as well as mothers working part time ($\beta = .171$) and siblings ($\beta = -.137$), significantly predicted internalising scores, all p's $< .05$. In contrast, child engagement in play and learning activities did not predict externalising scores in the first model, $R^2 = .008$, $F(6, 198) = .27$, $p = .95$, and the final model was not significant, $R^2 = .093$, $F(12, 192) = 1.63$, $p = .085$, see table 38 below.

Table 37 Hierarchical Regression Analysis predicting SDQ Internalising scores (Child)

Step and Predictor Variables	**SDQ Internalising- PLEY - Child Engagement**			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Play Activities:				
- Read to child	0.124	0.119	0.115	0.118
- ABC's	-0.209*	-0.208*	-0.183	-0.165
- Numbers	0.160	0.183	0.163	0.178
- Play with toys and games	0.063	0.075	0.061	0.045
- Play with jigsaws and puzzles	-0.188*	-0.169*	-0.165*	-0.174*
- Paint and draw	0.002	0.003	0.011	0.012
Parent Beliefs:				
- Play Support		-0.160**	-0.176**	-0.178**
- Academic Focus		-0.000	-0.009	-0.016
Child Relationships:				
- Siblings			-0.123	-0.137*
Environmental Factors:				
- Education				0.069
Work : (ref fulltime work**)**				0.171*
- Part-time Work - At home/Other				0.020
R^2 △	5.4%, n.s.	3.5%, *p*< .05	0.9%, *n.s.*	1.7%, *n.s.*
Total R^2 adjusted				6.3%, *p* < .05

* *p* < .05, ***p* < .01, *** p < .001, *n.s.*= not significant

Table 38 Hierarchical Regression Analysis predicting SDQ Externalising scores (Child)

Step and Predictor Variables	**SDQ Externalising- PLEY – Child Engagement**			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Play Activities:				
- Read to child	-0.025	-0.034	-0.038	-0.002
- ABC's	-0.049	-0.056	-0.028	-0.034
- Numbers	-0.016	0.028	0.009	0.031
- Play with toys and games	-0.003	0.025	0.014	-0.004
- Play with jigsaws and puzzles	-0.052	-0.035	-0.029	-0.030
- Paint and draw	0.016	0.028	0.037	0.025
Parent Beliefs:				
- Play Support		-0.238**	-0.250***	-0.229**
- Academic Focus		0.015	0.028	0.018
Child Relationships:				
- Siblings			-0.109	-0.093
Environmental Factors:				
- Education				-0.105
Work : (ref fulltime work)				0.077
- Part-time Work - At home/Other				 -0.029
R^2 △	0.8%, *n.s.*	5.6%, $p < .05$	1.1%, *n.s.*	1.8%, *n.s.*
Total R^2 adjusted				9.3%, *n.s.*

* $p < .05$, **$p < .01$, *** $p < .001$, *n.s.*= not significant

SDQ Prosocial. Finally, child engagement in play and learning activities, indicated that child engagement in activities did not predict Prosocial scores, $R^2 = .054$, $F(6, 208) = 1.99$, $p = .068$. The final model was significant, $R^2 = .174$, $F(12, 202) = 3.55$, $p < .001$, with 12.5% of variance explained in the model, all p's $< .05$. Examining the β values in the final model, indicated that Play Support, ($\beta = .282$) and siblings ($\beta = .232$) as well as play with jigsaws and puzzles ($\beta = -.150$), made unique contributions to the model, See Table 39, all p's $< .05$. P-P plots and scatter plots for the three regressions are included in Appendix P.

Table 39 Hierarchical Regression Analysis predicting SDQ Prosocial scores (Child)

Step and Predictor Variables	**SDQ Prosocial - PLEY – Child Engagement**			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Play activities:				
- Read to child	0.040	0.042	0.050	0.059
- ABC's	0.082	0.090	0.046	0.037
- Numbers	0.118	0.072	0.108	0.105
- Play with toys and games	-0.027	-0.054	-0.029	-0.027
- Play with jigsaws and puzzles	-0.115	-0.147*	-0.155*	-0.150*
- Paint and draw	0.119	0.102	0.087	0.085
Parent Beliefs:				
- Play Support		0.239***	0.270***	0.282***
- Academic Focus		-0.068	-0.083	-0.085
Child Relationships:				
- Siblings			0.223***	0.232***
Environmental Factors:				
- Education				-0.065
Work : (ref fulltime work)				-.036
- Part-time Work				
- At home/Other				0.016
R^2 △	6.0%, *n.s.*	2.4%, $p <$ .001	1.4%, p <.001	2.8%, *n.s.*
Total R^2 adjusted				12.5%, $p <$ .001

* $p < .05$, **$p < .01$, *** $p < .001$, *n.s.*= not significant

Summary of Socioemotional findings related to Child Engagement

Child engagement in play and learning activities had a similar effect to parental engagement in activities. Similar to parental engagement, in two of the the fully adjusted final models (e.g., Internalising and Prosocial), Play Support had a significant effect on two of the socioemotional outcomes, with parental beliefs about play, contributing more than the activities themselves. Table 40 below summarises the percentage of variance across the socoioemotional outcomes at each block of the regression models. Parent play beliefs have a significant influence over and above the play and learning activities or other factors.

Examining the play activities on socioemotional development outcomes, child engagement in play with jigsaws and puzzles, reduced internalising scores, even after family and other factors were controlled for. In contrast, play and learning activities had no effect on externalising scores for either parent or child engagement in activities. This was similar for Prosocial scores; none of the play activities, with the exception of jigsaws and puzzles, had an effect on Prosocial scores when family and other factors were controlled for. Of interest is when the child engaged in jigsaws and puzzle play, it appeared to reduce prosocial scores. Having siblings also appears to reduce internalising scores. In addition, children had higher internalising scores when mothers worked part time compared to mothers who worked full time.

Table 40 Percentage of Variance (R^2) for Child Engagement in Socioemotional Development explained at each Block of the Regression Model

	SDQ Internalising	SDQ Externalising	SDQ Prosocial
Block 1: *(Play Activities)*	6.0%*	0.8%	5.4%
Block 2: *(Block 1 + Parent Play Beliefs)*	8.4%	6.4%**	12.2%***
Block 3: (*Block 2 + Child Relationships)*	9.8%	7.5%	16.8%***
Block 4: *(Block 3 + Environmental Factors)*	12.6%	9.3%	17.4%

* $p < .05$, **$p < .01$, *** $p < .001$

Study 7: Do different types of play and learning activities contribute to different aspects of cognitive development, even after parental beliefs about play are accounted for?

The findings of Study 6 indicated that parental beliefs about play are important in different aspects of socioemotional development. The aim of the current study was to investigate if play and learning activities contributed to different aspects of cognitive development, even after controlling for parental beliefs about play. As in the previous study, we included the play and learning activities, and the Parent Play Beliefs Scale. The findings in Chapter Three indicated that play and learning activities have a role to play in aspects of cognitive development that have received little attention in previous research (i.e., non-verbal reasoning), in addition to influencing aspects of language development which have been more widely studied (i.e., vocabulary). In order to build upon the findings of Chapter Three, and expand knowledge related to the role of play and learning activities in early cognitive development, the current study included a measure of attention, along with a measure of language.

Previous research examining the role of the home learning environment in attention shows that engagement in home learning activities is associated with development of skills including attention (Hayes et al., 2018). For example, Baker (2013), included attention as a dimension of socioemotional development while other research examined reading and attention (O'Farrelly et al., 2018). Attentional Focusing has been associated with development across domains, including academic success as well as socioemotional development (Rueda et al., 2010). Attentional Focusing has also been used a measure of temperament in early childhood (Rothbart et al., 2001) and measured in a number of ways. Finally, similar to the previous study, the role of child engagement in play activities will also be investigated.

Method

Participants

Research participants for the current study were the same parents/guardians of children aged 6 and under included in Study 5 above. The final sample consisted of 276 participants. The participants' children aged from 6 months to 6 years and 11 months, with the mean children's age being 3.86 years (*SD* = 1.53). 53.6% of the children were male, and 80.4% had siblings (see Table 28). Full details of parental education and work situation are included in the participants section in Study 5.

Materials

Outcome Variable. The third section of the PLEY survey consisted of two separate parental reports scales to measure aspects of child cognitive development (i.e., attention and language development). The first of these, was the Attentional Focusing subscale from the Children's Behaviour Questionnaire (CBQ; Rothbart et al., 2001) and was included both to explore another aspect of cognition, and as a reliable parent report measure suitable for use in the survey. The Attentional Focusing subscale asked parents to respond to statements about their children's reactions in 9 different situations. For example, 'When drawing or colouring in a book, shows strong concentration'. Parents had to indicate on a 5-point Likert scale (ranging from 'Extremely untrue' to 'Extremely true') how true these statements were of their child. This 9-item subscale in the CBQ was reported to have high internal consistency, $\alpha = 0.74$, and in the current study it was $\alpha = 0.66$.

The second of the scales used was the Language Scale from the Alberta Language and Development Questionnaire (ALDeQ; Paradis et al., 2010). The ALDeQ is a non-language/culture specific parent questionnaire on first language development and measures early developmental milestones, child's current abilities in their first and second language, behavioural patterns and family history. It can help assess if there is evidence of any delay or problems in the first language. Example items include, 'Compared with other children of the same age, how do you think that your child expresses him/herself?' A second question was 'Compared with other children of the same age, how do you think your child pronounces words'. Example responses include, ('Not very well', 'A little less well', 'The same', 'Very good/better/one of the best') ('Not very clearly', 'Sometimes not clear, ‘Same’, ‘Very clear, one of the best’). The responses were all on a 4-point scale with a maximum score of 12 points for the four questions, with responses varying according to each question. A higher score was related to greater language and communication ability (e.g., 0 = Not very well, 1 = A little less well, 2 = The same, 3 = Very good/better/one of the best). No Cronbach’s alpha was available for the original questionnaire. This scale for the items in the current study had high internal consistency, $\alpha = 0.81$

Play and Learning Activities**.** As in study 6, the six-target play and learning activities or predictor variables, were reading, letter or alphabet learning, number, and shape learning, play with toys and games, play with puzzles and jigsaws and paint, draw, play with slime/make models. Parents indicated how often the child engaged in the activity and how often the child engaged in the activity. Responses were measured on a 6-point Likert scale ranging from ‘Never’ to ‘Everyday’.

Control measures/Covariates. In addition to the predictor variables (i.e., the play and learning activities), measures were entered in blocks to imitate Bronfenbrenner’s bioecological model. As in the previous analyses, measures of family and other influences were used to consider the role of the home learning environment on cognitive and language development. Parent play beliefs, Play Support and Academic Focus were entered in block 2, child relationship factor (i.e., siblings) were entered in block 3 and broader environmental factors (i.e., maternal education and usual situation regarding work) were entered in block 4. Table 28 above has already described the baseline characteristics of the sample.

Procedure

As described in the previous study, parents of children aged 6 and under were recruited in a number of ways, including through Irish primary schools, early childhood education centres and through social media platforms. The PLEY study adhered to the ethical standards of the PSI Code of Professional Ethics, (4.2.7; PSI, 2010), and ethical approval was granted by the Mary Immaculate Research Ethical Committee (MIREC-A19-027).

Analysis

The current study used hierarchical regression analyses to examine the effect of play and learning activities on attentional focusing (Rothbart et al., 2001) and language (ALDeQ; Paradis et al., 2010). The study mirrored the regressions in Study 6, with the same predictor variables and covariates. As before, separate ordinary least squares regressions were used to determine the extent to which each of the predictor variables, six individual play and learning activities (e.g., reading, ABCs, numbers, puzzles and jigsaws, play with toys and games, and painting/drawing) predicted scores on the outcome measures, independently of the other activities and independently of the control variables.

Results

Sample Characteristics and Descriptive Statistics for the current study have been described in detail in Studies 5 and 6 above.

Correlational Analysis

Correlational analyses were conducted between the between the PPBS subscales, Play Support and Academic Focus, and the attention and language development scores. There was a significant positive relationship between attentional focusing and painting and drawing, $r = .18$, $n = 235$, $p = .006$ and attentional focusing and puzzles and jigsaws activities, $r = .14$, $n= 237$, $p = .034$. There was also a small significant positive correlation between Attentional Focusing and Play Support, $r = .13$, $n = 237$, $p < .044$. Table 30 above, gives a complete summary of the correlation coefficients between the variables in Study 7.

Regression Analysis (Parental Engagement)

A number of hierarchical regressions were conducted to investigate the impact of the play and learning activities on parental engagement in socioemotional outcomes (e.g., Attentional Focusing and language). As before, the independent variables were entered in blocks to represent the nested layer and reflect the bioecological framework. The assumption of linearity was met for all variables. A visual inspection of P-P plots demonstrated that the assumption of normality was met for the analysis. The assumption of multicollinearity was met by examining bivariate correlations, and tolerance values greater than 0.1 and reciprocal VIF values less than 10 were observed for all variables (Field, 2018). The assumption of homoscedasticity was met and observed via visual inspection of a plot of standardised residuals versus standardized predicted values. Cases with standardised residuals greater than +/- 3.29 were removed as were cases that were two or more standard deviations from the mean. Outliers were checked by examining the Mahalanobis distances which indicated there were cases that exceeded the critical value (Field, 2018; Pallant, 2016) and these cases were removed from the analysis.

Attentional Focusing. The first of these was a hierarchical regression to examine if play and learning activities predicted Attentional Focusing scores. The results indicated at block 1, that parental engagement in play and learning activities did significantly predict scores on Attentional Focusing, $R^2 = .061$, $F(6, 214) = 2.32$, $p = .035$, accounting for 6.1% of variance in the scores. An examination of the standardised B coefficients indicated that parental engagement in painting and drawing was a significant contributor in the first block (See Table 41). Play with toys and games became significant in the second block and remained significant till the final block. After controlling for the influence of covariates, results showed that parental engagement in painting and drawing predicted scores on Attentional Focusing in the final block also. Comparing across the β values in the final model indicated that painting and drawing (β = 0.192) and play with toys and games (β = -0.195) contributed to the final model. Play Support (β = 0.170) also significantly contributed to the final regression model, $R^2 = .110$, $F(12, 208) = 2.15$, $p = .015$, all *p's* < .05, even after parental beliefs about play and other factors were accounted for.

Table 41 *Hierarchical Multiple Regression Analysis predicting Attentional Focusing (Parent)*

Step and Predictor Variables	**Total Attention - PLEY- Parental engagement**			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Play Activities:				
- Read to child	-0.017	-0.037	-0.039	-0.057
- ABC's	0.134	0.128	0.122	0.139
- Numbers	-0.087	-0.109	-0.105	-0.108
- Play with toys and games	-0.157	-0.220**	-0.201*	-0.195*
- Play with jigsaws and puzzles	0.131	0.122	0.116	0.109
- Paint and draw	0.177*	0.179*	0.176*	0.192*
Parent Beliefs:				
- Play Support		0.189*	0.190*	0.170*
- Academic Focus		-0.44	-0.053	-0.047
Child Relationships:				
- Siblings			-0.068	-0.056
Environmental Factors:				
- Education				0.094
Work : (ref fulltime work)				0.030
- Part-time Work				
- At home/Other				-0.013
R^2 △	6.1%, $p < .05$	3.6%, $p < .05$	0.4%, *n.s.*	0.09%, *n.s.*
Total R^2 adjusted				5.9%, $p < .05$

**p* <.05, ***p* <.01, *** p <.001, *n.s* = not significant

Language. A further hierarchical regression was conducted to investigate the impact of play and learning activities on language (Total Language from the ALDeQ). The results indicated that at block 1, play and learning activities accounted for 3.6% of variance but did not significantly predict scores on Total Language, $R^2 = .036$, $F(6, 208) = 1.20$, $p = .307$ (See Table 42). After adding covariates to the model, (parent beliefs, siblings and environmental factors) the model, while accounting for 8.9% of the variance in scores, was not significant, $R^2 = .089$, $F(12, 202) = 1.50$, $p = .142$, all p's < .001. P-P plots and scatter plots for both regressions are included in Appendix Q.

Table 42 Hierarchical Regression Analysis predicting Total Language (Parent)

Step and Predictor Variables	**Total Language- PLEY- Parental Engagement**			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Play Activities:				
- Read to child	0.131	0.126	0.123	0.130
- ABC's	-0.101	-0.132	-0.143	-0.145
- Numbers	0.122	0.124	0.130	0.128
- Play with toys and games	-0.028	-0.054	-0.024	-0.037
- Play with jigsaws and puzzles	-0.166	-0.154	-0.160	-0.148
- Paint and draw	0.001	0.022	0.017	0.005
Parent Beliefs:				
- Play Support		0.158*	0.162*	0.186*
- Academic Focus		0.134	0.126	0.131
Child Relationships:				
- Siblings			.097	0.100
Environmental Factors:				
- Education				-.034
Work : (ref fulltime work)				0.081
Part-time Work				
At home/Other				0.100
R^2 △	3.3%, *n.s.*	2.6%, *n.s.*	0.8%, *n.s.*	1.2%, *n.s.*
Total R^2 adjusted				8.0%, *n.s*

**p* <.05, ***p* <.01, *** p <.001, *n.s* = not significant

Summary of Cognitive Findings (Parental Engagement)

Tables 41 and 42 above demonstrate the results of the analysis for the attention and language outcomes. The play activities explain 6.1% of the variance in Attentional Focusing scores and 3.3% of the variance in Total Language scores, although only the model for Attentional Focusing was significant. In the fully-adjusted final models, frequency of parental engagement in painting and drawing had a significant and positive effect on Attentional Focusing scores. In contrast, parental engagement in playing with toys and games had a significant, negative effect on Attentional Focusing scores. Table 43 below summarises the percentage of variance accounted for the cognitive outcomes, Attentional Focusing and language for parental engagement in the various activities at each block of the regression models. Overall, play and learning activities demonstrate some effect on Attentional Focusing, when compared with parental play beliefs and other factors. In addition, parents with a play support belief contributed to increased attention scores. None of the play and learning activities had an effect on language scores when family and other factors were controlled for.

Table 43 Percentage of Variance (R^2) for Parent Engagement in the PLEY Cognitive Variables Explained at each Block of the Regression Model

	Attentional Focusing	Total Language
Block 1: *(Play activities)*	6.1%*	3.3%
Block 2: *(Block 1 + Parent Play Beliefs)*	9.7%*	6.0%
Block 3: (*Block 2 + Child Relationships)*	10.1%	6.8%
Block 4: *(Block 3 + Environmental Factors)*	11.0%	8.0%

* $p < .05$, ** $p < .01$, *** $p < .001$.

Regression Analysis (Child Engagement)

Following the exploration of parental engagement in play and learning activities. further hierarchical regressions were conducted to investigate the impact of the play and learning activities on child engagement on cognitive outcomes (e.g., Attentional Focusing and language). As before, the independent variables were entered in blocks to represent the nested layer and reflect the bioecological framework. The assumption of linearity was met for all variables. A visual inspection of P-P plots demonstrated that the assumption of normality was met for the analysis. The assumption of multicollinearity was met by examining bivariate correlations, and tolerance values greater than 0.1 and reciprocal VIF values less than 10 were observed for all variables (Field, 2018). The assumption of homoscedasticity was met and observed via visual inspection of a plot of standardised residuals versus standardized predicted values. Cases with standardised residuals greater than +/- 3.29 were removed as were cases that were two or more standard deviations from the mean. Outliers were checked by examining the Mahalanobis distances which indicated there were cases that exceeded the critical value (Field, 2018; Pallant, 2016) and these cases were removed from the analysis.

Attentional Focusing. The previous regressions highlight the role of parental engagement in play and learning activities in attention and language development. Separate regressions were run to examine the role of child engagement in these activities (i.e., how frequently the child engaged in the play activities). The findings indicated that child engagement in a number of play and learning activities significantly predicted scores on Attentional Focusing, $R^2 = .123$, $F(6, 214) = 5.02$, $p < .001$, and accounted for 12.3% of variance in the scores. In the first block ABC's, numbers, play with jigsaws and painting and drawing were significant. After controlling for parental play beliefs, siblings and environmental factors, a number of play activities continued to predict Attentional Focusing scores in the final model, $R^2 = .165$, $F(12, 208) = 3.42$, $p <.001$, accounting for 11.7% of variance in scores. Comparing across the β values in the final model, indicated that Numbers ($\beta = -.260$), followed by ABC's ($\beta = .238$), and painting and drawing ($\beta = .174$), contributed significantly to the final model, see Table 44 below, all *p*'s < .05.

Language. A second regression examined the effect of child engagement in activities on Total Language, while controlling for parent play beliefs and other factors. The findings indicated that child engagement in play and learning activities, $R^2 = .080$, $F(12, 203) = 1.48$, $p = .134$, did not significantly predict language scores on the measure used, see Table 45 below, all *p*'s < .05. P-P plots and scatter plots for both regressions are included in Appendix R.

Table 44 Hierarchical Regression Analysis predicting Attentional Focusing (Child)

Step and Predictor Variables	**Total Attention - PLEY- Child Engagement**			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Play Activities:				
- Read to child	0.014	0.017	0.020	-0.005
- ABC's	0.240*	0.245*	.226*	0.238*
- Numbers	-.0243*	-0.264*	-0.248*	-.260*
- Play with toys and games	0.126	0.113	0.121	0.123
- Play with jigsaws and puzzles	0.156*	0.135	0.129	0.127
- Paint and draw	0.180*	0.174*	0.166*	0.174*
Parent Beliefs:				
- Play Support		0.122	0.130	0.118
- Academic Focus		-0.036	-0.048	-0.032
Child Relationships:				
- Siblings			0.098	0.080
Environmental Factors:				
- Education				0.129
Work : (ref fulltime work)				0.009
- Part-time Work - At home/Other				0.040
R^2 △	12.3%, *p* < .001	1.7%, *n.s.*	0.9%, *n.s.*	1.5%, *n.s.*
Total R^2 adjusted				11.7%, *p* < .001

**p* <.05, ***p* <.01, *** p <.001, *n.s* = not significant

Table 45 Hierarchical Regression Analysis predicting Total Language (Child)

Step and Predictor Variables	**Total Language- PLEY- Child Engagement**			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Play Activities:				
- Read to child	0.152*	0.164*	0.166*	0.172*
- ABC's	0.017	-0.001	-0.014	0.001
- Numbers	-0.099	-0.061	-0.051	-0.051
- Play with toys and games	-0.036	-0.025	-0.018	-0.040
- Play with jigsaws and puzzles	0.010	-0.011	-0.012	-0.014
- Paint and draw	0.067	0.078	0.072	0.077
Parent Beliefs:				
- Play Support		0.083	0.092	0.110
- Academic Focus		0.108	0.104	0.120
Child Relationships:				
- Siblings			0.065	0.053
Environmental Factors:				
- Education				0.047
Work : (ref fulltime work)				0.187*
- Part-time Work				
- At home/Other				0.158*
R^2 △	2.9%, *n.s.*	1.2%, *n.s.*	0.4%, *n.s*	3.5%, *p*< .05
Total R^2 adjusted				2.6%, *n.s*

**p* <.05, ***p* <.01, *** p <.001, *n.s* = not significant

Summary of Cognitive Findings (Child Engagement)

Tables 44 and 45 above demonstrate the results of the analysis for Attentional Focusing and language outcomes. The play activities explain 12.3% of the variance in Attentional Focusing scores and only 2.3% of the variance in Total Language scores, as for parental engagement, only the model for Attentional Focusing was significant. In the fully-adjusted final models, frequency of child engagement in ABC's, and painting and drawing had a significant and positive effect on Attentional Focusing scores. However, child engagement in number games had a significant and negative effect on Attentional Focusing scores. Table 46 below summarises the percentage of variance accounted for in the cognitive outcomes, attention and language for child engagement in the various activities at each block of the regression models. Additionally, in contrast to the previous findings for socioemotional development, child engagement in play and learning activities have a greater effect on Attentional Focusing, when compared with parental play beliefs and other factors. In contrast none of the play and learning activities had an effect on language scores when family and other factors were controlled for.

When we compared the effect of parent versus child engagement in cognitive development, we found a noticeable difference between parent and child engagement in Attentional Focusing. When parents engaged in activities, painting and drawing had a significant positive effect, and play with toys and games a significant negative effect on Attentional Focusing scores. Of particular note, when children engaged in play activities, there was a significant positive effect on attention scores for play with letters, and painting and drawing but for number games, there was a negative effect with reduced attention scores.

Table 46 Percentage of Variance (R^2) for Child Engagement in the PLEY Cognitive Variables Explained at each Block of the Regression Model

	Attentional Focusing	Total Language
Block 1: *(Play Activities)*	12.3%***	2.9%
Block 2: *(Block 1 + Parent Play Beliefs)*	14.1%	4.1%
Block 3: (*Block 2 + Child Relationships)*	15.0%	4.5%
Block 4: *(Block 3 + Environmental Factors)*	16.5%	8.0%

* *p* < .05, ***p* < .01, *** p < .001.

Discussion

The aim of this study was to examine if other factors such as parent beliefs about play, the quality of the home environment and parent versus child engagement in activities had an effect on development. The current findings highlight the relationships between parental engagement in play, beliefs about play and the richness of the home play environment. The findings also demonstrate that when we included parental beliefs about play, that very few play activities contributed to either socioemotional or cognitive development. However, results indicate other factors are important too, as we observed that when parents value play it had a positive influence on socioemotional outcomes and on total attention, even after other factors were controlled for.

Beginning with Study 5, we wanted to explore if there was an association between parental beliefs about play, and parent and child engagement in play and learning activities. We found parents had higher mean play support scores than academic focus scores and higher play support scores were associated with lower academic scores. Examining parent versus child engagement in activities, found that with the exception of reading, children engaged in more activities independently than they did with their parents. Generally, across the play activities we examined, we found high parental engagement in activities. An interesting finding was that children engaged in formal activities more frequently alone, than they did with parents. As children showed an interest in letters and numbers and puzzles, parents were more likely to engage in those activities with the child.

We also observed that when parents supported play for development, they engaged more frequently in all of the activities. In contrast when parents had a higher value on academics, they engaged less in play activities. Richness of the home play environment was associated with greater engagement in painting and drawing and puzzles and jigsaws. Finally, our results also highlighted that Play Support, contributed to the richness of the home environment, even when we considered factors such as parental education and age. In contrast, having an Academic Focus, made no contribution to the quality of the home environment. Overall, we found strong support for associations between beliefs about play, the home play environment and parental engagement in play activities.

Next examining parental play beliefs, the findings highlight the importance of parents valuing play for socioemotional development. This study sought to determine if factors such as parental beliefs influenced child development outcomes, in addition to parental engagement in play and learning activities. We found positive parental beliefs about play to be important for socioemotional development in early childhood, over and above play and learning activities. This finding, of the importance of play beliefs for socioemotional development, is consistent with previous research (Kelly et al., 2011; Parmar et al., 2004). Parmar et al. (2004) found parents beliefs to be important for socioemotional development as did Kelly et al. (2011), who suggested that parental beliefs and engagement in activities influence socioemotional development.

The findings reported in this chapter aimed to build on the findings from the GUI studies in the previous chapters. Examining parental engagement with the child, none of the play and learning activities were significant across the three socioemotional measures, internalising, externalising and prosocial scores, when we controlled for play beliefs and environmental factors. For cognitive development, parental engagement in play with toys and games reduced attention scores while painting and drawing had a contrasting effect, increasing attention scores after controlling for parental beliefs and other factors.

When we examine child relationship factors, we find a positive effect for siblings, but only for Prosocial scores, after other factors are controlled for. This is consistent with previous research that found that having siblings supported socioemotional development (McHale et al., 2012), though the finding here is specific to Prosocial behaviour, rather than Internalising or Externalising behaviour. We also examined if other factors such as parental education and work, influenced development outcomes. Previous studies have shown that mothers with higher education spend more time in developmental activities with their children (Craig, 2006; Kalil & Ryan, 2020). For parental engagement in play and learning activities, we observed that higher maternal education was associated with increased internalising scores. Also internalising scores were higher for children whose mothers worked part time in contrast to the reference category of fulltime work.

By examining the factors in this layered way, we were taking account of the bioecological model of development that emphasises the importance of relationships and interactions that shape development in early childhood (Bronfenbrenner, 1995). Lin and Yawkey (2013) found that parents with higher education and income had significantly more positive perceptions of child's play than parents with lower education and income levels. Having siblings only appeared to increase prosocial scores but had no effect on the other outcomes. While we might have expected that the wider factors included in this study such as maternal education and work might have a greater influence, in addition to siblings, there was only a few example of this in the current study (e.g., for internalising scores).

The current study found a negative correlation between Academic Focus and lower education but no effect for work status. Previously research had found an association between both higher and lower parental education and beliefs about play valuing play for development or fun (Lin & Li, 2019; Manz & Bracaliello, 2016). In contrast our findings were that Academic Focus was associated with lower education but there was no association for Play Support. The sample had a high level of education, so this may have had an influence on these results. The Parent Play Belief Scale (PPBS) was designed for use with low income families, however we found it to be an effective measure of parental beliefs in this educated sample.

Previous literature has highlighted the importance of parental play beliefs in relation to how parents create opportunities for play and structure their home environment (Haight et al., 1997; Parmar et al., 2004). Manz and Bracaliello (2016) found support of a positive relationship between parent play beliefs and parent involvement in early learning. Fogle et al. (2006) also suggested that parents who reported higher levels of Play Support, may organise their home environments to support more play as well. We found evidence of this also, with Play Support positively correlated with each of the play and learning activities. We also found a relationship between Play Support and the richness of the play environment in the home. Additionally, Play Support also predicted greater frequency in play activities. In contrast to findings from Lin and Li (2018) who found parents who had a stronger emphasis on learning engaged more in activities with their child, we found little support for an association between Academic Focus and activities, in fact we found significant negative correlations between reading and toys and games and Academic Focus.

Longitudinal studies such as the GUI study, primarily focus on the effect of parental engagement in a composite score of play and learning activities in the home (Kelly et al., 2011; McMullin et al. 2020). When we examined parental engagement in play and learning activities in the Growing Up in Ireland data, we found that play and learning in the home mattered across developmental domains. However, of the six activities examined in the GUI study only one activity, painting, asked the parent how frequently the child independently engaged in the activity. There appears to be limited research conducted on parent versus child engagement in activities and how it influences development. This current study differed from previous studies as it began by examining parent engagement in individual play and learning activities and the effect on developmental outcomes. It followed these studies with a comparison of parent versus child engagement in activities. As expected, parents reported that children engaged in the individual play and learning activities more frequently by themselves than they did with the parent. We also observed mixed findings across age groups for parental engagement in activities. For example, parents engaged in more jigsaws and puzzles with three- and four-year-olds. In contrast, children aged five and six enjoyed painting and learning letters and the alphabet independently. Additionally, we observed that parent engagement with their child, was higher in formal activities of letter and number games than it was in the activities reading and painting and drawing, and lowest for toys and games.

While we know that parents' supportive engagement predicts later cognitive and language skills (Landry et al., 1997; Tamis-LeMonda, 2004), less is known about the independent effect of child engagement in play and learning activities in the home. Children are thought to learn values and beliefs through play with toys (Cherney & London, 2006). Coo et al. (2020) noted that adult led structured play activities are not as important for promoting children's learning and found that unstructured or free play activities are better for fostering curiosity and self-guided learning during childhood. In the main analysis, we examined the effect of parental engagement on the outcomes, in addition to other factors. Here we observed that parental engagement in activities had little effect on the outcomes with the exception of reducing attention scores.

Examining child engagement in activities, play with puzzles and jigsaws reduced internalising scores when children engaged in play alone. However they also appeared to have an effect of reducing prosocial behaviour. The findings here suggest that in some activities (e.g., ABC's and painting) children have greater cognitive gains when they play independently than when parents are involved. Despite the findings here, solitary play should not be a substitute for parent and child play. There are many benefits (e.g., for language) when parents engage in responsive play interactions such as reading aloud (Healey & Mendelsohn, 2019) and further research is needed in the area to examine other influential factors. Overall, we demonstrated a high correlation between parent and child engagement in activities. Parent beliefs also contributed greater variance across development domains when parents engaged in activities, with a slightly lesser effect when children engaged in activities.

Overall, in addition to parental engagement in activities, the findings here support that child engagement in play and learning activities has a positive effect on early child development. Parent's role in scaffolding in early child development is well understood, particularly in supporting cognitive development (Vygotsky, 1978). When parents scaffold in guided play, it has been demonstrated to support learning more than free play (Fisher et al., 2013). However, parents need to balance supporting their child in play at home (e.g., scaffolding) and the possible developmental gains when children play by themselves (Cherney & London, 2006; Healey & Mendelsohn, 2019).

Children who experience less opportunities for play, before they enter school or preschool, may be at a higher risk for socioemotional problems (e.g., difficulties with their peers or how to manage in a classroom setting). Downer and Mendez (2005) found that parents who believe that play is developmentally important have been found to be more effective at contributing to their child's education. They engage in more play and learning activities at home, with the result that these children tend to have better educational outcomes (Downer & Mendez, 2005). Parents do not need to be hands on entirely in play with their children, as the current findings suggest that allowing children time and opportunities to play alone is also important for development. Coo et al. (2020), also previously recommended that parents allow children lots of time for free play. In addition, they believed that parental beliefs about play influence the activities they engage in with their children as well as the environment they create (Coo et al., 2020). This current study found some evidence that parents who place a greater value on play for development, organise their homes with more creative opportunities for their children.

Some parents may not be aware of the importance of play in the home. An important role adults have is in promoting and protecting the conditions that allow play to happen. In supporting play, flexibility, unpredictability, and security is needed for children to play freely but ultimately children's play belongs to children (Lester & Russell, 2010). Educating parents on the value of play and their role in play is particularly important for healthy socioemotional development. The Play Support construct used in this study, demonstrates something at a relational level, similar to Bronfenbrenner's view of the importance of relationships for development. This contrasts with the findings of Lin and Li (2018) on the developmental benefits of play. This relational finding emerges clearly in this study, particularly for socioemotional development. The parent child relationship, which includes positive and supportive beliefs about play, matter.

The PLEY study examined many factors in the home environment. It was interested in the relationship between parent play beliefs and parental engagement in activities. It also focused on aspects that have been less researched (e.g., child engagement in activities). Where the GUI study focuses primarily on parental engagement in play and learning activities, the PLEY survey, collected data about child engagement across a range of activities, in addition to parental engagement in the same activities. In addition, the current study addressed the lack of research on the role of play beliefs in the home environment and early child development and found evidence that it is important to take parental play beliefs into account when investigating this topic.

The current research demonstrated that parents' beliefs about play impact on development, as we found that Play Support belief had a positive influence on outcomes, particularly across socioemotional development outcomes. To date there has been little research conducted about parental beliefs about play in the home and development outcomes, and to the best of our knowledge, there has been little research conducted relating to parental beliefs about play in Ireland. The Parent Play Belief Scale (PPBS) which was used in this study, has mainly been used in examining play in low income children in the USA, particularly African American children though a number of Asian and American researchers have also adapted or used it (Jiang & Han, 2015; Lin & Li, 2019).

As well as adding to the knowledge about parental beliefs about play, the current research included a measure of child engagement in play and learning activities. With the exception of a few studies (Lin & Li, 2018) most studies to date have focused on parent rather than child engagement in activities. While focusing on parental engagement in activities provides a useful insight, it is important to consider the child's engagement in these activities too, as they may have different impacts on different aspects of early child development, as the findings related to attentional focusing highlighted. The current study also examined the contribution of proximal processes in the microsystem (i.e., play and learning activities), environmental factors (i.e., education and work). In addition to the models in the previous chapters, the studies here also included the macrosystem (i.e., parental beliefs about play) using the lens of Bronfenbrenner.

The PLEY survey gathered information on a range of important factors (e.g., play and learning activities, play beliefs, the home environment), as well as including developmental measures. A methodological consideration in designing the survey was that it would be brief enough (e.g., less than twenty minutes) and not too onerous for busy parents to complete, while still gathering a useful amount of information. This meant that some variables that were included in the GUI study were omitted from the current study due to time considerations. However, the survey was made as accessible as possible by making it available online, and accessible on a phone as well as on bigger screen devices.

Furthermore, by including the Parent Play Belief Scale in the current study, the survey examines the contemporary experience of play in the home environment of young children using a standardised measure. In the next chapter, there is a detailed discussion of strengths and limitations of the current research.

Conclusion

There are many factors that play a role in cognitive and socioemotional development in early childhood. This chapter examined the role of different play and learning activities and explored how parental beliefs (e.g., Play Support) influence the home play environment. Situating these factors in Bronfenbrenner's model of development, suggest that at a microsystem level (e.g., the home environment) and a macrosystem level (e.g., beliefs) that wider factors influence development. In the next chapter we discuss the findings reported here in conjunction with those reported in the previous chapters, and examine the role play and learning activities, and family and wider influences, have on cognitive and socioemotional development.

Chapter Six

General Discussion Chapter

"Children discover the world through play and reveal their creative abilities. Without play, full intellectual development is impossible. Play is a huge open window through which a life-giving stream of concepts and ideas pours into the child's spiritual world. Play is a spark, igniting the fires of inquisitiveness and curiosity".

Vasily Sukhomlinsky, (2016, p. 111)

This research aimed to examine the effect of individual play and learning activities on development, while controlling for the effect of family and other factors on child development. Recent research suggests that trends in children's play show that children play less (Burdette & Whitaker, 2005; Gray, 2011) with play becoming more supervised (Whitebread et al., 2012) as children increasingly engage in more structured activities (Hofferth & Sandberg, 2001; Kane, 2016). These early years (i.e., up to age five) are an important phase in early development when the family and home environment are having an important impact on child development (Yu & Daraganova, 2015).

Time dedicated to free play during the pre-school years has decreased in home environments (Coo, et al. 2020). While parents are still very actively involved with their children some research suggests there is generally a greater emphasis on engaging in structured learning activities with children from an earlier age (Bassok et al., 2016; Belfield & Garcia, 2014). Children's development is dynamic, and they learn in the multiple environments they inhabit, for example the home and preschool in early childhood. Few studies have examined play and learning activities in the context of family and other factors (e.g., the relationships the child has with parents and siblings in their immediate environment as well as more distal factors such as family income and parental education).

Having considered previous research on the topic in Chapter Two, the current research began in Chapter Three by examining the contribution of parental engagement in play and learning activities in the home environment to cognitive development, while also taking account of family and other factors, using a bioecological perspective. Studies to date have focused on the role of the home learning environment for vocabulary development (Rodriguez & Tamis-LeMonda, 2011) and language development (Son & Morrison, 2010). Other research has focused on the role of the home learning environment on literacy, numeracy and vocabulary development (Melhuish et al., 2008; McMullin et al., 2020; Sylva et al., 2010). However few studies have been conducted on aspects of cognitive development such as non-verbal reasoning.

Additionally, much of the previous research focuses on the effects of the home learning environment for academic attainment with less research examining the effect of activities in the home learning environment on socioemotional development. As in Chapter Three, in Chapter Four we examined the same factors (e.g., family and wider factors) on socioemotional development again using a bioecological perspective. For these studies, the Growing Up in Ireland national cohort study, which involved secondary analysis of the data, provided insight into these topics. The analyses primarily focused on children when they were three years old and also examined if play and learning activities at age three had an impact on development outcomes at age five.

Finally, in Chapter Five, we examined parental beliefs about play, the richness of the home environment, and parent and child engagement in activities and their effect on development outcomes. While some research has been conducted on parental beliefs in the US and Asia, to our knowledge, little is known about parental beliefs about play in

Ireland. Every home environment is unique and there are many daily activities that parents engage in at home (e.g., reading and playing, painting and drawing). We wanted to explore if parental factors, including parental beliefs about play and learning and how families create play and learning environment in their homes, contributed to developmental outcomes. The study also included parental reports of cognitive and socioemotional development. We adapted a measure of childcare quality, the Emlen Rich Environment and Activities Scale to measure the richness of the home environment. Overall, this research attempts to understand how parents' engagement in play and learning activities influence the home play and learning environment, including parental beliefs and impact on development outcomes using a bioecological perspective.

Summary of Main Findings

The main aim of this research was to examine the effect of individual activities on development outcomes while controlling for the effect of family and other factors on both cognitive and socioemotional development in early childhood. A range of standardised measures of child development were used to investigate the topic (e.g., the BAS-Naming Vocabulary Subscale, the Strengths and Difficulties Questionnaire (SDQ), Attentional Focusing Subscale from the CBQ. Hierarchical linear regression was the principal method of analysis used throughout, which allowed variables to be entered in blocks in the analysis. The variables were grouped according to the theoretical framework that this study was grounded in, the bioecological model of development (Bronfenbrenner, 1995).

In Chapter Three we examined the contribution of parental engagement in play and learning in the home to cognitive development, while also accounting for family and other factors in the regression models. We began with a cross sectional design, examining the effect of play and learning activities on two aspects of cognitive development, non-verbal reasoning as measured by the BAS-Picture Similarities and expressive vocabulary as measured by BAS-Naming Vocabulary at age three. We looked at the effect of parental engagement in six individual play and learning activities (i.e., reading, letter or alphabet activities, numbers or counting, songs or poems, playing games, painting and drawing) on the cognitive outcomes, Picture Similarities and Naming Vocabulary.

Overall, the findings from Chapter Three indicate that play and learning activities at age three have a positive influence on current cognitive development, although the effects are similar for expressive language and non-verbal reasoning. We also find stronger longitudinal effects for play and learning activities on expressive vocabulary than on non-verbal reasoning. The findings in this chapter highlight that different aspects of development may be uniquely affected by different play and learning activities. This was also evident in the findings related to aspects of socioemotional development, described below.

Chapter Four examined the contribution of parental engagement in play and learning in the home while controlling for the influence of family and other factors on socioemotional developmental, as measured by the Strengths and Difficulties Questionnaire (SDQ). We used three SDQ subscales, internalising subscale (i.e., emotional and peer problems combined), externalising subscale (i.e., conduct problems and hyperactivity combined) and the prosocial subscale. The findings for socioemotional development indicated that a number of play and learning activities had associations with the socioemotional outcomes, with better socioemotional outcomes, even after family and other factors were controlled for. However, some of the play activities were associated with increased socioemotional difficulties also (e.g., numbers). What emerged in the analysis on socioemotional outcomes was that the parent child relationship factors (e.g., warmth, hostility and closeness), situated in the microsystem of the home environment, contributed more to the regression models than the play and learning activities or other factors. Findings relating to SDQ internalising scores highlight mixed results for play and learning activities. Overall play and learning activities have a lesser effect than parent child relationship factors. In fact, parent child relationship factors have a greater impact than activities at both age three and five. Together it suggests that some formal play and learning activities are associated with increased behavioural difficulties, and poorer outcomes, and importantly that greater closeness and low conflict in the parent child relationship improve internalising difficulties in early childhood.

We then examined the effect of play and learning activities on SDQ externalising behaviour and found that overall, a number of activities (i.e., reading, games and painting) had a positive effect on SDQ externalising scores at age three and five. Overall, in relation to externalising behaviour, these findings suggest two main points. Firstly, that informal play and learning activities are associated with a reduction in externalising difficulties both currently and longitudinally. However, as for internalising scores, it is the parent child relationship that has the greatest effect in predicting SDQ externalising scores, more so than the play and learning activities, with greater impact of these factors at age three.

Finally, in chapter Four, we examined the effect of play and learning activities on SDQ prosocial behaviour. Overall, some of the activities (e.g., painting, ABC’s, songs and numbers) positively predicted scores on the prosocial subscale of the SDQ, even after family and other factors were included. Examining family and other factors again demonstrated that parent and child relationship factors, closeness, warmth and hostility, made the greatest contribution to the model. However, as for the other socioemotional variables, the parent child relationship factors contributed the most to prosocial scores at age three and five.

What clearly emerged as having the greatest impact across each of the socioemotional measures was that parent child relationship factors accounted for more unique variance in the regression models than the play and learning activities or other factors. For both internalising and externalising behaviour, parent child relationship factors with low levels of closeness and high hostility (i.e., for internalising behaviour at age three) in the parent child relationship predicted higher scores. For prosocial behaviour it was the opposite, with parent child relationship factors (i.e., higher level of closeness, low level of conflict and additionally high level of warmth) predicting higher prosocial scores.

Having examined the effects of family and other factors on parental engagement in play and learning activities in Chapters Three and Four, we wanted to examine if factors such as parental beliefs impacted on development outcomes. The final empirical chapter, Chapter Five, explored the role of parental beliefs about play on development. Beliefs exist in the macrosystem at a cultural level but can also exist at the individual or microsystem level (Vélez-Agosto et al., 2017). We also wanted to examine if the richness of the home environment, and child engagement (i.e., how frequently the child engages in play activities) versus how frequently the parent engages with their child in the same in activities, influenced developmental outcomes.

Similar to the analyses in Chapters Three and Four, the analyses in Chapter Five aimed to examine the contribution of each of the factors (i.e., play and learning activities, parental beliefs and child relationship and environmental factors) on child developmental outcomes. As in the previous chapters the measures of child development investigated aspects of socioemotional development (i.e., using the SDQ). Two aspects of cognitive development were also measured, firstly Attentional Focusing from the Children's Behaviour Questionnaire (CBQ; Rothbart, 2001), and secondly language using a shortened version of the Language Scale from the Alberta Language and Development Questionnaire (ALDeQ; Paradis et al., 2010).

The results in Chapter Five found that when we included parental beliefs in the regression models, that very few play activities were associated with either socioemotional or cognitive outcomes in our studies. Parental engagement with toys and games appeared to reduce attention scores. Only one activity, painting and drawing, had a positive influence on attentional as demonstrated by an increase in scores.

When we examined the effect of parent beliefs, we found that supportive parental play beliefs with parents who valued the development benefits of play, provided stronger support for socioemotional development than did the play and learning activities themselves. Play Support positively predicted all three of the socioemotional outcomes, accounting for between 4% and 7% of the variance in the SDQ outcomes. Play Support also accounted for over 3% of variance for attention scores. Overall parents who have positive beliefs about play and enjoyed play with their children were having a positive influence on their child's development. We found robust support for a supportive belief about the importance of play across the socioemotional measures.

Different Activities have Different Impacts on Different Types of Development

One of the aims of the current research was to examine the impact of the different play and learning activities in the home environment in early childhood on different aspects of development. The findings overall suggest that different play and learning activities may contribute to different aspects of development to a greater or lesser extent. To illustrate this, analysis of the GUI data in Studies 1 and 2, demonstrated that the activity that contributed to more outcomes was the informal activity, painting and drawing. At age three, painting contributed to both aspects of cognition, with increased scores. Unexpectedly the findings suggest that painting and drawing at age three appears to reduce vocabulary scores at age five. Additionally at age five, painting and drawing at age three, was no longer associated with non-verbal reasoning. The activity also contributed to each of the socioemotional outcomes, for example, prosocial scores at age three. Overall, painting and drawing supported vocabulary and reasoning at age three, but neither cognitive outcome at age five. It also supported each of the socioemotional outcomes at age three and continued to be associated with two out of three of the socioemotional outcomes at age five.

As well as painting and drawing, reading also was associated with better outcomes across the development measures. Parental engagement in reading at age three had a positive influence on expressive vocabulary, both currently and longitudinally. It had a similar but lesser effect on non-verbal reasoning currently and longitudinally. In fact, reading made the largest unique contribution to the regression model at age three. In Studies 3 and 4, reading was also associated with better internalising and externalising scores at age three and again at age five. Overall, reading, has a positive effect, supporting reasoning, vocabulary and socioemotional outcomes.

Examining parental engagement in games, found that as well as painting and drawing and reading, that games was also an important contributor across development domains. At age three, games contributed to both non-verbal reasoning and vocabulary scores. At age five, there was also a longitudinal effect of playing games at age three on vocabulary scores and non-verbal reasoning scores at age five. Playing various games and puzzles also positively influenced externalising scores at age three and continued to influence externalising scores at age five. In contrast playing games had no impact on internalising or prosocial scores. Overall, playing games supported cognitive and various aspects of socioemotional development at age three but contributed less across the domains at age five.

A different pattern emerged for the formal activities of letter and alphabet and number games. For letter games, there was no current effect on either of the cognitive outcomes at age three, however there was a longitudinal benefit for engaging in letter games at age three on expressive vocabulary scores at age five. At age three, letter games demonstrated a positive effect on prosocial scores, this effect continued though was lessened at age five. In contrast there was a negative effect of letter games at age three on internalising scores at age five. Overall engagement in letter and alphabet games at age three, contributed more to expressive vocabulary at age five than to current development. In contrast, number games had a negative effect on socioemotional outcomes of (i.e., internalising and externalising scores) at age three and no effect on cognitive measures.

The last activity we examined was songs and nursery rhymes. Singing songs appeared to benefit prosocial behaviour at age three. However, songs also had a surprising negative association with non-verbal reasoning at age three though no long term influence at age five. Overall singing songs and nursery rhymes demonstrated no further associations with any of the development outcomes at age three or five. Examining the effect of play and learning activities in the PLEY study, Studies 6 and 7 demonstrated little impact of play and learning activities on the development outcomes. Parent engagement in painting resulted in increased scores for attention while engagement in toys and games reduced attention scores. When children engaged in play alone, there were a few benefits of play activities, for example, a benefit for Attentional Focusing was observed, with increased scores for attention when the child engaged in letter games and as for parent engagement, painting demonstrated an increased score. In contrast when the child had greater frequency in number games, it resulted in reduced attention scores.

Across the studies we found the effect of play and learning activities was maintained, even when we controlled for family and other factors. These findings are consistent with previous studies that an activity such as reading has a positive influence on cognitive development (Kalb & Van Ours, 2014; Kopp & Lindenberger, 2011) . They also support the current findings that reading supports socioemotional development via the parent child relationship. However, few studies have looked at the impact of other individual play and learning activities on development, such as how playing games or painting and drawing contribute to aspects of development such as non-verbal reasoning. For example, in Study 1, we found that reading, playing games and painting and drawing had an independent effect on non-verbal reasoning scores.

Regarding the current findings of the negative impact of number and shape activities and letter or alphabet activities on socioemotional development, previous research has reported mixed effects on whether letter and alphabet activities and number and shape activities at home have a positive or negative effect. One study suggested that there was limited impact for parents in teaching numeracy directly to the child until the child was of kindergarten age (Manolitsis et al., 2013). Likewise, recently McCormick et al. (2020) found no benefits for numeracy and alphabet activities on either language or maths grades. The findings here support this previous research at age three, for example, no effect for number and shape activities and alphabet activities at age three on cognitive outcomes, and a negative influence of numbers and shapes on socioemotional outcomes. However, this is somewhat confounded by the positive influence of parental engagement in letter and alphabet activities and number and shape activities at age three on vocabulary and prosocial scores at age five.

A recent longitudinal study found that 20 stimulating activities in early childhood which included teaching number activities and the alphabet (as well as reading, storytelling, naming parts of the body, colours, singing to and talking with the child) were found to promote academic achievement at the age of 16 (Culpin et al., 2020). The 20 activities related to frequency of engagement when the child was aged between 6 months and 3 years and 6 months and appear to have been entered as a composite score. Culpin et al. (2020) found that these early stimulating activities had a long term positive impact on academic success. Additionally, for socioemotional development, Culpin et al. observed that parental enjoyment of their child in 14 activities when children were aged 0-3 years, was associated with lower English scores at age 16, though this effect buffered later conflict in the relationship with their adolescents.

Culpin et al. (2020) findings contrast with the current research, where we found a lack of effect, as well as negative findings for some activities (i.e., letter and alphabet activities and number and shape activities) on current development at age three. It is possible however that early engagement in formal learning activities may eventually create a positive long term effect as Culpin found. We see some evidence of a longitudinal effect for engagement in formal activities at age three on Prosocial scores at age five, and for expressive vocabulary, but not for non-verbal reasoning scores at age five. However, though Culpin et al. examined the effect of engagement in activities on later cognitive outcomes as well as socioemotional outcomes, their focus is on a total score of a large number of activities, and they do not examine the effect of individual activities on development outcomes.

Previous research has demonstrated that the context that children learn in may have an effect on the learning outcomes. Fisher et al. (2013) found that teaching children, aged four to five about shapes in a guided play condition, demonstrated improved knowledge of shapes. These effects were present a week later compared to learning about shapes in free play or through didactic approaches. Shape knowledge, which is part of mathematical knowledge, appeared to be scaffolded through guided play (Fisher et al., 2013). Scaffolding in guided play improved engagement, exploration in shape knowledge and supported early maths learning in the activity of learning about shapes. They also found that didactic and free play did not help children learn as readily as guided play (Fisher et al., 2013).

Examining the negative effect of number and shape activities in the GUI study, one possible explanation is that parents at home are using a didactic approach around number and shape activities. This is one potential reason for the findings (i.e., no effect for number and shape activities on cognitive outcomes, and a negative effect on both Internalising and Externalising scores) for three year olds when parents engaged in number and shape play, though we have no way to examine if this was the case. It is also possible that the age of the child is significant as the children in the study by Fisher et al. were aged four and five. Additionally, while Fisher et al. demonstrated a positive effect for shape knowledge in the guided play condition it was simply on cognitive outcomes, and they did not examine if any of the three conditions elicit any effect on socioemotional outcomes. Generally, what our findings and Fisher's research suggest, is that for activities such as number and shape activities in the home, that a playful approach or guided play of formal activities, especially at the younger age, may be better than a didactic approach, so that children benefit from the activity.

It is also important to highlight the positive effect of play and learning activities on non-verbal reasoning. This is one of the first studies that has examined individual play activities and the effect of the home learning environment on non-verbal reasoning. Non-verbal reasoning is a measure of fluid intelligence and should be less susceptible to stimulation at home (Rindermann et al., 2010), yet the current study found a positive effect for parental engagement in the activities reading, games and painting on non-verbal reasoning when the child was aged three, even when family and other factors were controlled for.

In summary, in examining the effects of different activities on different types of development, we find for cognitive development, play and learning activities were found to exert positive effect on expressive vocabulary, even after family and other factors were controlled for and the effect was evident currently and longitudinally. Further evidence of the independent and unique impact of different activities on development was apparent in considering the findings related to non-verbal reasoning ability. The play activities (i.e., reading, games and painting) contributed to picture similarities scores at age three, and reading and playing games continued to have an influence at age five. For socioemotional development, play and learning activities exerted a positive effect on externalising and internalising scores and to a lesser extent on prosocial scores, again independently of other family and environmental factors. The effect was apparent at age three and lessened somewhat at age five. Overall, the effects of the different activities are apparent across development domains, even when we control for family and other factors. A final caveat regarding the findings is that in most cases, these findings are correlational in nature and do not provide evidence of a causal relationship.

Parent Factors interact with Play Activities differently for Different types of Development

The current research found that parent factors (e.g., the parent child relationship which included level of closeness, hostility and warmth) had differing impacts across development domains. Overall, parent factors were more important for the socioemotional measures than they were for the cognitive measure. For example, at age three, high levels of closeness and warmth and low levels of hostility were associated with higher prosocial scores. A similar effect remained for prosocial scores at age five. In contrast only a high level of closeness between parent and child was associated with higher expressive vocabulary scores at age three and five.

Previous research demonstrates how critical the parent child dyad is for healthy individual adjustment (Cui et al., 2018). Parents who communicate affection to their child support development in many ways including autonomy and self-regulation (Lugo-Gil & Tamis-LeMonda, 2008) and parenting practices such as warmth can have positive long term outcomes (Culpin et al., 2019). As in previous studies (e.g., Konig, 2009; Schoppe-Sullivan et al., 2006; Weisleder et al., 2019) there was also evidence in the current research of the importance of the parent child relationship for socioemotional development. For example, the findings in Study 3, indicated that the parent child relationship accounted for between 7% and 19.4% of the variance in socioemotional outcomes at age three and for between 2.5% and 8.3% of variance in socioemotional outcomes at age five in Study 4. Overall, it was abundantly apparent in the current research that the parent child relationship had a very strong influence on socioemotional development, as well as some influence on cognitive development.

In Chapter Five we examined different parental factors such as parent beliefs about play, and how they impacted differently across development domains. Similar to the findings in Chapter Four that parent child relationship factors supported socioemotional development, parental beliefs about play were also found to predict socioemotional development and attention, though they did not predict language development. Research using the Parent Play Beliefs Scale has not previously focused on the influence of parental beliefs about play on developmental outcomes. Fogle & Mendez (2006) had explored the relationship between parents' attitudes about play and the child's prosocial peer play. Another study examined play beliefs and their association with responsive parenting (LaForett & Mendez, 2016). Other studies had focused on different aspects of play beliefs and identified profiles of mothers based on their play beliefs (Fisher et al., 2008; Lin & Li 2019). Mothers who valued both play and academics highly were found to have a more balanced view of play and learning and their children had the best developmental outcomes (Lin & Li, 2019).

In addition, previous studies examined factors such as play beliefs and child temperament (Fogle & Mendez, 2006) or the emotional climate of the family (LaForett & Mendez, 2016). Therefore, there is little previous research to compare findings related to parent play beliefs and how they interact with the home play environment and potentially influence cognitive or socioemotional developmental outcomes. Overall, we found that the parent child relationship influences development domains and in particular is critical for socioemotional development. We also found strong support in Studies 3 and 4, that a close and warm parent child relationship, with low hostility, is associated with better socioemotional outcomes. Study 6 found that a positive play support belief was associated with better socioemotional outcomes. In addition, this belief was also important for attention, a measure of cognitive development.

Other Family and Environmental Factors (siblings, childcare, education, income) are important too

This study examined the effect of play and learning activities, and their impact on developmental outcomes while considering the impact of other factors, such as the child's relationships, siblings and childcare as well as parental education and income. The findings from the current research highlight two main points. The first point is that the individual play and learning activities continued to exert an effect on early childhood development even after these factors were statistically controlled for. The second point is that these factors, also made significant unique contributions to the regression models in predicting child development, demonstrating firm evidence for adopting a bioecological framework in examining this area.

While the environmental factors of parental income and education made some unique contributions to the models, they generally accounted for less variance than the parent child relationship factors. It may be that factors (e.g., parental education) affect the way parents interact with their children at home, rather than exerting a direct influence. Previous research on the effect of other factors have found in relation to siblings that five year old children with siblings had better social skills in peer groups compared to children without siblings (Downey & Condron, 2004). Research has also shown that sibling relationships can have both a positive and negative effect and be both a risk and protective factor for development (Dirks et al., 2015).

Between the first wave (i.e., 9 months) and the second wave (i.e., age three) of the GUI study, 33% of the children had a new sibling in their family. What was surprising was that siblings appeared to have no effect on any of the outcomes across development domains. Previous research had demonstrated that having older siblings reduced vocabulary scores of five year olds (McGinnity et al., 2015) while Havron et al., (2019) found more specifically that children with older sisters had greater language skills than children with older brothers. McGinnity et al. had used both the number of younger and older siblings but not their gender in their analysis. In addition, the dichotomous variable used in the current study does not appear to have been sensitive enough to pick up on the effect of siblings on development domains. Research by Jaeger (2009) and Workman (2017) previously found that family dilution was not impacted by siblings. However, our results suggest that further investigation is needed to fully understand the effect of siblings on the various aspects of development as the effect may differ for example, in say a family with a new baby in the house when the child is three in comparison with a family with a number of older children or based on the gender of the sibling.

Regarding childcare, there was little impact of attendance at childcare on developmental outcomes as reported in Studies 1 to 4, with the exception of internalising scores at age five. The results of study 4, suggested that when children were in childcare at age three, that they had reduced internalising scores at age five. Overall, these results are similar to previous findings (e.g., Loeb et al., 2007; McGinnity et al., 2017; Sylva et al., 2008). These two factors, siblings, and childcare generally had a lesser impact than other family and other factors on the aspects of development measured in the current research.

Measures of Socio-Economic Status (SES) such as parental education and income are frequently linked to poorer home learning environments and to poorer child outcomes (Deflorio & Beliakoff, 2015; McNally et al., 2019), particularly maternal education (McMullin et al., 2020; Sylva et al., 2010). Becker (2011) examined parental education and its links to outcomes using the Millennium Cohort Study (MCS). She found that children's scores on vocabulary were linked to parental education. Even when maternal education, was reduced from the original 13 categories to 4 categories in keeping with previous research, it appeared to have little impact on cognitive scores. Maternal education appeared to have only association with socioemotional outcomes of internalising and externalising behaviour. For example, in Study 3, higher internalising scores (i.e., poorer socioemotional behaviour) at age three, were associated with lower levels of education (i.e., leaving cert or less) but not to parents in the lowest educational category. Children of parents with cert/diploma, also had higher internalising scores in comparison to the reference group of mothers with degree or higher. Additionally, children with mothers who had lower education (i.e., leaving cert or less) also had increased externalising scores at age three and internalising scores at age five, also in comparison to the reference group of mothers with degree or higher. In Study 6, maternal education was associated with increased internalising scores. In contrast, family income appears to have no influence when we controlled for maternal education across the Growing Up in Ireland studies analysis.

Parents with lower education level generally have less opportunity to improve their vocabulary than children of more highly educated parents. Though the specific pathway between SES and child outcomes are not fully understood, differences in outcomes have been observed for children from lower SES backgrounds across cognitive and behaviour and socioemotional domains (Deflorio & Beliakoff, 2015). For example, McMullin et al. (2020) found some evidence that engaging in activities may have greater benefit for children in lower income and class families in supporting cognitive development (McMullin et al., 2020). Family income has also been linked to children's educational attainment (Yu & Daraganova, 2015). Across the studies in the current research, there was no evidence of family income influencing outcomes, and there was only a number of examples of the effect of parental education on the development outcomes.

As well as parental education, however, there may be other impacts that were not captured in the current study, such as the teaching style at home. Research has identified that less educated parents preferred didactic methods to better educated parents (Stipek, 1992). In the current research, as reported in Chapters Three and Four, we found at age three that there were differences in reading, letter or alphabet activities, songs and playing games between parents based on their education level. As education increased so too did parental engagement in nearly all activities except letter or alphabet activities, where scores decreased as maternal education increased. This is also consistent with the findings reported in Chapter Five, which indicated evidence of this in some of the activities, for example more educated parents read more to their children than lower educated parents. The reverse was true for letter or alphabet activities; lower educated parents engaged more frequently in letter or alphabet activities than higher educated parents. However, we also found evidence of maternal education impacting on socioemotional outcomes, but not in a consistent way. This is something that should be further examined.

One reason why parental engagement in activities is important is that there are links between increased engagement or stimulation and cognitive outcomes. Research has found that public programmes that support increasing cognitive stimulation have been effective in improving cognitive outcomes linked to poverty (Guo & Harris, 2000) especially when it is difficult to improve family finances. Greater parental engagement has also been linked to parental beliefs (Lin & Li, 2018). Overall analysis of the GUI data in the current research demonstrates mixed support for previous research that SES (i.e., parental education and family income) have positive effects on cognitive and socioemotional outcomes. In fact, the findings in the current study are that some categories of education were having a negative influence on outcomes (e.g., internalising scores at age three) and no effects for income on development outcomes when maternal education is included. In the PLEY study, we also found some limited effects of maternal work and education on development outcomes. In the next section we considered the consequences of our findings for bioecological theory and for child developmental research generally.

Implications of the research

Implications for Theory

As described in Chapter Two, Bronfenbrenner believed that human development was rooted within and across many environments including the family, wider community, and culture (Hayes et al., 2017). Development happens as a result of the interactions between all of the environments including psychological, biological and environment (Bronfenbrenner and Morris, 2006). Bronfenbrenner's bioecological approach provides a useful framework to examine development in the context of the Process Person Context Time (PPCT) framework, as well as examining the role of proximal processes in the home. Bronfenbrenner (1977) emphasised the importance of testing the influence of each system element on development (Grolig, 2020). The current research used this approach in structuring the analysis of the data, by considering the role of each set of variables in turn according to Bronfenbrenner's nested system of influence.

Entering the variables in layers, to represent the bioecological nested model of development, provides insight into the role of the different ecological systems in supporting child development. For cognitive development, the findings of Chapter Three suggest that play and learning activities contribute the most to cognitive outcomes. To illustrate this, we found that proximal processes (i.e., the play and learning activities in the home) had the greatest influence on cognitive development. Compared to the effect on the socioemotional outcomes, play and learning activities (e.g., reading, playing games and painting) contributed significantly more to both of the cognitive outcomes. This effect was also present in the findings of Chapter Five, with the frequency of both parent and child engagement in the some of the activities significantly predicting attentional focusing scores.

Applying the bioecological approach, proximal processes had the greatest influence on cognitive outcomes. In contrast, while the proximal processes (i.e., play and learning activities, painting, games, reading and songs) had a positive influence on socioemotional outcomes, it was the next layer, the parent and child relationship that made the largest unique contribution to the socioemotional outcomes, when we controlled for family and other factors. Examining the effects using the bioecological approach, stresses the importance of the parent child relationship over the proximal processes for socioemotional development. Though we see the positive influence of individual activities on socioemotional development it may be the reciprocal or bidirectional influence of any positive activity rather than a particular activity that support development. This may explain the positive effect for engagement in letter or alphabet games on Prosocial scores. In contrast it may be that for cognitive development, specific activities support cognitive development, while additionally supporting the parent child relationship.

Finally, while the other layers contribute also, they generally do so to a lesser extent. For example, drawing on the findings reported in Chapters 3 and 4, the layer that contributed the least was child relationship factors of siblings and childcare, which had no influence on cognitive development at age three or at age five. What needs to be considered however is that the dichotomous variables used for both childcare and siblings was not strong enough to discern their true contribution to the models. However, when we examine the effect of beliefs in the macrosystem, in Study 6, we find that play beliefs are significantly associated with socioemotional development, more than any of the individual play and learning activities, family or other other factors. This is consistent with the findings from the GUI data about the importance of the parent child relationship (e.g., warmth and closeness) in Chapter Three and Four. Some of the statements in the parent play beliefs scale also focus on the warm relationship between parent and child during playtime, as well as having fun with the child and enjoying spending time with them. Bronfenbrenner believed that when children play, they are influenced by both their environment and their social or cultural beliefs, which in turn influence development and learning. The current research finds evidence of this.

Overall, the findings suggest that different systems contribute differently to cognitive and socioemotional development. Looking at the findings through the Process, Person, Context and Time (PPCT) model, the research reported in Chapters 3, 4 and 5 examined proximal processes (e.g., daily play and learning activities), and also looked at some of the contextual influences for example, maternal education and family income, that are known to have an influence on development (McNally et al., 2019). It also examined distal contextual influences (e.g., parental beliefs about play). Additionally, the studies also examined mesotime, the element of engaging in the play and learning activities on a regular basis.

Examining the findings through the interaction between the various elements of development in the PPCT model, we found that nearly all of the factors that were examined contributed in some way to development. Bronfenbrenner described his theory as “an evolving theoretical system for the scientific study of human development over time” (Bronfenbrenner, cited in Tudge et al., 2016, p. 428). Bronfenbrenner also wrote that elements “simultaneously influence development” as it was an interactive system and not additive (Tudge et al., 2016, p. 428). Although the current research separated the individual layers of development, to provide insight into the contribution of the different layers to different aspects of development, it is the interaction between all of the elements and not any one element that support development.

The current findings provide support that proximal processes in the microsystem, as measured through the individual play and learning activities, are particularly important for cognitive development. While these activities also influence socioemotional development, the parent child relationship (e.g., microsystem) is more important (e.g., high level of closeness, warmth and low conflict) for this aspect of development. We also found support for the different influences (e.g., family and other factors in the mesosytem and exosystem) on development. Hayes et al. (2017) suggest that the original model focuses on the nested system of the environments, the microsystem, mesosystem, exosystem and macrosystems, but that it is the child’s relationships that are more important in revised versions of the model (Hayes et al., 2017).

In considering the role of bioecological systems in early year settings, Hayes et al. (2017) have argued that the bioecological model needs to be revised to focus more on relationships. Based on the findings here, we argue that this may be important in the home environment also. Additionally, the theory could be refined to consider that proximal processes may have a greater impact on cognitive development than they do on socioemotional development. Furthermore, we found evidence of Hayes et al. suggestion of the importance of relationships, as we found the parent child relationship factors were associated with socioemotional outcomes, both concurrently and longitudinally. In fact, it was these relationships that accounted for most variance in the analysis across multiple aspects of development in Chapter Four. There may be other individual child characteristics (e.g., intelligence) that account for variance in any of the systems which were not included in the current analysis. Despite this, the current study finds that the bioecological theory is a useful framework for the research questions regarding factors that influence play and learning in the home environment. Overall, the current study found strong support for the importance of relationships, particularly for socioemotional development.

Other development theorists may also be useful to consider. For example, Vygotsky (1978) who described the Zone of Proximal Development (ZPD) and the role of scaffolding in supporting cognitive development. This important component, ZPD, described what the child could achieve on their own versus what they could do with support. Vygotsky believed that by playing, children worked out the rules for social interaction and that play helped children develop many skills (Golinkoff et al., 2006). He proposed that play encouraged higher level thinking and that imaginative play especially allowed the child to safely try out new ideas and roles unencumbered from constraints of reality (Howard & McInnes, 2013).

Vygotsky described play: “play is not the predominant feature of childhood, but it is a leading factor in development” (Vygotsky, 1978, p. 101). Evidence of the benefits of independent play is clearly demonstrated in Study 5, where the findings show that children’s frequency of engagement in various play and learning activities significantly predict their developmental scores to a greater extent than when parents engage in play activities with them. However, Vygotsky also saw a role for parents in supporting their child as he believed the parent had an important role in scaffolding their child in play, learning and thinking through rich language interactions (Vygotsky, 1978). The findings of the current research support Vygotsky’s theory in highlighting the importance of parental engagement in the play activities in supporting development, including in the development of vocabulary.

Implications for Real World Settings

This section considers some of the potential implications the findings of the current research may have for parents and professionals in everyday life. For example, when children move to preschool or school, there are important skills they need to ease the transition from one domain to another. In recent times, there has been an increase in parental expectations about success for their child as well as an overemphasis on academic outcomes at home in early childhood (Belfield & Garcia, 2014; Culpin et al., 2020). Therefore, the findings throughout the current research, including having positive beliefs about play and a more informal approach to play and learning, may be a useful approach in relation to supporting child development.

Overall, there are a number of implications for real world settings and practical ways parents can support their child's cognitive and socioemotional development. This research highlighted the importance of parent's beliefs about play, and we discuss how parental beliefs about play may support early child development. We conclude this section by looking at current government policy and how parents even with knowledge about good parenting practice also need encouragement.

The findings in Study 6, indicated that parents' beliefs about play have an important role in supporting socioemotional development. For socioemotional behaviour, the studies found that children whose parents had a high belief in the value of play were associated with better socioemotional outcomes. In contrast, beliefs about play for academic purposes did not predict socioemotional outcomes. As well as the belief that play is important for development, a combination of informal play and learning activities at home supported socioemotional development. Parent's beliefs predicted overall engagement and richness of the home environment. Children engaged more frequently in activities when there was a richer home environment also. The results suggest that positive beliefs about play influence parental behaviour, and indirectly influence socioemotional development outcomes.

Parental beliefs about play in Study 7, also appeared to support cognitive development. Overall, our findings suggest that informal play and learning activities are associated with development and were demonstrated in Studies 1 to 4, and in Study 7. For example, an activity such as shared reading demonstrated current and longer term associations between non-verbal reasoning and vocabulary and longer term socioemotional development. The informal activity of painting also was associated with cognitive and socioemotional score increases across both the GUI and PLEY studies. Overall, parents need to strike a balance between playful activities and social skills rather than overemphasising academic activities. There also need to be a balance between play support of parents (e.g., scaffolding) and possible developmental gains when children play by themselves (Cherney & London, 2006; Healey & Mendelsohn, 2019).

These findings add to the literature that examine how best to support developmental outcomes in lower socioeconomic groups, for example by working with parents to encourage play in the home and influence their beliefs about the importance of play. Kelly et al. (2011) found that children in lower socio economic groups had greater socioemotional difficulties but suggested amongst other things that families who engaged in lots of play and learning activities could narrow the gap between different income groups. Activities and resources are important to recompense for gaps in language development by socio-economic status. Similarly, McNally et al. (2019) found low levels of maternal education have been linked to poorer vocabulary development, although the effects are mediated by parent practices, household income and resources. When resources are unavailable, parents' expectations or beliefs, may support educational success (Yu & Daraganova, 2015) and positive parenting may have some effect in offsetting the effects of poverty or family disadvantage (Kiernan & Mensah, 2011). Additionally, in terms of intervention programmes or providing supports to families, beliefs about play may be more amenable to change than family income or education levels, for example.

In addition to the findings on beliefs, some of the strongest findings throughout the thesis were in relation to the importance of the parent child relationship on socioemotional development and the effect of informal activities on all aspects of development. In an Irish context, Public Health Nurses (PHN's) have an important role in supporting parents from a child's earliest stage of development. They conduct developmental assessments on all infants, and screen for developmental delays as part of a series of reviews in early childhood. The findings about the significance of the parent child relationship from this study are important for PHN's to communicate to new parents and new parents should be aware of the importance of a positive and strong relationship with their child. For parents with literacy or language difficulties this is helpful advice that the focus does not have to be on letter or alphabet activities or number and shape activities, instead they can nurture a warm relationship in playful activities. As also found here, in the first three years, focusing on painting and games, as well as shared reading, appears to be associated with cognitive score increases too and reduced behavioural difficulties too.

Throughout the current research the benefits of a variety of playful activities for child development were highlighted. However, it also found that some more learning based activities (e.g., alphabet and number activities) had either a negative or no influence on development outcomes. The current research findings are consistent with previous research by Nowak and Evans (2013), and Belfield and Garcia (2014), of either no effect or a negative effect of letter or alphabet activities and number and shape activities on developmental domains. Additionally, recent studies have suggested that there is increased emphasis at an earlier age on literacy and learning activities such as alphabet and number and shape activities then previously. For example, Belfield and Garcia (2014) examined changes in the US from the National Household Education Survey (NHES) between two different waves, 1993 and 2007 and found a significant leap in the number of three year olds that recognised all the letter of the alphabet between the two waves. The increase between the two waves was greater for the three year olds than it was for the four year olds in the study.

The NHES parental self-report survey suggested that parental engagement increased more for the three year olds than it did for the four year olds in the 15 years between the two surveys. Belfield and Garcia (2014) found that parental expectations of what children needed to be ready for preschool (e.g., know the alphabet, use pencils, count to 20 or higher and take turns and share) also increased between the two surveys. In fact, parental expectations were the same for the three year olds as for the four year olds in the study. They also found a positive association between maternal education and frequency of reading children's books, though a negative correlation between maternal education and reading alphabet books. The current findings (e.g., the link between lower maternal education and alphabet activities) are consistent with those of Belfield and Garcia.

The current findings also suggest that more informal playful activities at age three, rather than letter and number games, are associated with increased and improved scores on measures. Researchers and most early year educators recognise that it is socioemotional skills that are more important than formal literacy or numeracy skills for a smooth transition to school (Ring et al., 2016; Webster-Stratton & Reid, 2004). Some parents appear to place an overemphasis on formal activities in the home (e.g., the findings in Chapter Three indicated that 42% of parents engage in number activities with their three year old every day) may need to be encouraged with a message about the importance of a combination of messy play, and activities such as family board games and reading. Previous research using the GUI data found that three year old children were actively involved in a range of activities with their parents on a weekly and daily basis (Smyth, 2016), so communicating that some activities offer greater benefits than others is important. Additionally, the findings reported in Chapter Five indicate that beliefs about the importance of play support are associated with development outcomes.

Research had also found negative effects for parental engagement in numeracy activities in the home, but they were primarily for cognitive rather than for socioemotional development (Huntsinger et al., 2016). While research has demonstrated benefits for both formal and informal numeracy for development (Lehrl, Ebert et al., 2020; Lukie et al., 2014; Ramani et al., 2015; Skwarchuk et al., 2014), it may be that development is supported more through informal literacy and numeracy activities (e.g., shared reading and applying numeracy to weighing out ingredients in cooking) rather than formal literacy activities (e.g., teaching the alphabet from ABC books or doing sums).

A caveat to consider also is that parental engagement in letter or alphabet activities at age three had a positive influence on prosocial behaviour at age three and five, demonstrating that alphabet learning has some positive influence also. As discussed above it may be the case that what is important for prosocial development is that the parent and child are interacting, and building a positive parent-child relationship, more so than the activity itself. Overall, if parents focus on the quality of the parent child relationship, with playful and fun activities rather than formal activities, it may support multiple aspects of development. However, research also demonstrates that knowledge of letter sounds, and names and the alphabet are necessary for emergent literacy (Willoughby et al., 2015) and informal teaching of letter activities is known to be associated with improved writing skills (Evans et al., 2000). Therefore, there needs to be some balance with the inclusion of some formal literacy and numeracy activities for later reading and literacy development, especially when children begin school.

Signifcantly, in Studies 1 to 4, the activity of painting and drawing, was the main contributor to development outcomes; it contributed to all outcomes at age three, though engagement at age three only benefitted two socioemotional outcomes at age five, and appeared to have a negative assocaition with expressive vocabulary at age five. Reading also had multiple benefits for cognitive development at age three and increased scores for both cognitive and socioemotional outcomes at age five. Previous research has found that reading picture books to young children is believed to support language and literacy skills and vocabulary learning and growth in early childhood (Fletcher & Reese, 2005; Morgan & Meier, 2008) and influence cognitive development in infancy (Murray & Egan, 2014). McNally et al. (2019) also found evidence that reading with three year olds supported their expressive vocabulary. However, while much previous research in the area supports the developmental benefits of early shared reading (e.g., see Hoyne & Egan, 2019) less research focuses on the benefits of other individual activities such as painting.

Implications for Policy

Shared reading has also been associated with socioemotional development which supports close and engaging interactions between parent and child (see also Baker, 2013: Betawi, 2015; Hoyne & Egan, 2019; Kelly et al., 2011; Kuo et al., 2004). Family literacy programmes that involve bookgifting have shown many positive outcomes. These are programmes that provide free books to families (e.g., Bookstart in the UK). As an intervention, bookgifting schemes can help bridge the gap between mismatched literacy practices in the home and school by providing families with strategies and resources to support their child's emerging literacy (Barratt-Pugh & Rohl, 2016). Other positive impacts of book gifting programmes are that they are centred on the important relationship between the parent and child in the home, including the emotional closeness that develops from sharing books at home (Wray & Medwell, 2013). While many countries have national book gifting programmes (e.g., UK) there is no such programme in Ireland.

Previous research and reviews has demonstrated the effectiveness of book gifting programmes that are low cost and have been found to be successful, particularly in disadvantaged communities (Wray & Medwell, 2013; Zuckerman, 2009; see Egan et al., 2020 for a review). A recent evaluation of a pilot bookgifting scheme, Bookseed, for babies in Limerick, found a number of benefits for participating infants and parents. Benefits included fostering positive relationships with the infant, supporting language development, and developing a positive relationship with books (Moloney et al., 2020). Parents were delighted to receive the bookgifting pack, with over 70% of parents reporting they were very interested or excited to receive the books and information about the scheme. These findings suggest that as well as receiving free books, such schemes have wider benefits. Interviews with the parents in the scheme also highlighted the importance of parental beliefs and knowledge about the benefits of reading with their infants, consistent with the findings of Chapter Five in the current research, related to parental beliefs about the benefits of play.

As well as receiving books as gifts, later reading attainment is positively associated with visiting a library (Burnett et al., 2014). Shared reading itself is an easy and inexpensive activity that fits readily into daily family routine (Van Kleeck, 2008), however, it is also worth noting that the earlier a shared reading intervention begins, the greater the developmental benefits (Dunst et al., 2013). In addition to books, many libraries also have other resources available for families such as arts and crafts materials, puzzles and games. Encouraging families to join the library and making sure parents are aware of the activities and resources available in the local library (e.g., storytelling, jigsaws) is also valuable.

Many studies have examined the effect of the Home Learning Environment and focus on total measures rather than on individual play or learning activities and their benefits for cognitive development (Hayes et al., 2018; Sammons et al., 2015; Sylva et al., 2010). This current research wanted to tease out if individual activities were associated with development outcomes. The current research found support of this, particularly that informal activities, painting, drawing and play with play-doh, games, and reading made the greatest contribution across development domains. However, board games were also one of the less frequently engaged in activities, with 29% of parents engaging in this activity daily compared to number games (42%) which demonstrated no benefits for development. This suggests that it is more than just frequency or engagement in the activity that is having an effect on developmental outcomes.

Research in recent decades appears to increasingly focus on the home learning environment with an emphasis on parental engagement in learning and particularly the development of academic skills (Melhuish et al., 2008; Sammons et al., 2015). However, in light of the findings in the current study, that informal play activities in early childhood offer greater benefits for both cognitive and socioemotional development, perhaps we should consider an alternative to the widely used home learning environment and begin to discuss the importance of the home play environment for development among policy makers, professionals, educators and especially with parents.

Another important finding that relates to policy development, is that while the current research found high levels of parental engagement in play and learning activities, a substantial number of children do not have parental engagement at the same level. For example, Murray and Egan (2014) reported that at 9 months of age 19.3% of infants were never read to. Our findings in Chapter Three indicated that when the children were three years old, 2.3% of parents never read with their child, while over 10% of parents did not engage in games (See Figure 2). The data reported in Chapter Five also demonstrated that some parents did not engage in activities with their children, for example 14% of parents never or hardly ever engaged in puzzle or jigsaw with their child (See Figure 14). Aside from the mixed findings in the current research regarding alphabet and number activities, children who are not engaging frequently in a variety of activities and have poorer home learning environments need extra supports.

The skills that are acquired through play in the home are very important as they make transitions to early years settings much easier. Not having play skills can have an impact on children as they move from home to school (LaForett & Mendez, 2017) and adults are important in the development of play as they scaffold developing play skills (Bulotsky-Shearer et al., 2016). When children have less experience of play before they attend Early Childhood Care and Education (ECCE) settings, it may be more difficult for them to negotiate the multiple interactions they have on a daily basis with their peers (e.g., turn taking and sharing). They may also experience difficulties understanding expectations about play (e.g., how rough the rough and tumble play will be) or cleaning up after activities and minding toys and equipment. Parents, as the main adult in a child's early years, therefore, have a valuable role in facilitating play with their children at home.

There are several ways to support families experiencing poverty or disadvantage to support their child's cognitive and socioemotional development. Previous research has suggested increased income and welfare reform to support lower income families as well as other approaches such as parenting interventions that raise awareness about the importance of reading, play and learning (e.g., McNally et al., 2019). The findings in Chapter Five, that parents' who believe in the value of play engage more frequently in play with their child, also has a potential practical implication. As previously stated, while it is difficult to change a person's education or income level, it is potentially easier and cheaper to change a person's beliefs and the activities they engage in in the home through a parenting intervention in early childcare settings or with information and support from a trusted professional such as a PHN or an organisations working with children and their families (e.g., Barnardos; Children's Books Ireland).

Overall, this research found positive associations between beliefs about play, the richness of the home environment, parental engagement in activities with their child and early child development. Positive play beliefs were associated with the home environment. Findings in the PLEY study also found associations with development when parents created a rich and varied home learning environment, which is consistent with previous research (Rodriguez & Tamis-LeMonda, 2011; Sammons et al., 2015). Lower income families can also create innovative home environments as resources can include library books and resources, as well as a positive belief about play for development.

A final implication which applies to current Irish policy is that the government's First 5 policy emphasises the importance of the home learning environment and support for parents in nurturing a playful home environment where material needs are met.

> "Accessible, high-quality information and guidance will be made available for parents to promote healthy behaviours, facilitate positive play-based early learning and create the conditions to form and maintain strong parent-child relationships. A continuum of parenting services - ranging from universal to targeted - including high-quality parenting programmes, will also be made available".
>
> (https://first5.gov.ie/about-first-5)

As described in the current research, there are a small number of children who are not benefitting from rich home environments with lots of parental engagement. These children and their families need to be reached. In addition, even though current government policy is supportive of facilitating play based learning and nurturing relationships, this that does not mean that the message has been received by all parents. Sometimes knowledge alone about important key tasks for parents is not enough and further encouragement and support is necessary to help parents to engage with their child. To illustrate this, De Bondt at al. (2020) found that even when parents knew how important it was to read to their young child, they sometimes needed extra encouragement, for instance being involved in interventions such as a book-gifting programme prompted parents to read regularly to their infants from an early age. More progress is required to encourage and actively engage parents in their role in the home play and learning environment. A bioecological approach may also be useful in this regard in ensuring that policies in the macrosystem, are supported and implemented in the other ecological systems in which the child develops.

Strengths and Limitations of the Current Research

Following on from a discussion of the key findings and implications of this research, the strengths and limitations of this research will now be considered. Some of the main strengths and limitations relate to the sample size and design of the research. There were advantages to using the GUI dataset, particularly as the research was able to explore the relationship between parental engagement in play and learning and development using a large and nationally representative sample. In addition, as the findings from the GUI study were from a large cohort study, it provided a solid foundation to explore further questions in the PLEY study. However, there were also limitations for both the GUI study (i.e., no control over measures selected) and the PLEY (i.e., sample size). This next section will consider the strengths and limitations of the samples, research designs and measures used in the research in this thesis.

Using a large, nationally representative sample is a crucial strength of the design of the current research, as reported in Chapters 3 and 4. The Growing Up in Ireland study, a national longitudinal study, is a robust study that captures information across a wide variety of domains, including cognitive and socioemotional development. It measures many different factors that support or hinder the well-being of children. It is nationally representative of children in two cohorts, across all income groups, and provides important insights into parental engagement in play and learning, and the impact on child development. In using this large representative sample, it allows us to generalise our findings about factors that influence play and learning in the home to the general population. It also allows us to make international comparisons to other research, as many of the variables (i.e., play and learning activities and outcome measures) are used in other studies, including other international cohort studies for example including Growing up In Scotland (GUS), the Millennium Cohort Study (MCS) and the Effective Pre-school and Primary Education project (EPPE).

For the Growing Up in Ireland study, another strength was the use of a longitudinal design. Using the GUI study allowed access to a large cohort study that examined a wide range of child and environmental factors that influence development across time. Many of these variables would have been either unethical or impractical to examine experimentally (Mertens, 2015). It allowed us to use secondary analysis to examine this large national dataset. It has been suggested that secondary analysis could 'lend new strength to the body of fundamental knowledge' (Glaser, 1963, p. 11, cited in Long-Sutehall et al., 2010). Additionally, by conducting secondary analysis of existing data that has informed consent and been anonymised, it allows examination of specific research questions, and allowed a new perspective to be applied to the original dataset (Long-Sutehall et al., 2010).

Additionally, a strength of the current research was examining socioemotional outcomes. Wirth et al. (2020) noted to date, longitudinal studies have focused more on cognitive outcomes, with less research focusing on socioemotional development. In addition to using outcomes that are not frequently examined, the analysis was able to incorporate many different environmental factors that may influence the home environment and early development. Throughout the research, hierarchical multiple regression analysis was the principal analysis conducted. This method allows for the statistical control of particular variables (i.e., income levels) to examine the influence of predictor variables of interest (i.e., individual play and learning activities) by entering the predictors in a particular order (Howitt & Kramer, 2014). This allowed us to test Bronfenbrenner's bioecological framework by entering the variables in blocks to represent the influence of the different layers in the theory (Bronfenbrenner & Morris, 2006).

Another strength of the research presented in this thesis, particularly the GUI study, was that the research used reliable and validated measures of cognitive and socioemotional development (e.g., the British Ability Scales and the Strength and Difficulties Questionnaire). The Strengths and Difficulties Questionnaire (SDQ), an empirically validated measure (Kelly et al., 2011) is regularly used in cohort studies (e.g., GUI and MCS). The second robust measure used in the PLEY study was the Parent Play Belief Scales (PPBS). The PPBS is an empirically developed and validated measure, created by Fogle & Mendez (2006). The current research also expanded knowledge on parental beliefs by exploring it in an Irish sample.

There were a number of other strengths in the current research. The PLEY study was developed to fill the gap between what the GUI study had examined and what the current research was interested in (i.e., factors in the home learning environment such as parental beliefs about play). In addition, the activities that were selected for exploration have been used in many cohort studies and are developmentally appropriate activities for young children. A further strength of the PLEY study was that it built on the findings from the GUI study on the effects of play and learning on development and explored new questions related to the current research.

In addition to measuring the variables reported in Chapter Five, information was also gathered in the PLEY survey relating to other aspects of play, such as outdoor play and screen play, as the data was collected by a team of researchers in the Cognition, Development and Learning Research Lab in Mary Immaculate College. While each researcher was interested in different aspects of play, an important element of the data collected was that it would be available to other researchers for future research, and parents gave their informed consent for the data to be archived and for it to be used for future research.

Although there were many advantages in using the GUI data, there were some limitations also. While overall, the GUI study measured a large number of variables, the researcher had no control over the variables that were selected to be included, how responses were recorded, or the measures used. Additionally, there were some difficulties regarding the use and selection of variables in the GUI study. The activities were different at age five, so if we wanted to examine the effect of the activities from age three, such as letter or alphabet activities and songs and games, they were no longer included. Other activities were introduced which while developmentally appropriate (e.g., listening to the five year old child read), meant further follow up of the effect of letter or alphabet activities and number and shape learning activities at age five was not possible.

For example, one limitation in the GUI study was that the measure of engagement in play activities focused on parental engagement in play with the child and did not examine child engagement in play activities. The GUI data asked parents how many days per week anyone at home engages in activities with the child but had no information available on child engagement in activities. When the children were aged three, parents were asked how many days on average *anyone* at home engages in the activity with the child for the first five activities (i.e., reading, learning ABC's or alphabet, numbers and counting, songs and playing games). The last item, painting and drawing, wasasked about differently (e.g., how many days on average does the child paint, draw, colour or play with play-doh at home). Therefore, in Chapter Three and Four, we were unable to compare parental engagement with child engagement in activities. In order to address child engagement in play activities, in Chapter Five we included a measure of child engagement which allowed us to examine child engagement in activities with parental engagement in the same activities.

Another limitation of the research also relates to the sample size of the studies in Chapter Five. In the GUI sample, we examined the effects of play and learning activities on a sample of 9,793 children aged three, and on 9,001 children when they were aged five. In contrast, in the PLEY study, the final sample had 276 participants, under the age of six. At the recruitment stage, we appealed to parents of children aged six and under. However, even within this apparently narrow age range, children were at very different stages of cognitive and socioemotional development, such as those aged 0-2 years, in contrast to those of preschool age (3-4 years) or early school age (5-6 years approximately). A limitation of this sample was the number of children in each of the age categories; we were particularly interested in children in the age group 3 to 4, before they were overly influenced by wider environments of school and would have liked more participants in all of the age groups. However, we did find the strength of the relationship between parent and child engagement in activities reduced as the child got older and gained more independence.

In addition, there was a number of differences between participants in the GUI and PLEY studies. For example, compared to the GUI sample, the PLEY sample, was a homogenous sample of older and more highly educated parents compared to the participants in the GUI study. The sample was a highly educated group of women, with over three quarters of participants educated to degree level or higher. This meant that the regularly used four category of education could not be applied in the PLEY studies. Additionally, of the surveys completed, 96% were completed by mothers, with only 4% of fathers participating. Apart from excluding fathers and their voice and role in play and learning with the child, participants in self-report surveys may be more likely to overestimate their rate of involvement in a normative behaviour and respond in a socially desirable way (Brenner & DeLamater, 2016). Furthermore, in contrast to the GUI study, in the PLEY study one fifth more of mothers had breastfed their infants. Therefore, while the PLEY study provides important information about parental engagement in play and learning in well-educated homes, a limitation may be that it does not give a clear picture of current engagement in play and learning activities across all Irish homes.

Another potential limitation were the cognitive and language measures used in the PLEY study. While some of the measures in the PLEY survey are very robust (e.g., SDQ measures), the cognitive measure, (e.g., Attentional Focusing) and the language measure (e.g., adaptation of the ALDeQ) are not used as frequently. While both measures are standardised parental-report developmental measures they were included as brief and alternative measures to standardised measures such as the British Ability Scales (BAS). There is some uncertainty whether the measure, Attentional Focusing was a sufficiently robust cognitive measure. Attentional Focusing is a subscale of the CBQ, which includes a number of other subscales designed to assess temperament in early childhood (Rothbart et al., 2001). Attentional Focusing has been linked to school success as well as socioemotional development (Rueda, et al., 2010). It is also a subscale of effortful control which include a number of other subscales (i.e., inhibitory control, low intensity pleasure, and perceptual sensitivity; Simonds et al., 2007).

Compared to the BAS used in the previous studies, the Attentional Focus scale is a parent report measure and not an individually administered psychometric test. However, among the nine items in the scale it does demonstrate abilities such as concentration in tasks (or lack of) and becoming involved (or not) in play and learning tasks in the home. Additionally, the language measure, the ALDeQ, may not have been sufficiently robust either. The ALDeQ was designed to measure language delay or problems. The current sample all demonstrated high mean scores on each of the ALDeQ items. It was intended as a short parent screening tool, but in contrast to the BAS Naming Vocabulary score, it may not have been sensitive enough. However, despite using these parental report measures, the findings suggested that a child's attentional focus in particular may be influenced by both child and parental engagement in play and learning activities.

Some further limitations related to the use of a number of parental report measures. A number of these measures were used in both the GUI study and the PLEY study. This could potentially lead to two issues, social desirability or response bias and the accuracy of parents as assessors of their child's development. For example, Hofferth (1999) previously reported that parents over reported how much reading they did with young children because of social desirability. Sessa et al. (2001) also found that parents and child report of parenting (e.g., structure, warmth-responsiveness, and hostility) did not necessarily correspond with each other. However, the sample had less than 100 children aged under 6, and 30% of the children were from single parent homes. Sanzone et al. (2013) believed it was very difficult to eliminate social desirability responses.

Another factor that could influence results is parents' ability to correctly assess their young child's development. However, Squires (2017), supported the use of parents as primary assessors of their child's development, in particular in identifying young children at risk of developmental delays. She believed that when simple and clear language was used in measures that parents were in fact accurate observers of their child's development (Squires, 2017). This leads on to the matter of parental reports of the SDQ. It was difficult to find accurate reliability analyses for the SDQ. We used the three factor model (i.e., internalising, externalising and prosocial) throughout which is suitable for use in low risk populations (Goodman & Goodman, 2011). There are mixed findings in relation to the reliability of the parent report SDQ. Previous studies that have used parent report of the SDQ have found that internal consistency was lower and only moderate based on parent report (Nixon, 2012). In the PLEY study we found that internal consistency was fair for parent report of the SDQ Externalising and Prosocial scores and poorer for SDQ Internalising scores. However, other studies have reported that the parent rated SDQ is a reliable measure for use with pre-schoolers (Klein, et al., 2012).

Future Research

This research looked firstly at a large cohort of children, across a broad range of income and education backgrounds in the Growing up In Ireland Study and found evidence that parental engagement in play and learning activities have a positive impact on cognitive and socioemotional development. In the PLEY study, we also examined parental engagement in play and learning activities as well as other parental factors. The PLEY study found when parents had a positive belief about play for development that it was positively associated with socioemotional development. However, as the PLEY study included a sample of highly educated and older parents, future research could target wider income and educational backgrounds, more comparable to the GUI sample. A future study might also consider the role of parent beliefs in other types of play, such as outdoor play.

Reading, along with games and painting and drawing, had a greater influence on development outcomes in the GUI studies, compared with the more learning based activities of letter or number games. However, there is some debate as to whether reading is a formal or informal activity. Reading is defined as an academically focused activity within the Parent Play Beliefs scale (i.e., it is categorized as more important than play for Academic Focus; Fogle & Mendez, 2006). Other researchers have queried if reading is more of a play activity (Jiang & Han, 2016). Stipek (1992) has also suggested that reading is an informal activity. While the current research did not tease out the question of whether reading was an informal or formal activity, it would be interesting to explore this in future research. It may that the context of the reading situation is important to consider. For example, it may be the case that reading with an infant or toddler is more playful than reading with an older child, or in supporting a child that is learning to read. In addition, future research could examine if there is a longitudinal effect of formal or learning based activities.

In addition, much of the previous research on what parents believe to be either play or learning, focuses on parents of children in early childhood settings (Breathnach et al., 2016; O'Gorman & Ailwood, 2012) or focuses on cultural difference in beliefs about play (Brooker, 2010; Roopnarine & Davidson, 2015). The current research demonstrated strong support for parents' value of play for development, though it did not explore exactly what parents' views are of play and learning. A qualitative approach could also be employed in future research with parents discussing engagement in particular activities. Central to any discussion on play is placing the child at the centre and it is important that educators and professionals see things from the child's perspective, which in the past has not always been the case. The focus is generally on play from the perspective of the parent or teacher (Moyles, 2010). While some studies have examined parents' perspective of what children's understanding of play is (Breathnach et al., 2016), fewer studies have considered play from the child's perspective and it is rarely included, particularly in research about how children learn through play (Colliver & Fleer, 2016).

Including the child's voice would therefore also be important in future research. Studies that have looked at children's view of learning through play, primarily examine it in early childcare settings rather than the home (e.g., Fluckiger et al., 2018). In addition to parent reports of play, observational methods of play could also be used in future studies and involve children themselves, rather than a parental-report survey design. Future research may also include other aspects of the PPCT model such as child characteristics. Furthermore, future research could investigate if there are developmental benefits to children playing alone and if child led play has greater current and longer term developmental effects than parental engagement in play.

Additionally, in both the GUI and PLEY studies, it was mothers or Primary Care Givers (PCG) who mostly participated and completed the surveys: in GUI study, 98% were mothers, while in the PLEY study, 97% were mothers. The numbers made it impossible to examine differences in mother or father roles in parental engagement. While fathers were not excluded from participation, as demonstrated in both studies, mothers are more likely to fill in surveys than fathers which makes it difficult to examine their contribution. There is evidence that both mothers and fathers spend lots of time in child activities and being around children, taking them places and involved in play and learning with them (Roopnarine & Davidson, 2015; Sayer et al., 2004) so fathers voices are important to listen to. However, much of the research on play focuses on mothers, though some recent research in this area has focused on the role of fathers (Cabrera et al., 2007, Baker, 2018). Future research should try to include more fathers to complete the survey.

Furthermore, Roopnarine and Jin (2012) found that within families, mothers and fathers had conflicting beliefs about the value of play. They found that maternal beliefs about the cognitive benefit of play moderated the relationship between the amount of time children played and the child's cognitive development (Roopnarine & Jin, 2012). Warash et al. (2017) found that mothers valued play more than fathers, while fathers placed a higher value on academic skills. They also found that all parents believed play to be beneficial but that perceptions of play changed as children made the transition to school. Other aspects of the environment such as father's role in development or father's engagement in play and learning in the home environment and their beliefs about play could also be explored. A study focused on fathers' engagement in play and learning in the home and their beliefs could greatly benefit current knowledge.

Overall future research could focus on recruiting larger number of parents to participate in each age group and participants with a wider spread of education. Larger numbers may demonstrate a change in parental beliefs about play as the child gets older. In the current study we observed a positive relationship between the age of the child and Academic Focus, but none for Play Support and child age. This suggests that as children start at school, that parents may become more focused on academic rather than playful learning. In addition, while the findings demonstrate certain relationships and trends (e.g., that Play Support is beneficial for socioemotional outcomes), these should be interpreted in light of the highly educated parent sample and may not be generalisable to larger populations. Future research should try and have broader and larger sample with children of different ages.

What has brought a renewed sense of importance into the play and learning environment of the home is COVID-19. An example of this is that early childhood teachers indicated during lockdown that they encouraged parents to play with children during closures and that play would have a significant role on children's return to school (O'Keeffe & McNally, 2021). The PLEY survey was rereleased just at the end of the first lockdown in Ireland in May 2020 and 506 parents participated in a second survey. One finding from this was that play had changed for many children with increases in outdoor play and screen time, and a third of children brought information about the virus or restrictions into their play (Egan et al., 2020). This unexpected global pandemic has made it more important for parents to be aware of the importance of play and learning activities in the home, particularly if we face subsequent lockdowns. A future question regarding COVID-19 is if it impacted parental engagement in play either positively or negatively. Unfortunately, our research suggests that some parents struggled to engage in play with their child during the pandemic, while juggling working from home (Egan, et al., 2021). One parent for example, noted that her two year old son was "*A bit more clingy to me and wanting me to be involved in play especially at times I'm trying to balance working from home*", while another said that her three year old was "*constantly asking to be played with and not understanding the demands and stress of work*". Future research should explore this topic further.

Finally, on a cautionary note, some balance is required regarding fun in play rather than advocating play for development's sake alone. Further studies have indicated that when mothers have more knowledge about play and its importance for development, they engage in higher levels of play (Damast et al., 1996; Ryalls et al., 2013). Recognising the importance of children's play, for fun or learning, does not mean parents understand how best to play with their children (Parmar et al., 2008). Coo et al. (2020) observed that unstructured or free play and learning were better for fostering curiosity and self-guided learning during childhood. Colliver and Veraksa (2019) suggested it was important that early educators observed children in free play and engage with them, but not interfere too much. When educators over intervene with children to guide play, children themselves see it as been play for academic learning rather than enjoyment (Colliver & Veraksa, 2019). Future research might examine if this applies for parents also.

Conclusion

The benefits of play and learning for development have been researched extensively in the literature, particularly in relation to aspects of language development.

However, less research has examined the importance of play and learning in the home for other aspects of cognitive development, such as nonverbal reasoning or attention, or for socioemotional development. With increased engagement in screen activities over the last decade (McClure et al., 2018; Radesky & Christakis, 2016;), some researchers have noted a general decline in play (Gleave & Cole-Hamilton, 2012; Gray, 2011). Play is essential for children's intellectual and physical development, but it is also an important resource for learning, wellbeing, and happy children (Sahlberg & Doyle, 2019).

The current research examined if children who engaged in higher levels of play and learning activities in the home in early childhood would have better cognitive and socioemotional outcomes both concurrently and longitudinally. Additionally, this research sought to investigate whether play and learning activities would impact on cognitive and socioemotional development, even after other factors were accounted for, such as the parent child relationships, income levels and parents' beliefs about play. The research also sought to establish what factors influence the creation of home play and learning environments for young children in Ireland. This research sought to explore these factors in relation to play and learning in early childhood, with a particular focus on the early childhood period aged 3-6, when children are beginning to attend preschool and school.

One of the key findings from this study is that parental engagement in play activities have significant associations with child developmental outcomes across multiple cognitive and socioemotional domains. It also found that informal play and learning activities are associated with increased cognitive and socioemotional outcome scores compared to formal learning activities. We also found that as well as developmental benefits from parental engagement in play and learning activities, that parent child relationships really matter too. Family and other factors make a difference, but to a lesser extent. Additionally, having parents who have positive beliefs about play has a positive influence on the home learning environment and associations with the child's socioemotional outcomes too.

The quality of the parent child relationship is critical for healthy development (Cabaj et al., 2014) and having "close relationships to competent, prosocial and supportive adults" serves as a protective factor against developmental threats (Masten & Reed, 2002, p. 126). A number of studies have found that parents, irrespective of education or income are engaging in lots of learning activities at home on a regular basis which is a positive step (Bassok et al., 2016; Kalil, 2016; McCormick et al., 2020), but the activities are of an academic rather than playful type. It appears that some parents may need clear information about the benefits of engagement in play rather than learning activities at home.

Parents have a vital role to play in their child's development. Parents and their children are together for significant amounts of time, and it is the parent who normally provides the materials the child plays with, along with organising the setting that the child plays in. Parents may also choose what activity the dyad engages in together at a particular time (Cannon & Ginsburg, 2008). Therefore, it is important to promote the role that parents have and the message that parents are essentially "first teachers", or perhaps it would be better if they were "first playmates".

Very little previous research has examined the effect of the layers of the different bioecological systems on play and development. While it is important to bear in mind that the interaction between each of the layers is important, this research tested the impact each layer had individually. Examining the layers in this way demonstrated the distinct effects of each of the factors that were examined. The current findings may be useful in guiding parents and professionals in how parents might interact and play with their child at home, as research has previously not explored how parental beliefs about play may influence development in early childhood. The research findings in this thesis therefore provide valuable information about contemporary play and learning activities in early childhood and the role of parental engagement. They also endorse the importance of parent child relationship factors in supporting child development.

This thesis adds to the current literature regarding the importance of play and learning activities across cognitive development and advances our understanding of the role of parental engagement in play and learning activities. It also adds to the knowledge about the importance of play and learning and the parent child relationship for socioemotional development, which has been much less researched. There are many factors that influence child development, but the current research illuminates the closest and most familiar microsystem, the family, and the role proximal processes have in early childhood. “A child’s greatest achievements are possible in play” (Vygotsky, 1978, p. 102). When parents support child’s play at home in all its mess and glory, they are supporting their child’s cognitive and socioemotional development.

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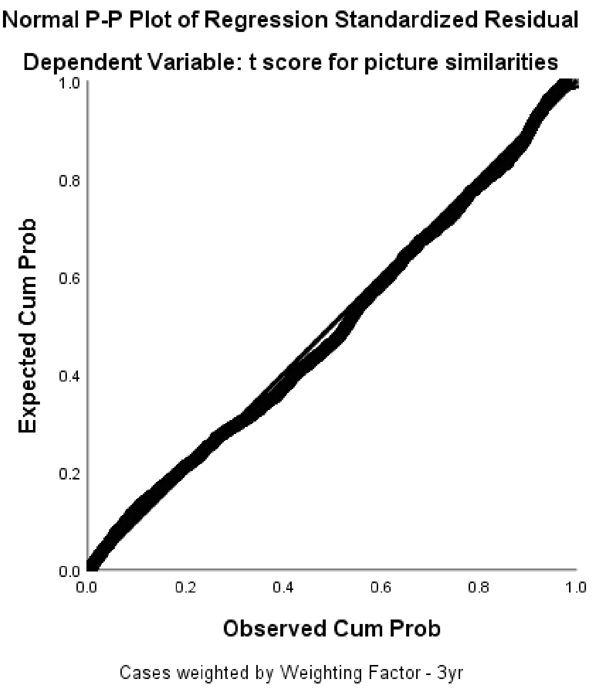
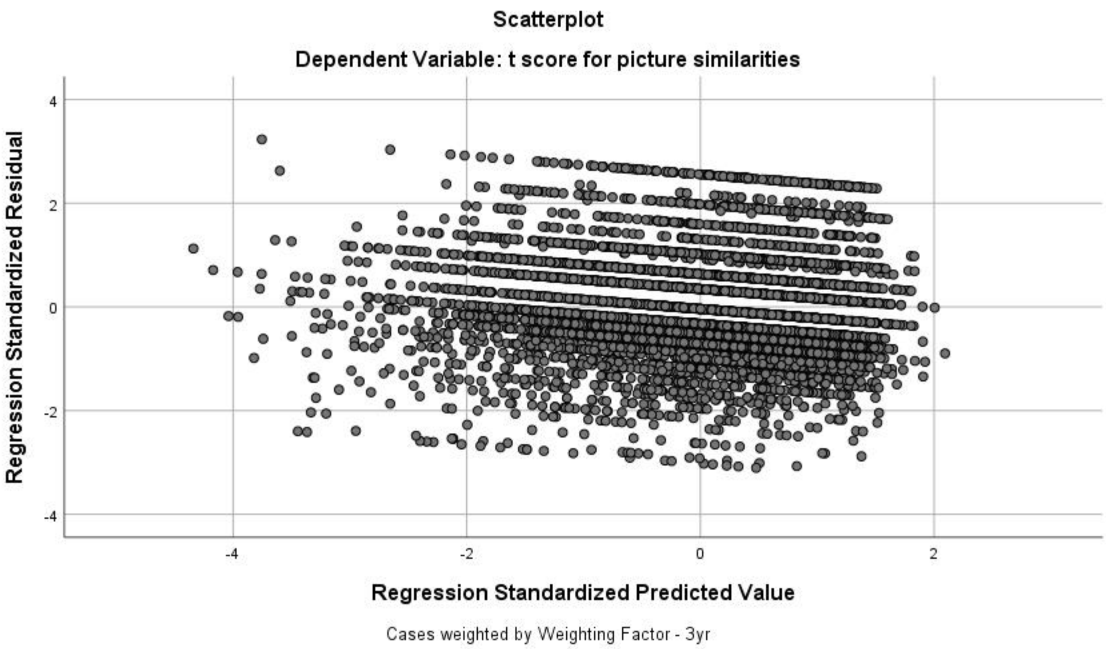
Appendices

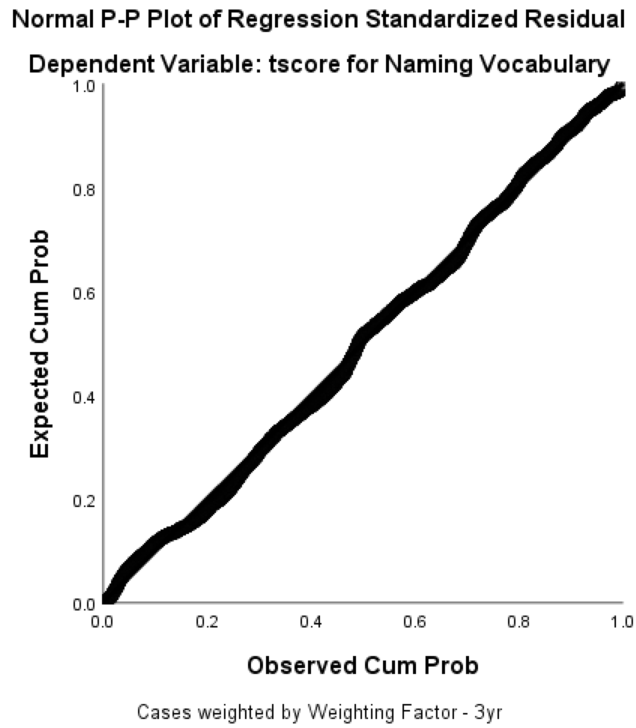
Appendix A- Study 1- Percentage of parents in the GUI aged three, engaged in the various play and learning activities (number of days per week).

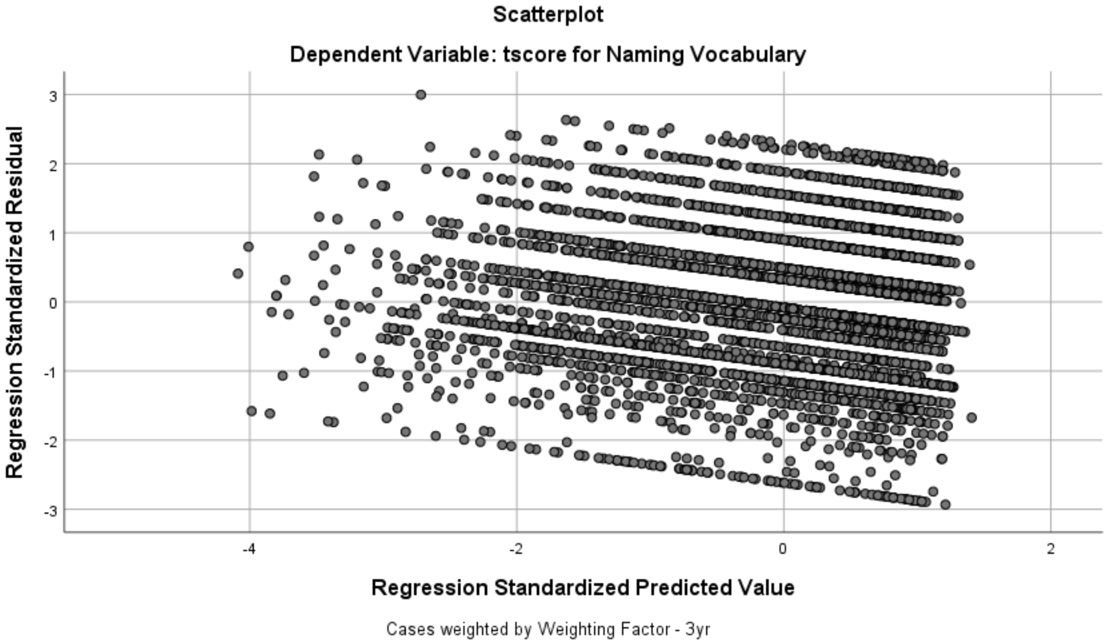
	Zero days	**One day**	**Two days**	**Three days**	**Four days**	**Five days**	**Six days**	**Seven days**
Read	2.3	2.5	5.3	8.8	8.2	10.5	4.7	57.6
ABCs	12.9	7.3	11.9	15.8	11.8	12.7	4.3	23.3
123s	2.5	2.7	6.1	11.5	11.7	15.9	7.3	42.3
Songs	2.5	3.0	5.7	10.2	10.6	14.9	7.0	46.0
Games	6.8	4.8	10.3	14.2	13.2	15.3	6.6	28.8
Paint and draw	1.8	3.2	7.5	12.6	13.2	15.9	8.3	37.6

Appendix B- P-P Plots and Scatter Plots for Cognitive Outcomes Age 3 (GUI)

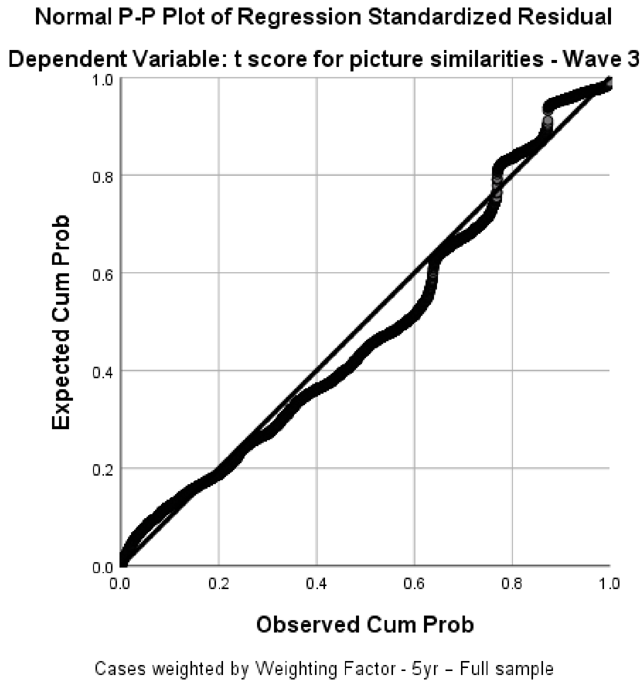


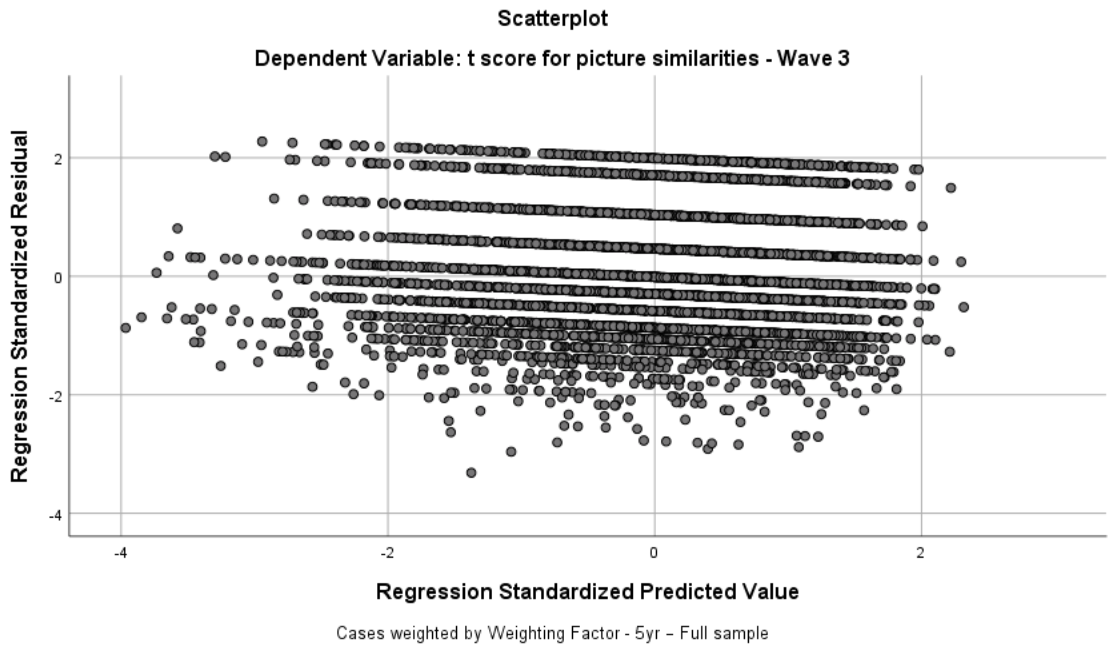


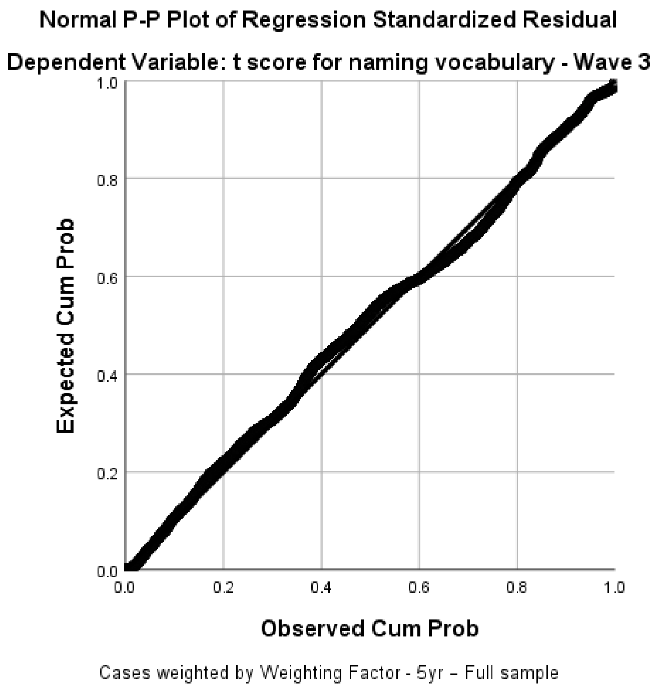

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: tscore for Naming Vocabulary
Expected Cum Prob
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
Observed Cum Prob
Cases weighted by Weighting Factor - 3yr

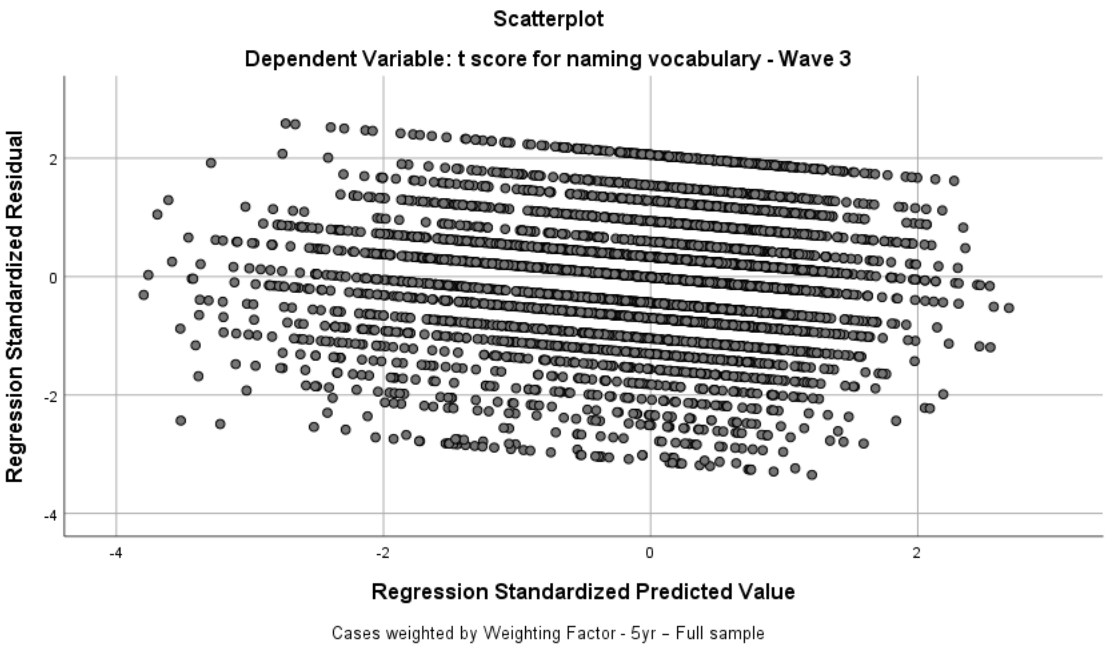

Scatterplot
Dependent Variable: tscore for Naming Vocabulary
Regression Standardized Residual
3
2
1
0
-1
-2
-3
-4
-2
0
2
Regression Standardized Predicted Value
Cases weighted by Weighting Factor - 3yr

Appendix C- P-P Plots and Scatter Plots for Cognitive Outcomes Age 5 (GUI)

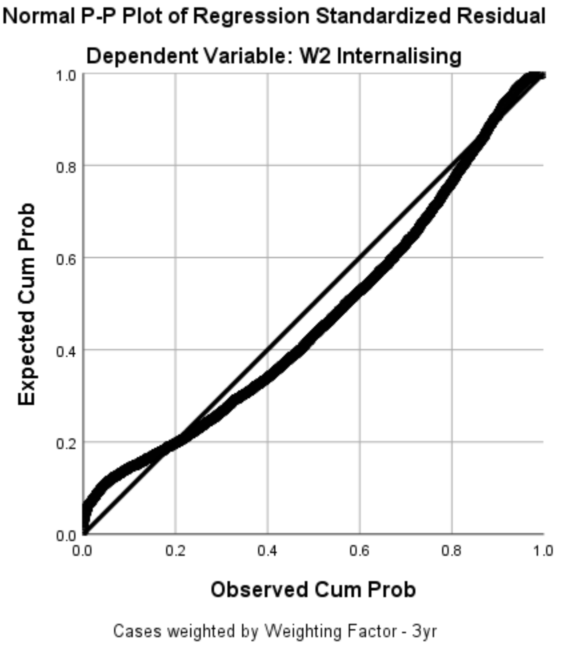


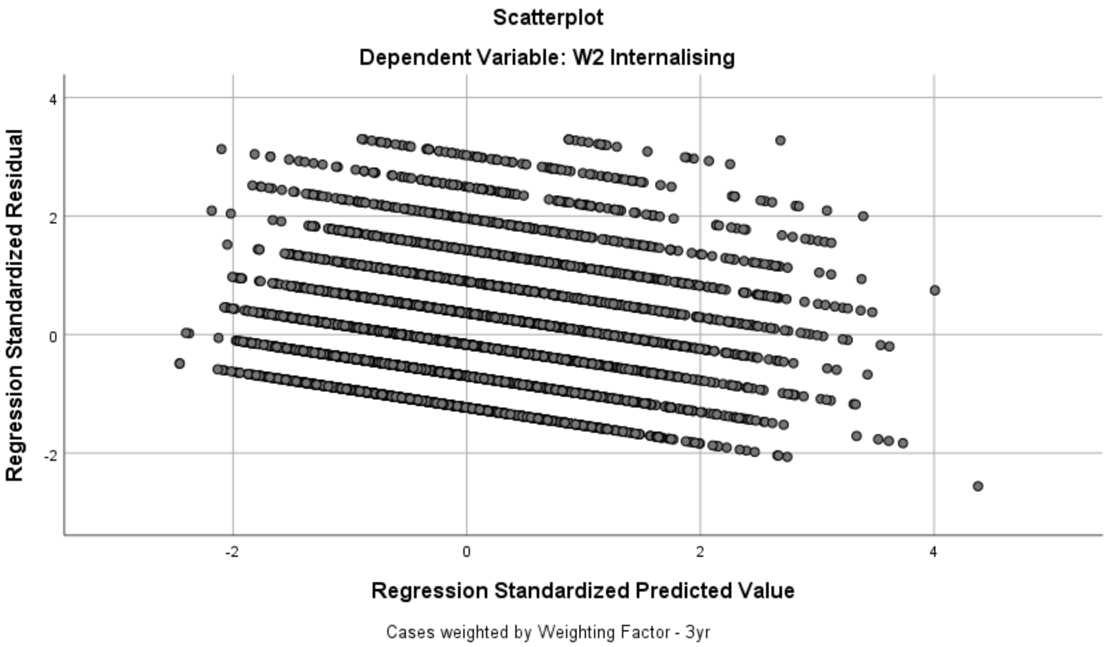


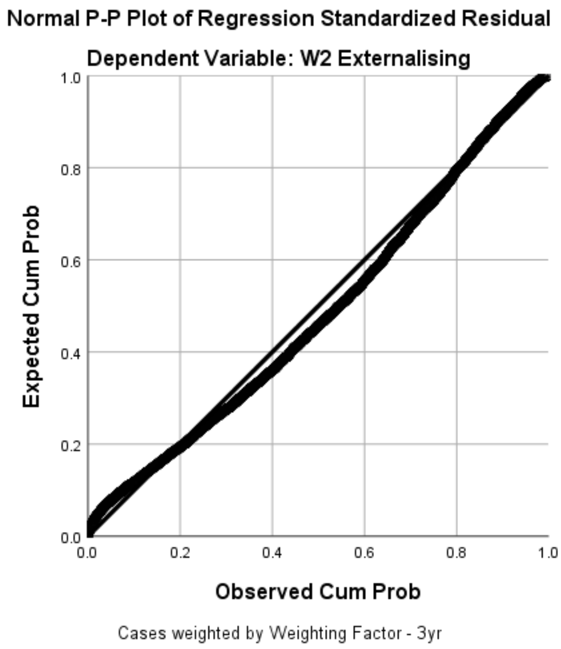

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: t score for naming vocabulary - Wave 3
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0
Cases weighted by Weighting Factor - 5yr – Full sample

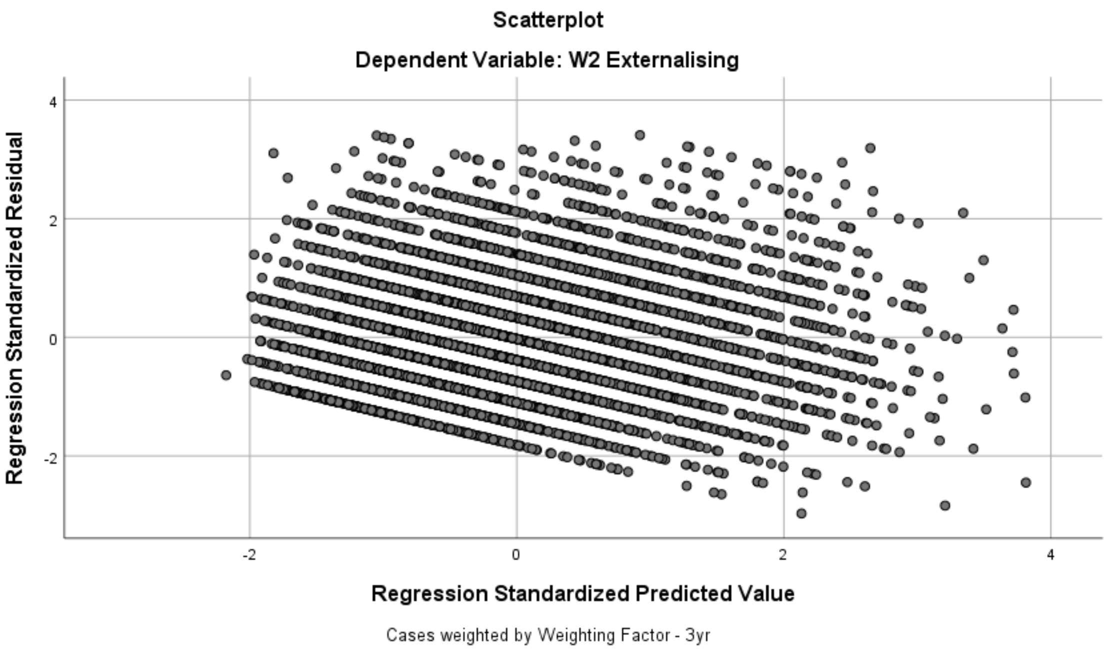

Scatterplot
Dependent Variable: t score for naming vocabulary - Wave 3
Regression Standardized Residual
Regression Standardized Predicted Value
-4
-2
0
2
Cases weighted by Weighting Factor - 5yr – Full sample

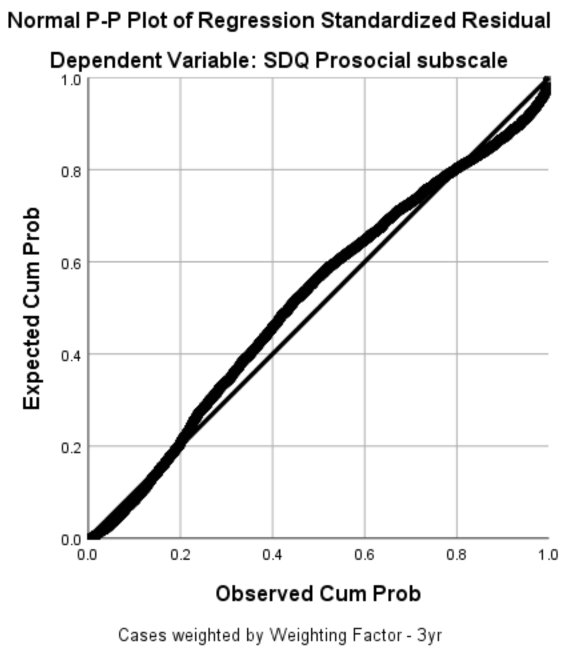
Appendix D- P-P Plots and Scatter Plots for Socioemotional Outcomes Age 3 (GUI)

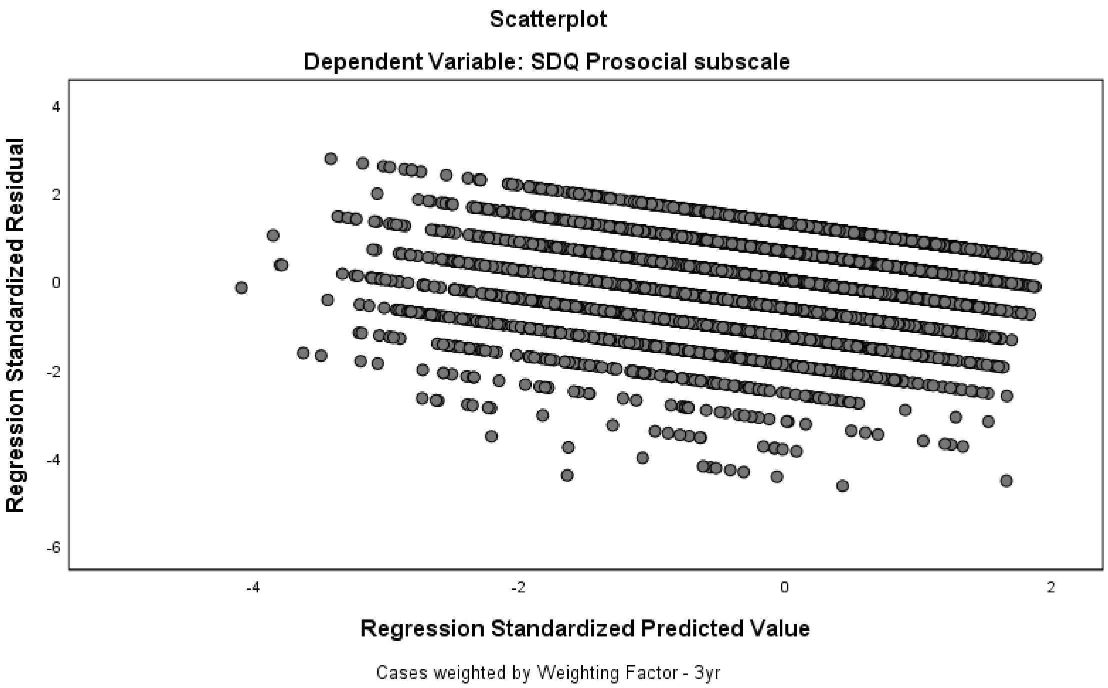




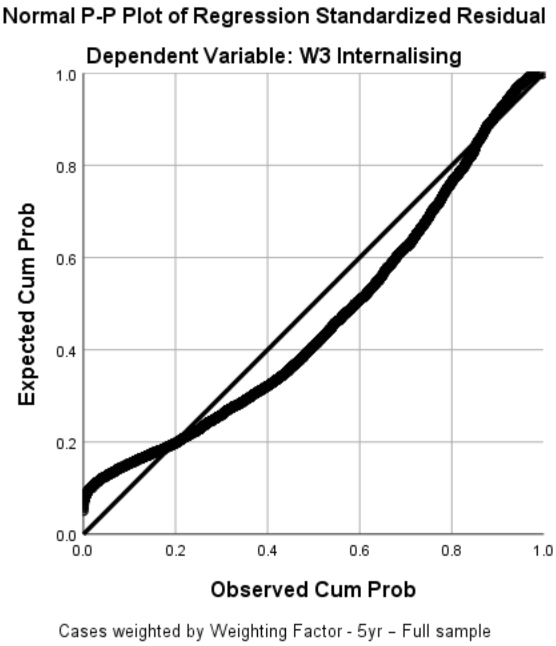

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: W2 Externalising
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0
Cases weighted by Weighting Factor - 3yr

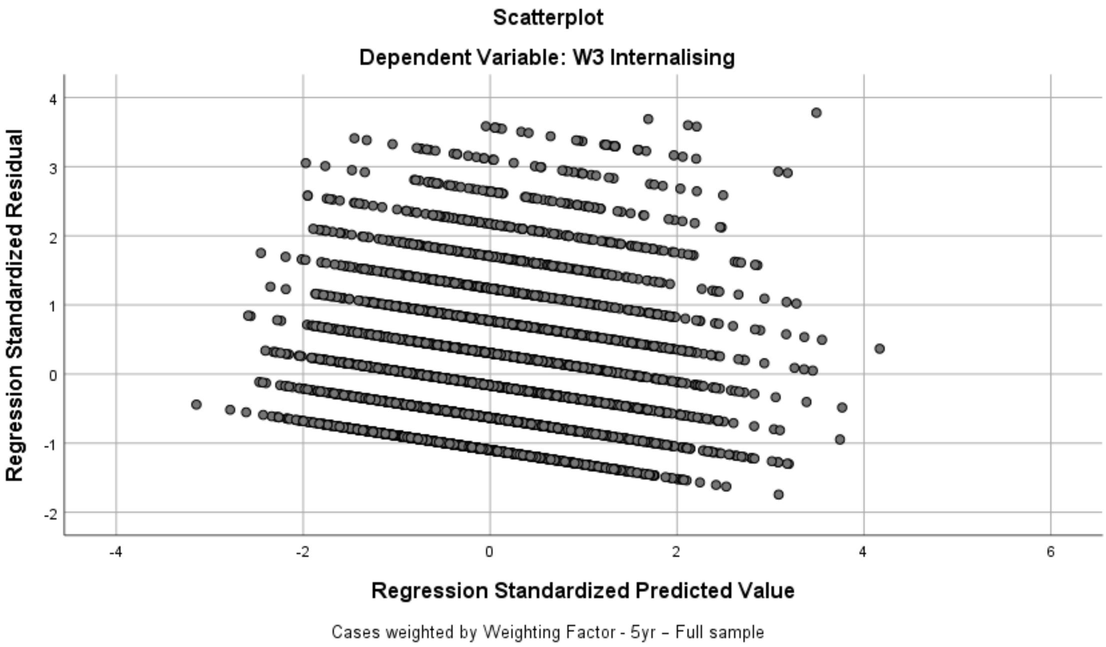

Scatterplot
Dependent Variable: W2 Externalising
Regression Standardized Residual
Regression Standardized Predicted Value
-2
0
2
4
Cases weighted by Weighting Factor - 3yr

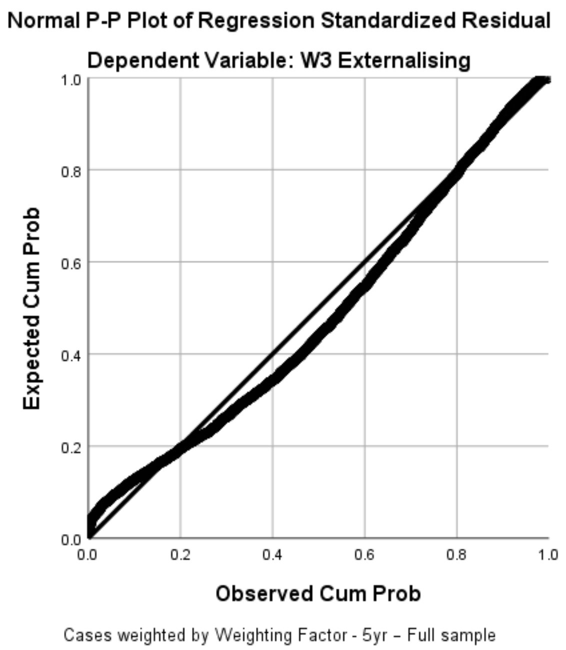

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: SDQ Prosocial subscale
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0
Cases weighted by Weighting Factor - 3yr

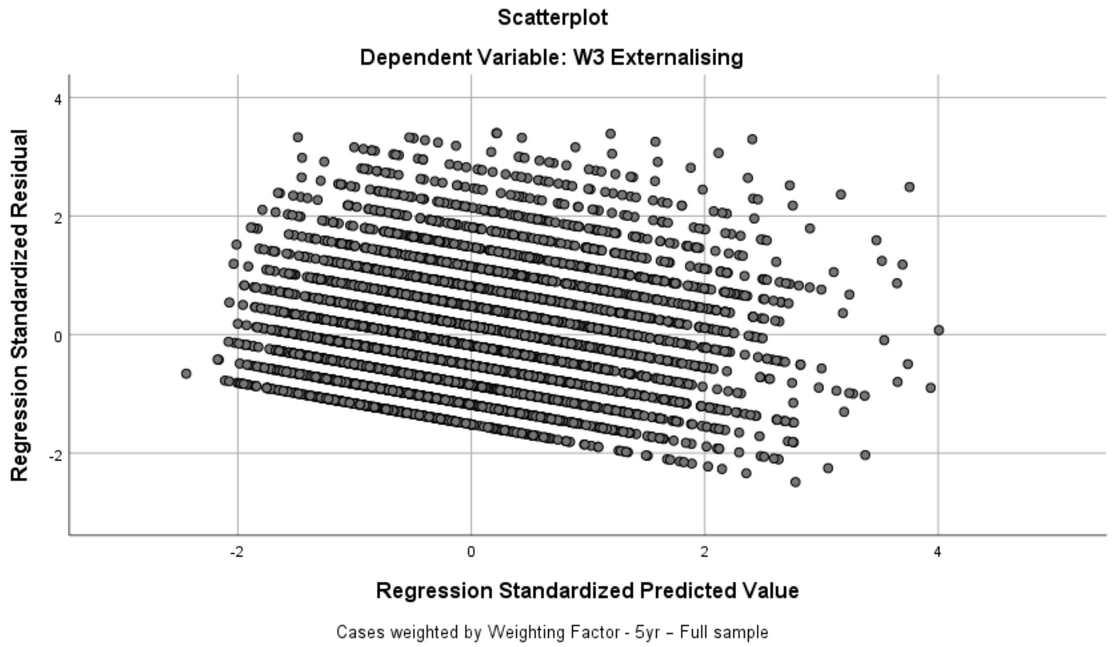

Scatterplot
Dependent Variable: SDQ Prosocial subscale
Regression Standardized Residual
Regression Standardized Predicted Value
4
2
0
-2
-4
-6
Cases weighted by Weighting Factor - 3yr

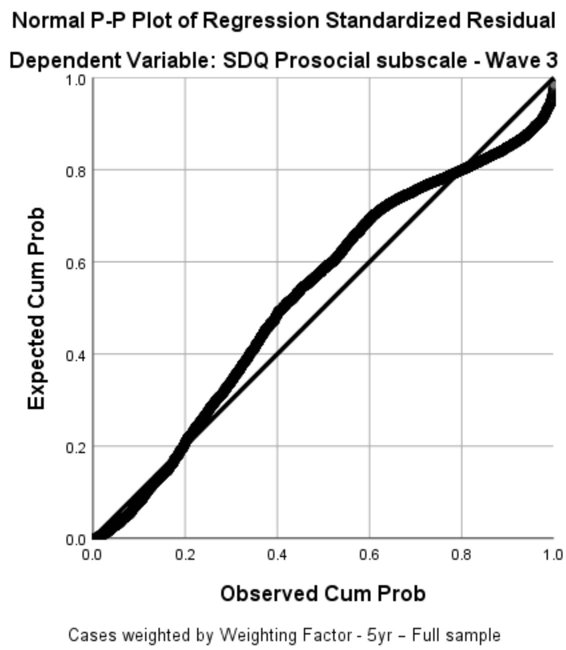
Appendix E- P-P Plots and Scatter Plots for Socioemotional Outcomes Age 5 (GUI)

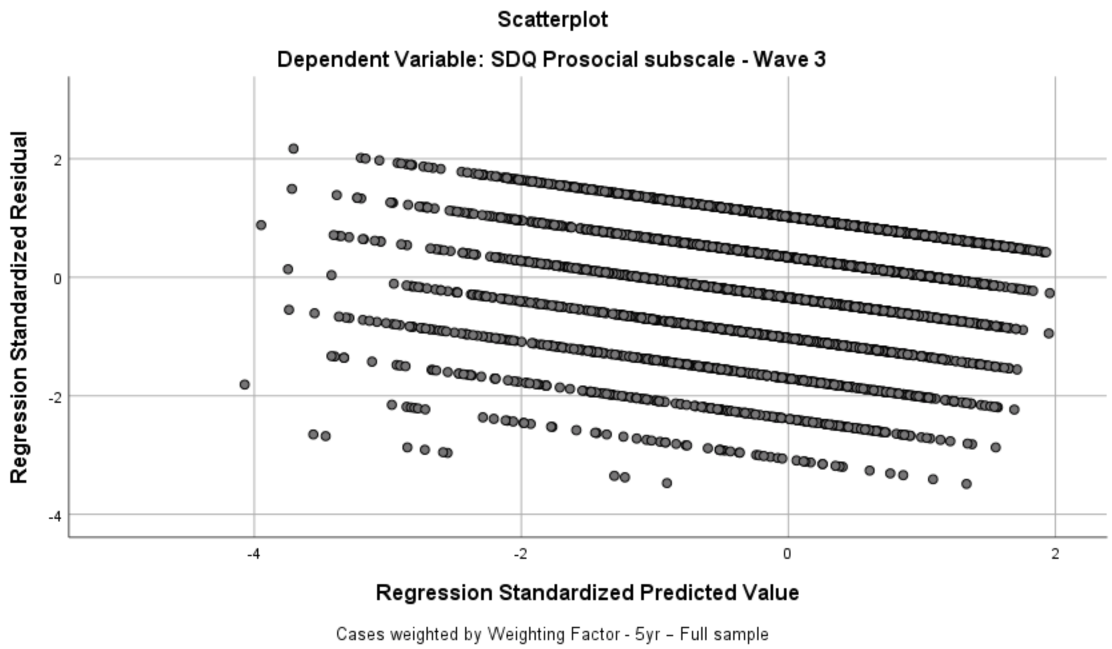





Normal P-P Plot of Regression Standardized Residual
Dependent Variable: W3 Externalising
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0
Cases weighted by Weighting Factor - 5yr – Full sample


Scatterplot
Dependent Variable: W3 Externalising
Regression Standardized Residual
Regression Standardized Predicted Value
-2
0
2
4
Cases weighted by Weighting Factor - 5yr – Full sample


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: SDQ Prosocial subscale - Wave 3
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0
Cases weighted by Weighting Factor - 5yr – Full sample


Scatterplot
Dependent Variable: SDQ Prosocial subscale - Wave 3
Regression Standardized Residual
Regression Standardized Predicted Value
-4
-2
0
2
Cases weighted by Weighting Factor - 5yr – Full sample

Appendix F- Parent Play Belief Scale

Please read each statement listed below and indicate how much you agree or disagree with each sentence about play for your child.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
(1) Play can help my child develop social skills, such as cooperating and making friends.	○	○	○	○	○
(2) Play does not help my child learn academic skills like counting or recognising letters.	○	○	○	○	○
(3) It is important for me to participate in play with my child.	○	○	○	○	○
(4) I have a lot of fun with my child when we play together.	○	○	○	○	○
(5) Play can improve my child's language and communication abilities.	○	○	○	○	○
(6) I teach my child social skills during play.	○	○	○	○	○
(7) Play does not influence my child's ability to solve problems.	○	○	○	○	○
(8) I can help my child learn to control his or her emotions during play.	○	○	○	○	○
(9) Playing at home will help/helped get my child get ready for school/preschool.	○	○	○	○	○
(10) My child will get more out of play if I play with him or her.	○	○	○	○	○
(11) Play can help my child develop better thinking abilities.	○	○	○	○	○

(12) It is more important for my child to have good academic skills than to play well with other children.	○	○	○	○	○
(13) Playtime is not a high priority in my home.	○	○	○	○	○
(14) Playing with my child is one of my favourite things to do.	○	○	○	○	○
(15) If I take time to play with my child, s/he will be better at playing with other children.	○	○	○	○	○
(16) Reading to my child is more worthwhile than playing with him or her.	○	○	○	○	○
(17) I do not think it is very important for other family members to play with my child.	○	○	○	○	○
(18) Play helps my child learn how to express his or her feelings.	○	○	○	○	○
(19) Play is a fun activity for my child.	○	○	○	○	○
(20) Playing together helps me build a good relationship with my child.	○	○	○	○	○
(21) I do not think my child learns important skills by playing.	○	○	○	○	○
(22) My child has a lot of fun when we play together.	○	○	○	○	○
(23) Through play, my child develops new skills and abilities.	○	○	○	○	○
(24) Playing at preschool did/will help my child get ready for school.	○	○	○	○	○

Appendix G- Richness of the Home Play Environment (HPE)

PLEASE READ EACH STATEMENT ABOUT YOUR CHILD'S HOME ENVIRONMENT AND INDICATE HOW CHARACTERISTIC EACH STATEMENT IS OF YOUR HOME.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
(1) There are lots of creative activities going on in our home.	○	○	○	○	○
(2) Our home is an interesting place for my child.	○	○	○	○	○
(3) There are plenty of toys, pictures, and music for my child.	○	○	○	○	○
(4) At home, my child has many natural learning experiences.	○	○	○	○	○
(5) At home, activities are provided that are just right for my child.	○	○	○	○	○

Appendix H– Letter to Principal

Dear Principal,

We wish to invite the parents of junior and senior infant pupils in your school to participate in a research study that is being undertaken by Dr Suzanne Egan and researchers in the Cognition, Development and Learning Research Lab in the Department of Psychology, Mary Immaculate College, Limerick. The survey is interested in the activities that young Irish children (aged 6 years and under) engage in at home, how parent(s) encourage their interest in play and learning and how this may affect child development. If parents wished to participate, they would be asked to respond anonymously to specific questions related to the following areas in a survey:

1. The family's demographics (information about the family)
2. Play and Learning Activities in the Home
3. Play and Learning Interests and Influences
4. Parent Playtime Experiences
5. Supports and Barriers to Play and Learning
6. Child's Attentional Ability
7. Child's Language ability
8. Child's Socio-Emotional development

Parents of pupils in junior and senior infants can volunteer to complete the survey, which will take approximately 20 minutes, in their own time. The Recruitment Letter and the Information Sheet contain additional information for parents about the study.

If you wish for the parents of your pupils to be invited to take part in this study, please contact the researchers to forward you information packs for the parents. This can be sent home to parents in their children's school bags. The information pack will include the Recruitment Letter and Information Sheet attached below, and a paper survey with a debriefing sheet. The pack can also be circulated electronically via email, newsletter, or website using the link below. If the parents wish to participate, they can then follow the link provided in the Recruitment Letter (same link provided below) or complete the paper survey and return it to the school where the researchers can collect the completed surveys.

This research study has received ethical approval from the Mary Immaculate College Research Ethics Committee (MIREC) (A19-027). If you have any queries relating to this study please contact us email via phone (000 123456) or email (xxx@mic.ul.ie; xxx@mic.ul.ie; xxx@mic.ul.ie).

Kind regards,
Dr Suzanne Egan, Chloé Beatty, and Clara Hoyne
Department of Psychology

Appendix I – Recruitment Letter to Parents

Do you have a child aged 6 years or under?
Would you like to participate in a study that looks at your role in your child's learning and play?

Parents are their child's first caregivers and teachers, and therefore play a role in their child's learning and development – especially in the early stage of childhood. As part of the Cognition, Development and Learning Research Lab in the Department of Psychology, Mary Immaculate College, Limerick, we are interested in looking at the activities that young Irish children (aged 6 years and under) engage in at home, both with and without their parent(s), and how parent(s) engage with their children in play and learning.

We have put together a survey that will ask about the activities that you are doing with your child(ren) at home, and some of your own attitudes towards these activities. Ultimately, we are interested in whether these activities and other factors affect your child's thinking and social skills. The survey will take approximately 20 minutes to complete, and will include specific questions related to the following areas:

1. The family's demographics (information about the family)
2. Play and Learning Activities in the Home
3. Play and Learning Interests and Influences
4. Parent Playtime Experiences
5. Supports and Barriers to Play and Learning
6. Child's Attentional ability
7. Child's Language ability
8. Child's socio-emotional development

If you are interested in finding out more about the study please read the attached information sheet, which provides more details about the study and what is involved. If you decide to participate in the research you can complete the survey via an online link (see below), or a paper survey that is also attached. Please ensure to return all surveys, completed or not, back to your child's school to be collected by the researchers.

(Insert link)

This research study has received ethical approval from the Mary Immaculate College Research Ethics Committee (MIREC) (A19-027).
If you have any concerns about this study and wish to contact an independent authority, you may contact
Mary Collins (MIREC Administrator),
Mary Immaculate College.
Telephone: 061-204980, or e-mail: mirec@mic.ul.ie.

King regards,
Dr Suzanne M. Egan, Chloé Beatty, and Clara Hoyne

Appendix J- Debriefing Sheet

Thank you for your participation in the study.

This study investigates the various family factors (e.g., education, attitudes, and employment) that influence the richness of the home environment and act as supports or barriers to play and learning in early childhood. Your contribution will also allow the researchers to explore the association between various types of play in the home and different aspects of child development.
Findings of this survey may help educate other parents on the importance of their role in home learning activities. We hope that the findings may play a role in developing policy and practice on play and learning in the home environment, such as the development of screen use guidelines for young children in Ireland or supports for the promotion of outdoor play.

Thank you again for giving your time to complete this survey.

Suzanne, Clara and Chloé.

Contact details:
Suzanne.Egan@mic.ul.ie (Ph: 061 204333)
Clara.Hoyne@mic.ul.ie
Chloe.Beatty@mic.ul.ie

Appendix K – Recruitment Notice for Online Use

Short Recruitment Notice (e.g., for Twitter):

Do you have a child aged 6 years or under? Would you like to participate in a study that looks at your role in your child's learning and play? To find out more about the research please click on the link below:

(Insert link)

Longer Recruitment Notice (e.g., for webpage or Facebook)

Do you have a child aged 6 years or under? Would you like to participate in a study that looks at your role in your child's learning and play? Researchers in the Cognition, Development and Learning Research Lab in the Department of Psychology in Mary Immaculate College, Limerick, are interested in examining the activities that young Irish children (aged 6 years and under) engage in at home and how parent(s) engage with their children in play and learning. We are hoping to investigate the role of these activities (e.g., screen time, story time and outdoor play) in child development and the factors that support or hinder it.

To find out more about the research please click on the link below:

(Insert link)

Appendix L- The Play and Learning in Early Years (PLEY) Survey

Play and Learning in the Early Years (PLEY) Survey

Thank you for your interest in this study

Purpose of the Research: The current research aims to examine 1) children's activities and interests at home, 2) your opinions on these activities and the factors that act as barriers or supports to play and learning in the home, and 3) its contribution to child development. This project is being undertaken by Dr Suzanne Egan, Clara Hoyne, and Chloé Beatty from the Cognition, Development and Learning Research Lab in MIC. This study has been approved by the Mary Immaculate College Ethics Committee. Before you decide whether or not you wish to participate, it is important for you to understand why this research is being done and what it will involve. Please take the time to read this information carefully. Our contact information is also provided at the end of this information sheet. If you know of other parents that may be interested in taking part in the survey please feel free to share the link.

King regards,

Dr Suzanne M. Egan, Clara Hoyne, and Chloé Beatty
Department of Psychology, Mary Immaculate College

Information Sheet

What is involved: If you decide to participate, the study will involve an anonymous survey that will ask questions about your family, your child's activities and interests in the home and your involvement in, and opinion of, these activities. This will be followed by questions about your child's development related to how focused they are on particular tasks, their language and how they get on with other people. It is anticipated that the survey will take approximately 15 minutes to complete.

Do I have to take part? You are free to decide whether you wish to take part in this research or not. If you do decide to partake in the survey, you will be asked to indicate your consent after reading through the following short Consent Form. You are free to withdraw from this study at any time and without giving reasons. Your decision to take part in this study will have no impact on your child's marks or assessments in school.

What are the benefits of this research? The aim of this study is to find out more about the home lives of young children and the factors that can support their development. This information can be very helpful for developmental researchers, policy makers and practitioners.

How will information about me and my family be used, and who will have access to it? The data collected on the surveys will be added to the other participants' data, so as to make inferences about general home practices (rather than any individual). Your responses on the survey will be anonymous and will remain confidential. The data will be stored on a password protected computer at all times.

Findings from the research may be presented at conferences or published in academic journals and the data may be archived for use in future studies by the Cognition Development and Learning Lab, to build upon the current questions we have asked in this study. This is to ensure that new knowledge gained from the data is shared with others.

What if I have a question? If you have a query about any aspect of the study or the information outlined here, please get in touch with the researchers:
Dr Suzanne Egan at 061 204333 or xxx@mic.ul.ie;
Clara Hoyne at xxx@mic.ul.ie;
Chloé Beatty at xxx@mic.ul.ie

This research study has received ethical approval from the Mary Immaculate College Research Ethics Committee (MIREC, A19-027).
If you have any concerns about this study and wish to contact someone independent, you may contact:
Mary Collins (MIREC Administrator),
Mary Immaculate College.
Telephone: 061-204980, or e-mail: mirec@mic.ul.ie.

Consent Form

If you wish to participate in this study, please read the following statements:

- I agree to take part in this study

- I confirm that I have read and understand the information sheet for this study, and have had the opportunity to ask questions about the study

- I understand that my participation is voluntary and that I am free to withdraw, and request that my data be removed from the study, at any time

- I understand that data collected about me during this study will be stored anonymously

- I agree to allow the data collected to be used for presentation and publication purposes, and for future research projects.

DEMOGRAPHIC QUESTIONNAIRE

Q1 Your age:

____

Q2 Your gender:

- ○ Male
- ○ Female
- ○ Other

Q3 Your relationship to child:

- ○ Mother
- ○ Father
- ○ Other (Please State): ________________________________

Q4 Gender of child:

- ○ Male
- ○ Female
- ○ Other

Q5 Age of child (In years and months, e.g., 4 years and 5 months):

____

Q6 Does your child have siblings?

- ○ Yes
- ○ No

Q7 What position is the child in the family?

- ○ Eldest
- ○ Middle
- ○ Youngest
- ○ Only Child

Q8 Was your child ever breastfed?

- ○ Yes
- ○ No
- ○ Unsure

Q9 What is the child's primary caregiver's highest education attainment?

- ○ No formal education
- ○ Primary education
- ○ Lower secondary
- ○ Upper secondary
- ○ Technical/Vocational
- ○ Certificate/Diploma
- ○ Bachelor's degree
- ○ Postgraduate degree
- ○ Doctorate

Q9a What is the child's secondary caregiver's highest education attainment (if secondary caregiver is living in the home)?

- ○ No formal education
- ○ Primary education
- ○ Lower secondary
- ○ Upper secondary
- ○ Technical/Vocational
- ○ Certificate/Diploma
- ○ Bachelor's degree
- ○ Postgraduate degree
- ○ Doctorate

Q10 Which of these descriptions best describes the child primary caregiver's usual situation with regards to work?

- ○ Working full time
- ○ Working part time
- ○ Unemployed
- ○ On Leave
- ○ Home duties/looking after family

- Student/Training
- Other

Q10a Which of these descriptions best describes the child's secondary caregiver's usual situation with regards to work (if secondary caregiver is living in the home)?

- Working full time
- Working part time
- Unemployed
- On Leave
- Home duties/looking after family
- Student/Training
- Other

Q11 In which country do you currently reside?

<u>PLAY AND LEARNING ACTIVITIES QUESTIONNAIRE</u>

Q12 **PLEASE INDICATE HOW OFTEN <u>YOUR CHILD ENGAGES</u> IN THE FOLLOWING ACTIVITIES**:

	Never	Hardly Ever	Occasionally	1 - 2 days per week	3-6 days per week	Everyday
Play with toys and games (1)	○	○	○	○	○	○
Play with puzzles and jigsaws (2)	○	○	○	○	○	○
Play using blocks or Lego or building materials (3)	○	○	○	○	○	○
Play entertainment games on a screen device (PC/Xbox/Smartphones/iPads/TV) (4)	○	○	○	○	○	○
Play educational games on a screen device (PC/Xbox/Smartphones/iPads/TV) (5)	○	○	○	○	○	○
Watch entertainment TV/Videos on any screen device (6)	○	○	○	○	○	○
Watch educational TV/Videos on any screen device (7)	○	○	○	○	○	○
Video calls or messaging (e.g., Skype/WhatsApp) (8)	○	○	○	○	○	○
Use a screen device for any other activity (9)	○	○	○	○	○	○
Visit the library (10)	○	○	○	○	○	○
Read (11)	○	○	○	○	○	○
Play sports or physical activities (12)	○	○	○	○	○	○
Play "make believe" or pretend games (13)	○	○	○	○	○	○
Paint, draw, play with slime/play-doh/make models (14)	○	○	○	○	○	○

Enjoy dance, movement, listens to music (15)	○	○	○	○	○	○
Climb on trees/climbing frames/wall bars/etc. (16)	○	○	○	○	○	○
Play with a ball (17)	○	○	○	○	○	○
Play chasing or running games (18)	○	○	○	○	○	○
Ride a bike/tricycle/scooter (19)	○	○	○	○	○	○
Skate (20)	○	○	○	○	○	○
Play on a trampoline (21)	○	○	○	○	○	○
Play outside (22)	○	○	○	○	○	○
Visit a playground (23)	○	○	○	○	○	○
Do everyday activities (cooking/caring for a pet) (24)	○	○	○	○	○	○
Play letter or alphabet learning activities (25)	○	○	○	○	○	○
Play number and shape learning activities (26)	○	○	○	○	○	○
Go on a play date (27)	○	○	○	○	○	○

Q12a **NOW PLEASE INDICATE HOW OFTEN YOU ENGAGE WITH YOUR CHILD IN THE FOLLOWING ACTIVITIES**:

	Never	Hardly Ever	Occasionally	1 - 2 days per week	3-6 days per week	Everyday
Play with toys and games (1)	○	○	○	○	○	○
Play with puzzles and jigsaws (2)	○	○	○	○	○	○
Play using blocks or Lego or building materials (3)	○	○	○	○	○	○

Play entertainment games on a screen device (PC/Xbox/Smartphones/iPads/TV) (4)	○	○	○	○	○	○
Play educational games on a screen device (PC/Xbox/Smartphones/iPads/TV) (5)	○	○	○	○	○	○
Watch entertainment TV/Videos on any screen device (6)	○	○	○	○	○	○
Watch educational TV/Videos on any screen device (7)	○	○	○	○	○	○
Video calls or messaging (e.g., Skype/WhatsApp) (8)	○	○	○	○	○	○
Use a screen device for any other activity (9)	○	○	○	○	○	○
Visit the library (10)	○	○	○	○	○	○
Read to your child (11)	○	○	○	○	○	○
Listen to your child read (if applicable) (12)	○	○	○	○	○	○
Play sports or physical activities (13)	○	○	○	○	○	○
Play "make believe" or pretend games (14)	○	○	○	○	○	○
Paint, draw, play with slime/play-doh/make models (15)	○	○	○	○	○	○
Enjoy dance, movement, listens to music (16)	○	○	○	○	○	○
Climb on trees/climbing frames/wall bars/etc. (17)	○	○	○	○	○	○
Play with a ball (18)	○	○	○	○	○	○
Play chasing or running games (19)	○	○	○	○	○	○
Ride a bike/tricycle/scooter (20)	○	○	○	○	○	○
Skate (21)	○	○	○	○	○	○

Play on a trampoline (22)	○	○	○	○	○	○
Play outside (23)	○	○	○	○	○	○
Visit a playground (24)	○	○	○	○	○	○
Do everyday activities (cooking/caring for a pet) (25)	○	○	○	○	○	○
Play letter or alphabet learning activities (26)	○	○	○	○	○	○
Play number and shape learning activities (27)	○	○	○	○	○	○
Go on a play date (28)	○	○	○	○	○	○

Q13 **OVERALL, HOW MUCH TIME WOULD YOUR CHILD SPEND ON THE FOLLOWING ACTIVITIES ON <u>AN AVERAGE WEEKDAY</u>?**

	0 minutes	1 - 30 minutes	31 - 60 minutes	61 - 90 minutes	91 - 120 minutes	2 to 3 hours	More than 3 hours
On screen time (Computer/TV/games/tablets/smartphone) (1)	○	○	○	○	○	○	○
Playing outdoors (2)	○	○	○	○	○	○	○
Reading or story time (3)	○	○	○	○	○	○	○
Playing with games and toys (4)	○	○	○	○	○	○	○

Q13a **OVERALL, HOW MUCH TIME WOULD YOUR CHILD SPEND ON THE FOLLOWING ACTIVITIES ON <u>AN AVERAGE WEEKEND DAY</u>?**

	0 minutes	1 - 30 minutes (2)	31 - 60 minutes (3)	61 - 90 minutes (4)	91 - 120 minutes (5)	2 to 3 hours (6)	More than 3 hours (7)

On screen time (Computer/TV/games/tablets/smartphone) (1)	○	○	○	○	○	○	○
Playing outdoors (2)	○	○	○	○	○	○	○
Reading or story time (3)	○	○	○	○	○	○	○
Playing with games and toys (4)	○	○	○	○	○	○	○

Q14 **HOW MANY CHILDREN'S BOOKS DOES YOUR CHILD HAVE?**

○ 0-10

○ 11-20

○ 21-30

○ More than 30

Q15 ***DOES YOUR CHILD EVER PLAY WITH OR USE ANY OF THE FOLLOWING DEVICES****?*

	Yes, they have their own	Yes, they use a parent's or sibling's	No
TV	○	○	○
Computer/Laptop	○	○	○
Tablet	○	○	○
Smartphone	○	○	○
Handheld console (e.g. Nintendo DS/PSP)	○	○	○
Game console (e.g. PlayStation/Xbox)	○	○	○

Q16 WHAT SCREEN ACTIVITY DOES YOUR CHILD <u>MOSTLY</u> ENGAGE IN?

○ Entertainment games (e.g. video games)

○ Educational games

○ Watching entertainment TV/Videos on any screen device

○ Watching educational TV/Videos on any screen device

○ Video calls or messaging (e.g. Skype/WhatsApp)

○ E-books

○ Mix of all activities

○ Other

Q16A WHAT SCREEN DEVICE DO THEY MOSTLY USE FOR THIS SCREEN ACTIVITY?

○ Computer/Laptop

○ Tablet/Smartphone

○ TV

○ Handheld/Game console

○ Mix of all devices

○ Other

PLAY AND LEARNING INTERESTS AND INFLUENCES QUESTIONNAIRE

Q17 ***REGARDING THE CHILD'S INTERESTS AND THE TYPES OF GAMES THEY LIKE TO PLAY, BOOKS THEY LIKE TO READ OR PROGRAMMES THEY LIKE TO WATCH - WHO, IF ANYONE, IS YOUR CHILD MOSTLY INFLUENCED BY FOR THE FOLLOWING ACTIVITIES?***

	Their own interest	Your interests	Other parent's interests	Siblings	School or preschool friends	Neighbourhood children	Other	N/A
Reading (1)	○	○	○	○	○	○	○	○
Special interest books (2)	○	○	○	○	○	○	○	○
Board games (3)	○	○	○	○	○	○	○	○
TV/Movies (4)	○	○	○	○	○	○	○	○

Outdoor games/play (5)	○	○	○	○	○	○	○	○
Computer or other screen games (6)	○	○	○	○	○	○	○	○

Q18 ***PLEASE READ THE LIST OF ACTIVITIES AND FOR EACH ONE INDICATE <u>WHO MOSTLY SUGGESTS OR INITIATES THE ACTIVITIES</u> (THE CHILD OR AN ADULT E.G. YOU OR OTHER CAREGIVERS). IF YOUR CHILD NEVER ENGAGES IN THE ACTIVITY, PLEASE SELECT 'NOT APPLICABLE (N/A)'.***

	Mostly me or other adult	Mostly child	Both equally	Part of routine	N/A
Suggests reading or story time (1)	○	○	○	○	○
Suggests learning about something new s/he has heard about (2)	○	○	○	○	○
Suggests games/toys to play with (3)	○	○	○	○	○
Suggests playing outdoors (4)	○	○	○	○	○
Watching educational TV/Videos (5)	○	○	○	○	○
Watching entertainment TV/Videos (6)	○	○	○	○	○
Playing educational on-screen games (PC/Xbox/tablet/smartphone) (7)	○	○	○	○	○
Playing entertainment on-screen games (PC/Xbox/tablet/smartphone) (8)	○	○	○	○	○
Any other activity on a screen (9)	○	○	○	○	○
Playing with arts and crafts material (10)	○	○	○	○	○
Playing with other children (siblings/friends) (11)	○	○	○	○	○

Q18A PLEASE READ THE LIST OF ACTIVITIES AND FOR EACH ONE INDICATE <u>WHO NORMALLY STOPS THE ACTIVITY</u> OR BRINGS IT TO AN END. IF YOUR CHILD NEVER ENGAGES IN THE ACTIVITY, PLEASE SELECT 'NOT APPLICABLE (N/A)'.

	Mostly me or other adult	Mostly child	Both equally	Ends naturally	N/A
Reading or story time (1)	○	○	○	○	○
Learning about something new s/he has heard about (2)	○	○	○	○	○
Games/toys to play with (3)	○	○	○	○	○
Playing outdoors (4)	○	○	○	○	○
Watching educational TV/Videos (5)	○	○	○	○	○
Watching entertainment TV/Videos (6)	○	○	○	○	○
Playing educational on-screen games (PC/Xbox/tablet/smartphone) (7)	○	○	○	○	○
Playing entertainment on-screen games (PC/Xbox/tablet/smartphone) (8)	○	○	○	○	○
Any other activity on a screen (9)	○	○	○	○	○
Playing with arts and crafts material (10)	○	○	○	○	○
Playing with other children (siblings/friends) (11)	○	○	○	○	○

PARENT PLAY BELIEFS SCALE

Q19 **Please read each statement listed below and indicate how much you agree or disagree with each sentence about play for your child.**

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Play can help my child develop social skills, such as cooperating and making friends. (1)	○	○	○	○	○
Play does not help my child learn academic skills like counting or recognising letters. (2)	○	○	○	○	○
It is important for me to participate in play with my child. (3)	○	○	○	○	○
I have a lot of fun with my child when we play together. (4)	○	○	○	○	○
Play can improve my child's language and communication abilities. (5)	○	○	○	○	○
I can teach my child social skills during play. (7)	○	○	○	○	○
Play does not influence my child's ability to solve problems. (8)	○	○	○	○	○
I can help my child learn to control his or her emotions during play. (9)	○	○	○	○	○

Playing at home will help/helped get my child get ready for school/preschool. (10)	○	○	○	○	○
My child will get more out of play if I play with him or her. (11)	○	○	○	○	○
Play can help my child develop better thinking abilities. (12)	○	○	○	○	○
It is more important for my child to have good academic skills than to play well with other children. (13)	○	○	○	○	○
Playtime is not a high priority in my home. (14)	○	○	○	○	○
Playing with my child is one of my favourite things to do. (15)	○	○	○	○	○
If I take time to play with my child, s/he will be better at playing with other children. (16)	○	○	○	○	○
Reading to my child is more worthwhile than playing with him or her. (17)	○	○	○	○	○
My child does not enjoy playing with me. (18)	○	○	○	○	○
I do not think it is very important for other family members to play	○	○	○	○	○

with my child. (19)					
My child will learn more if I allow him or her to play without me. (20)	○	○	○	○	○
Play helps my child learn how to express his or her feelings. (21)	○	○	○	○	○
Playing with my child is more useful than teaching letters and numbers. (22)	○	○	○	○	○
Play is a fun activity for my child. (23)	○	○	○	○	○
Playing together helps me build a good relationship with my child. (24)	○	○	○	○	○
I do not think my child learns important skills by playing. (25)	○	○	○	○	○
My child does not need my help to deal with his or her emotions during play. (26)	○	○	○	○	○
My child gets too excited during play. (27)	○	○	○	○	○
My child has a lot of fun when we play together. (28)	○	○	○	○	○
Through play, my child develops new skills and abilities. (29)	○	○	○	○	○

Playing at preschool did/will help my child get ready for school. (30)	○	○	○	○	○
Learning academic skills at preschool did/will help my child get ready for school (31)	○	○	○	○	○
Watching TV supports my child's learning. (32)	○	○	○	○	○
Playing games on a screen device supports my child's learning. (33)	○	○	○	○	○
By playing outdoors my child develops new skills and abilities. (34)	○	○	○	○	○

<u>RICH ACTIVITIES AND ENVIRONMENT SCALE</u>

Q20 PLEASE READ EACH STATEMENT ABOUT YOUR CHILD'S HOME ENVIRONMENT AND INDICATE HOW CHARACTERISTIC EACH STATEMENT IS OF YOUR HOME.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
There are lots of creative activities going on in our home. (1)	○	○	○	○	○
My screen time interferes with interactions	○	○	○	○	○

with my child. (2)					
Our home is an interesting place for my child. (3)	○	○	○	○	○
There are plenty of books for my child. (4)	○	○	○	○	○
There are plenty of toys, pictures, and music for my child. (5)	○	○	○	○	○
At home, there are rules about screen use for my child. (6)	○	○	○	○	○
At home, my child has many natural learning experiences. (7)	○	○	○	○	○
At home, activities are provided that are just right for my child. (8)	○	○	○	○	○
My child gets a lot of individual attention. (9)	○	○	○	○	○
I talk to my child about everyday activities. (10)	○	○	○	○	○
I use play activities as educational	○	○	○	○	○

experiences. (11)	

Q21 PLEASE INDICATE HOW MUCH YOU AGREE OR DISAGREE WITH THE FOLLOWING STATEMENTS ABOUT YOUR NEIGHBOURHOOD AND OTHER FACTORS THAT MAY SUPPORT OR LIMIT YOUR CHILD'S PLAYTIME:

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
This is a safe neighbourhood (1)	○	○	○	○	○
There are good parks, playgrounds and play spaces (2)	○	○	○	○	○
The state of footpaths, roads and street lighting is good (3)	○	○	○	○	○
There is heavy traffic on my street or road (4)	○	○	○	○	○
It is safe for children to play outside during the day (5)	○	○	○	○	○
Most people in my neighbourhood can be trusted (6)	○	○	○	○	○
There is rubbish and litter lying about (7)	○	○	○	○	○
Homes and gardens are in bad condition (8)	○	○	○	○	○

This is a good neighbourhood to bring up children (9)	○	○	○	○	○
Organised sports activities and clubs encourage my child outdoors (10)	○	○	○	○	○
Homework limits the amount of free play time my child has (11)	○	○	○	○	○
My child prefers to play indoors than outdoors (12)	○	○	○	○	○
There are other children outside to play with (13)	○	○	○	○	○
Scheduled lessons & clubs limit the amount of free play time my child has (14)	○	○	○	○	○
My child has access to outdoor play equipment (e.g., trampoline, bike, etc) (15)	○	○	○	○	○
Bad weather prevents my child from playing outdoors (16)	○	○	○	○	○
My child is in childcare and we get home very late (17)	○	○	○	○	○

My child prefers screen time or TV to other types of play (18)	○	○	○	○	○
My child has very little access to toys and games (19)	○	○	○	○	○
My child prefers to play with other children rather than alone (20)	○	○	○	○	○
My child does not like books or story time (21)	○	○	○	○	○
Our family enjoys books and reading (26)	○	○	○	○	○
TV programmes encourage my child to play particular games (22)	○	○	○	○	○
My child has a garden to play in (23)	○	○	○	○	○
Our family enjoys being outdoors (24)	○	○	○	○	○

ATTENTIONAL FOCUSING SUBSCALE

Q22 **THE FOLLOWING ARE STATEMENTS THAT DESCRIBE CHILDREN'S REACTIONS TO A NUMBER OF SITUATIONS. WE WOULD LIKE YOU TO TELL US WHAT YOUR CHILD'S REACTION IS LIKELY TO BE IN THOSE SITUATIONS. THERE ARE OF COURSE NO "CORRECT" WAYS OF REACTING; CHILDREN DIFFER WIDELY IN THEIR REACTIONS, AND IT IS THESE DIFFERENCES WE ARE TRYING TO LEARN ABOUT. PLEASE READ EACH STATEMENT AND DECIDE WHETHER IT IS A "TRUE" OR**

"UNTRUE" DESCRIPTION OF YOUR CHILD'S REACTION WITHIN THE PAST SIX MONTHS.

	Extremely untrue	Slightly untrue	Neither untrue or true	Slightly true	Extremely true
When picking up toys or other jobs, usually keeps at the task until it's done. (1)	○	○	○	○	○
When practicing an activity, has a hard time keeping her/his mind on it. (2)	○	○	○	○	○
Will move from one task to another without completing any of them. (3)	○	○	○	○	○
When drawing or colouring in a book, shows strong concentration. (4)	○	○	○	○	○
When building or putting something together, becomes very involved in what s/he is doing, and works for long periods. (5)	○	○	○	○	○
Has difficulty leaving a project s/he has begun. (6)	○	○	○	○	○
Is easily distracted	○	○	○	○	○

when listening to a story. (7)					
Sometimes becomes absorbed in a picture book and looks at it for a long time. (8)	○	○	○	○	○
Has a hard time concentrating on an activity when there are distracting noises. (9)	○	○	○	○	○

LANGUAGE SCALE

Q23 THE FOLLOWING FOUR QUESTIONS ASK ABOUT YOUR CHILD'S USE OF LANGUAGE. THERE ARE NO "CORRECT" ANSWERS HERE AS CHILDREN LEARN LANGUAGE IN THE DIFFERENT WAYS. PLEASE READ THE FOLLOWING QUESTIONS AND ANSWER AS BEST YOU CAN BY TICKING YOUR RESPONSE.

1.Compared with other children of the same age, how do you think that your child expresses him/herself?

- Not very well
- A little less well
- The same
- Very good/better/one of the best

Q23a 2. Compared with other children of the same age, how do you think your child pronounces words?

- Not very clearly
- Sometimes not clear
- Same
- Very clear, one of the best

Q23b 3.Compared with other children of the same age, does your child have difficulty producing correct sentences?

- A lot of difficulties
- Some difficulties
- Same
- No difficulties, maybe better

Q23c 4.Is it easy for your family or friends to have a conversation with your child?

- No, very hard
- Sometimes not easy
- Easy enough
- Very easy

STRENGTHS AND DIFFICULTIES QUESTIONNAIRE

Q24 **Listed below is a set of statements which could be used to describe your child's behaviour. For each item, please indicate how true the statement is of your child. It would help us if you answered all items as best you can even if you are not absolutely certain. Please give answers on the basis of the child's behaviour over the last six months.**

	Not True (1)	Somewhat True (2)	Certainly True (3)

Considerate of other people's feelings (1)	○	○	○
Restless, overactive, cannot stay still for long (2)	○	○	○
Often complains of headaches, stomach-aches or sickness (3)	○	○	○
Shares readily with other children (treats, toys, pencils etc.) (4)	○	○	○
Often has temper tantrums or hot tempers (5)	○	○	○
Rather solitary, tends to play alone (6)	○	○	○
Generally obedient, usually does what adults request (7)	○	○	○
Many worries, often seems worried (8)	○	○	○
Helpful if someone is hurt, upset or feeling ill (9)	○	○	○
Constantly fidgeting or squirming (10)	○	○	○
Has at least one good friend (11)	○	○	○
Often fights with other children or bullies them (12)	○	○	○
Often unhappy, down-hearted or tearful (13)	○	○	○
Generally liked by other children (14)	○	○	○
Easily distracted, concentration wanders (15)	○	○	○
Nervous or clingy in new situations, easily loses confidence (16)	○	○	○
Kind to younger children (17)	○	○	○
Often argumentative with adults (18)	○	○	○
Picked on or bullied by other children (19)	○	○	○

Often volunteers to help others (parents, teachers, other children) (20)	○	○	○
Can stop and think things out before acting (21)	○	○	○
Can be spiteful to others (22)	○	○	○
Gets on better with adults than with other children (23)	○	○	○
Many fears, easily scared (24)	○	○	○
Sees tasks through to the end, good attention span (25)	○	○	○

*****Before ending the survey on the next page, please note the data you have provided will be stored anonymously. However, should you wish, you may create a four-digit ID number (e.g., last four digits of a phone number or any other number of your choosing) so that you can withdraw your data from the study at any future time by contacting the researchers. You can enter this four-digit number below. Only you will know the four-digit code that you have used and the researchers will not be able to identify you from this code, other than to remove your data at a later point should you choose to do so.***

Appendix M – Study 5- Means Scores and Correlations by age for Parent versus Child Engagement in Activities.

Descriptive statistics were run between child and parent engagement in activities. Pearson product-moment correlations were also conducted across the age groups between child and parent engagement in each of the target activities. As expected, correlations between parent and child engagement in each of the activities were higher when children were aged under three with a gradual decrease as the child got older. All of the correlations were significant, with the exception of parent versus child engagement in play with toys and game when the child was aged 3 to 4. See Table below.

Means scores and Correlations by age for Parent v Child Engagement in activities

Activity	**Who engages?/ Correlation**	**Under 3**	**Age 3-4**	**Age 5-6**
	Parent	5.53	5.61	5.5
Read	Child	5.38	5.51	5.46
	Correlation	.67**	.64**	.48**
	Parent	3.14	3.41	3.63
ABC's	Child	3.26	3.90	4.04
	Correlation	.85**	.77**	.65**
	Parent	3.88	3.52	3.52
123's	Child	4.17	4.03	3.88
	Correlation	.82**	.71**	.63**
	Parent	5.42	4.82	4.07
Toys/Games	Child	5.88	5.89	5.75
	Correlation	.47**	.11	.33**
	Parent	3.86	3.97	3.42
Jigsaws/Puzzles	Child	4.18	4.40	3.96
	Correlation	.82**	.70**	.65**
	Parent	3.74	3.88	3.59
Paint/Draw	Child	4.44	4.92	4.99
	Correlation	.70**	.53**	.39**

* significant at .05 level (2-tailed), ** significant at .01 level (2-tailed).

Appendix N-Study 5 - Hierarchical Regressions Analysis predicting Parent's Play Beliefs, Quality of Home Environment and Frequency of Parental Engagement in Play

	Play Support Block 1 (β)
Predictor Variable:	
Maternal Education	.061
Parent Age	.000
Child Age	-.083
F	.898
R^2	.011
R^2 △	.011
Total R^2 adjusted	-.001

* *p* < .05, ***p* < .01, *** p < .001

	Academic Focus Block 1 (β)
Predictor Variable:	
Maternal Education	-.189**
Parent Age	-.033
Child Age	.153*
F	5.37
R^2	.064***
R^2 △	6.4%
Total R^2 adjusted	5.2%

* *p* < .05, ***p* < .01, *** p < .001

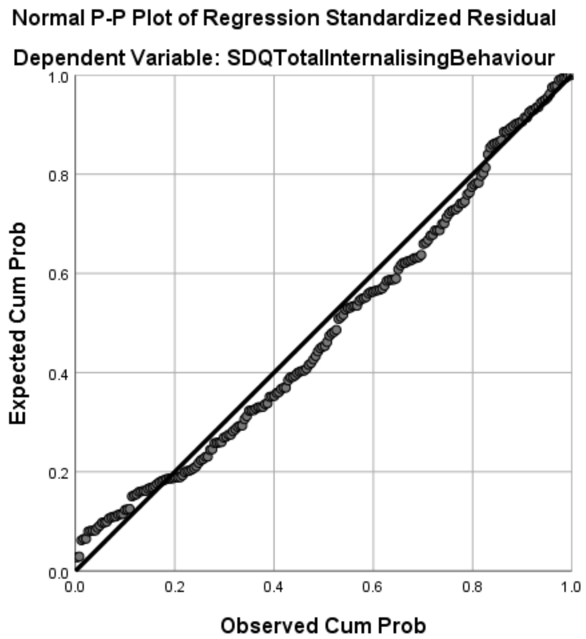
	Parent Engagement in Activities	
	Block 1 (β)	Block 2 (β)
Predictor Variable:		
Play Support	.362***	.353***
Academic Focus	-.054	-.064
Maternal Education		-.045
Parent Age		-.173*
Child Age		-.059
F	19.16	10.41
R^2	.143***	.187*
R^2 △	14.5%	4.4%
Total R^2 adjusted	13.5%	16.9%

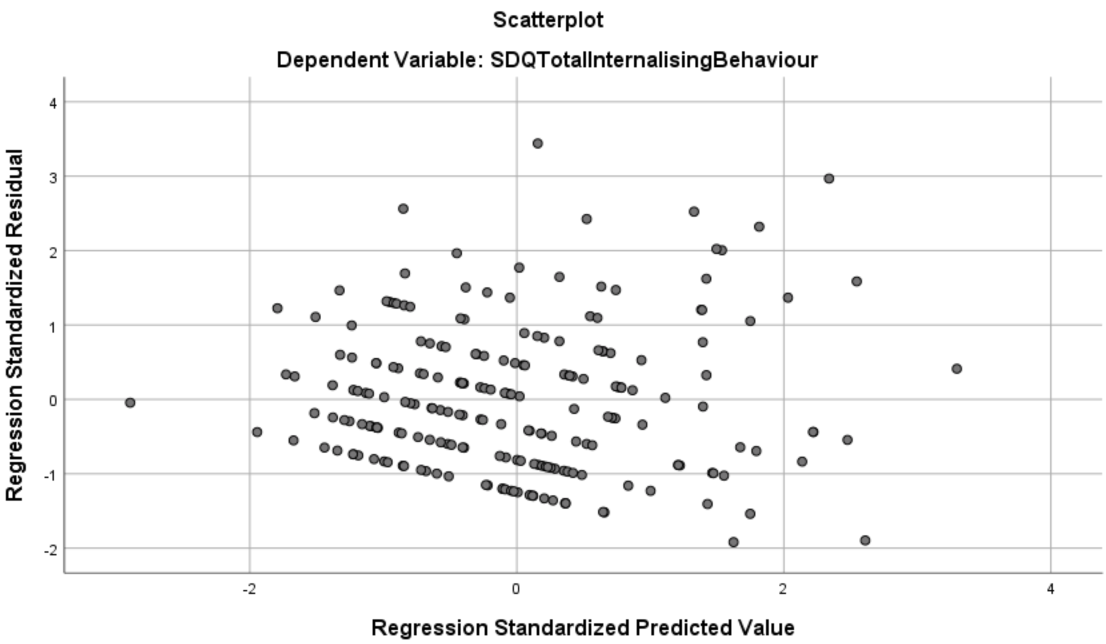
* *p* < .05, ***p* < .01, *** p < .001

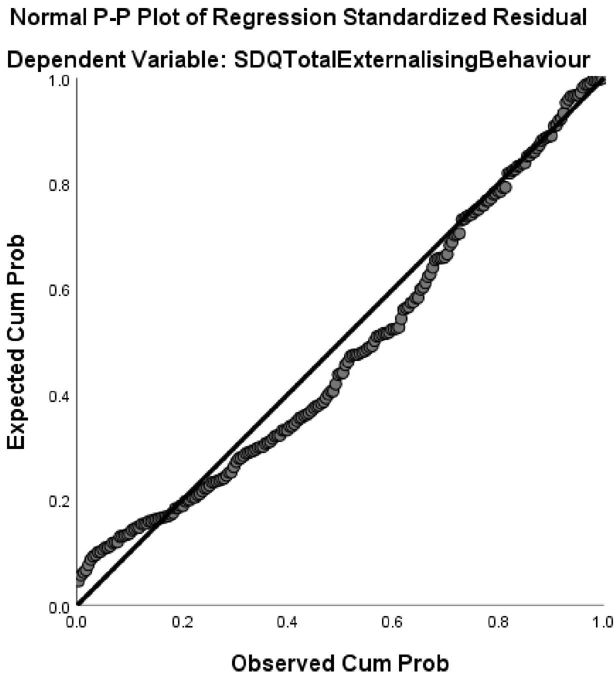
	Richness of the Home Play Environment	
	Block 1 (β)	Block 2 (β)
Predictor Variable:		
Play Support	.217	.228
Academic Focus	-.032	-.061
Maternal Education		-.016
Parent Age		.023
Child Age		.184
F	6.30	4.41
R^2	.051**	.087*
R^2 △	5.1%	3.6%
Total R^2 adjusted	4.3%	6.7%

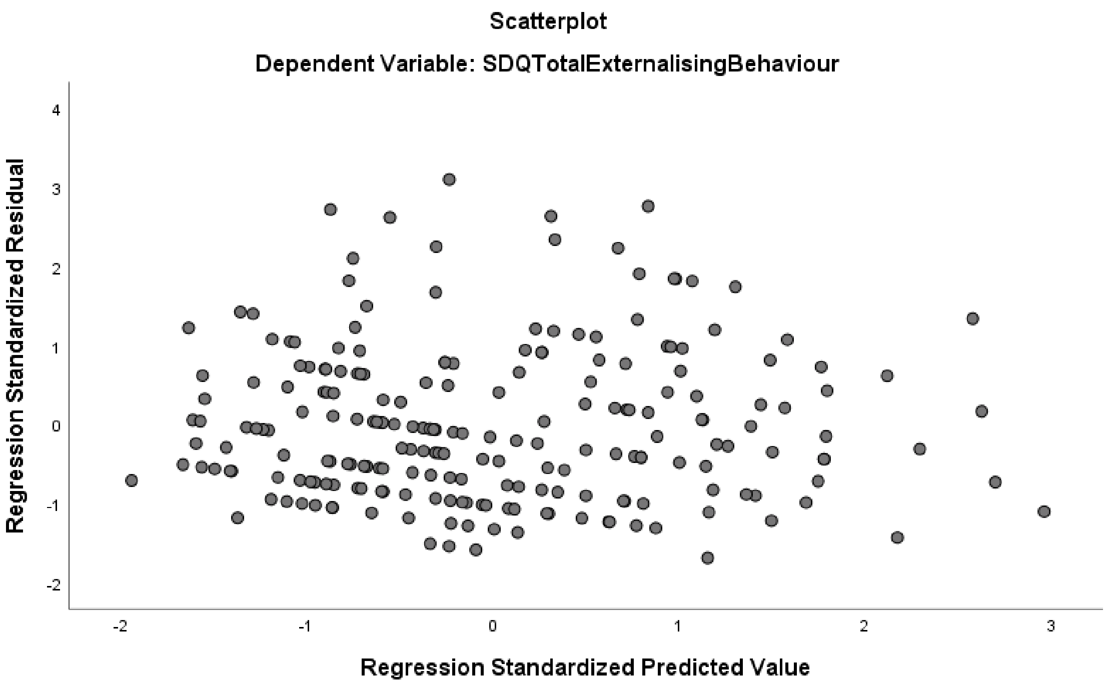
* *p* < .05, ***p* < .01, *** p < .001

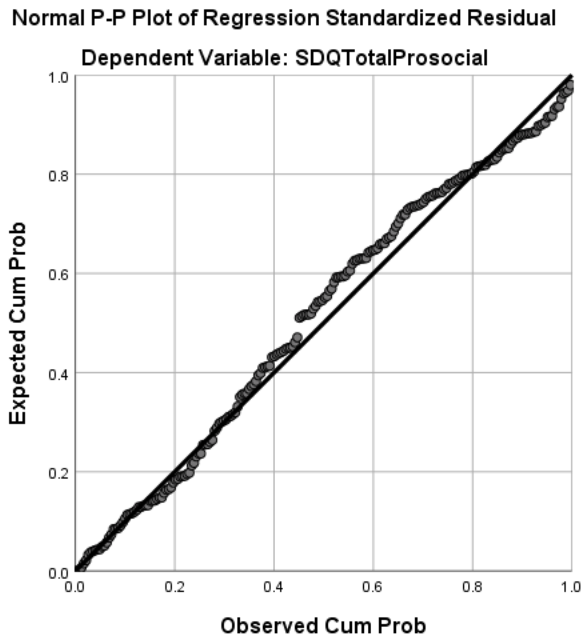
Appendix O- P-P Plots and Scatter Plots for Parent Engagement for Socioemotional Outcomes (PLEY)






Normal P-P Plot of Regression Standardized Residual
Dependent Variable: SDQTotalExternalisingBehaviour
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


Scatterplot
Dependent Variable: SDQTotalExternalisingBehaviour
Regression Standardized Residual
Regression Standardized Predicted Value
-2
-1
0
1
2
3
4


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: SDQTotalProsocial
Expected Cum Prob
Observed Cum Prob
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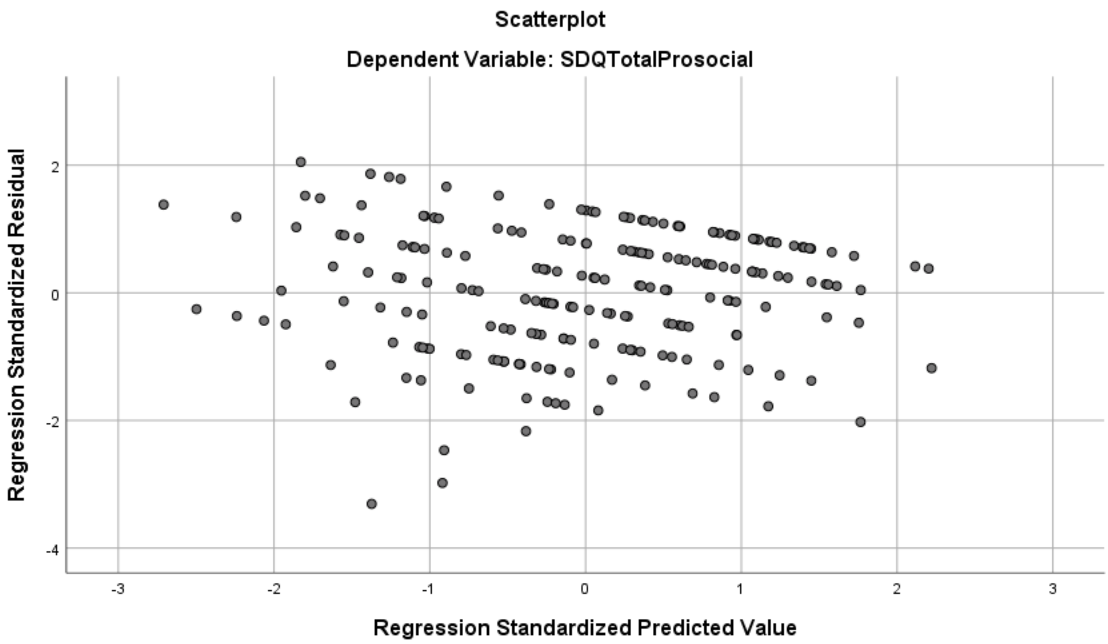
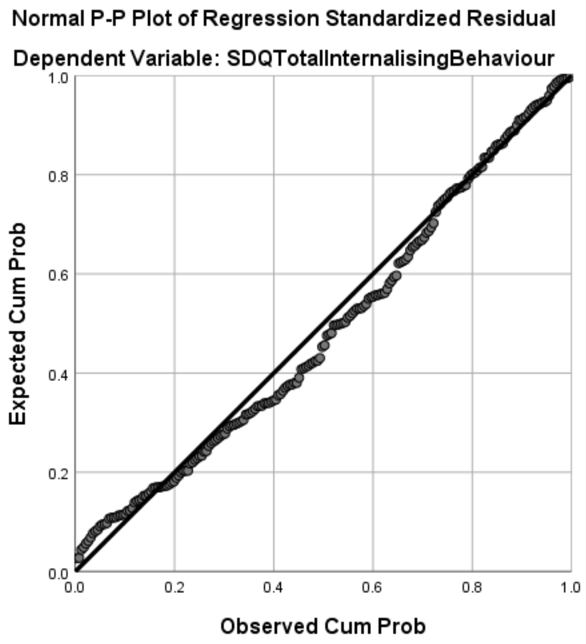
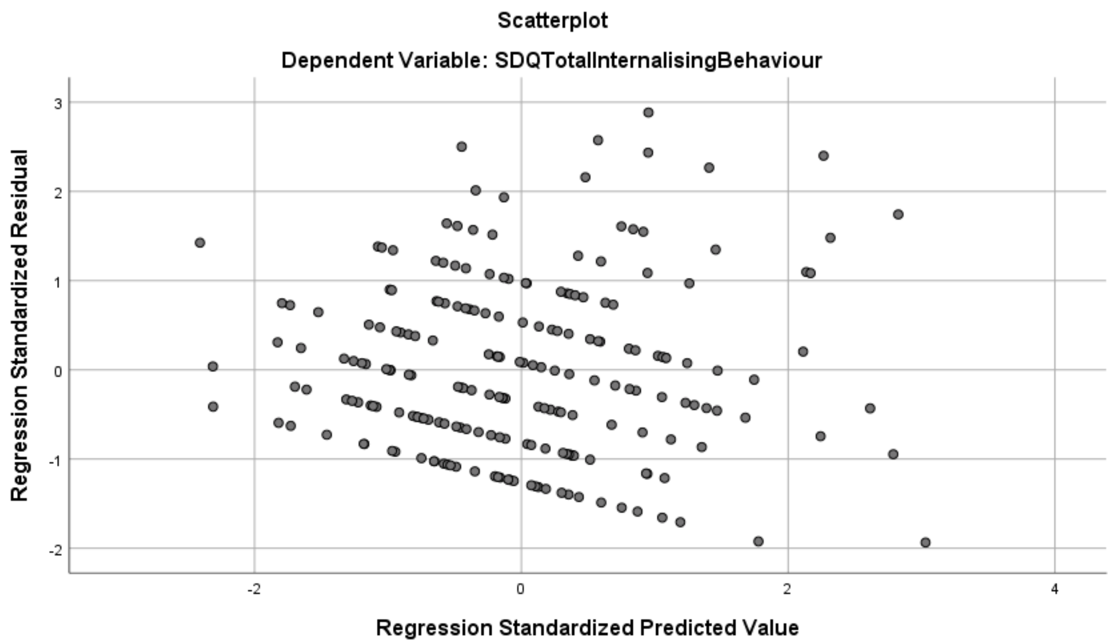
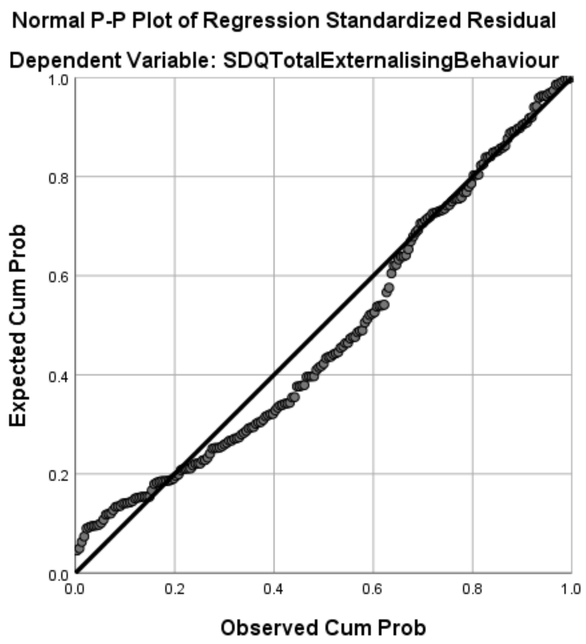
0.2
0.4
0.6
0.8
1.0


Scatterplot
Dependent Variable: SDQTotalProsocial
Regression Standardized Residual
Regression Standardized Predicted Value
-4
-3
-2
-1
0
1
2
3

Appendix P- P-P Plots and Scatter Plots for Child Engagement for Socioemotional Outcomes (PLEY)






Normal P-P Plot of Regression Standardized Residual
Dependent Variable: SDQTotalExternalisingBehaviour
Expected Cum Prob
Observed Cum Prob
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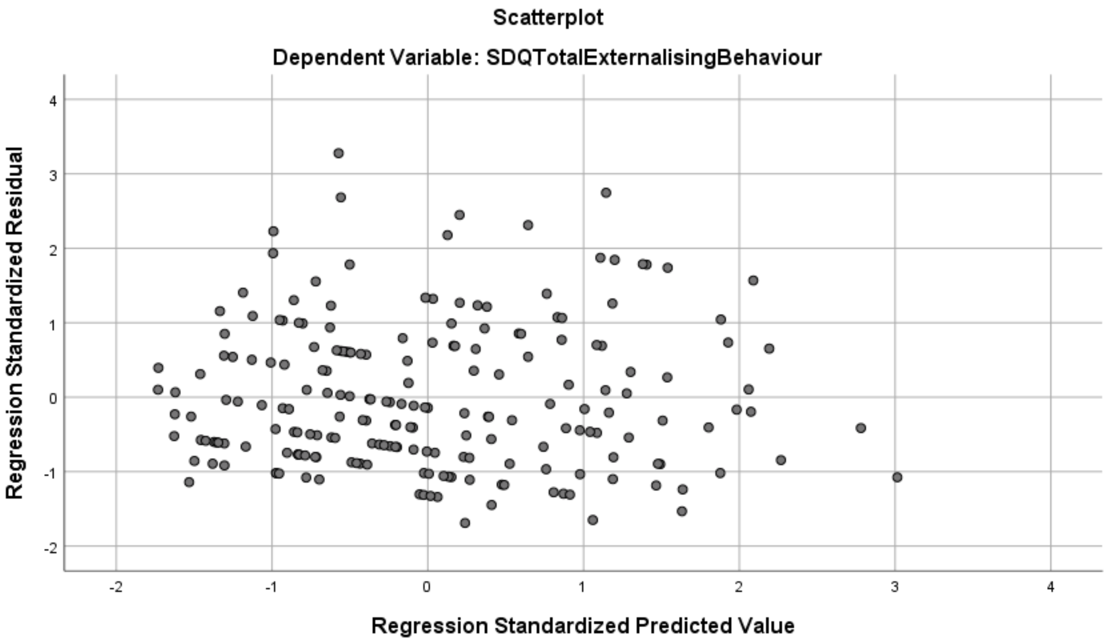
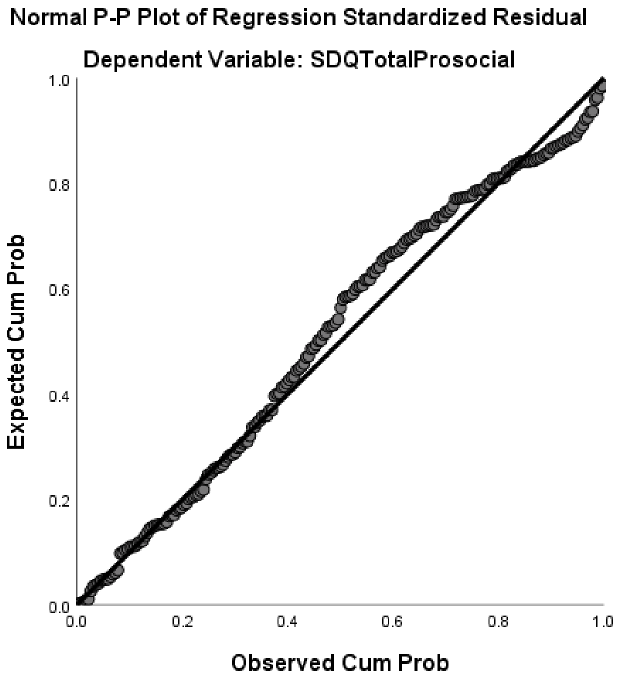
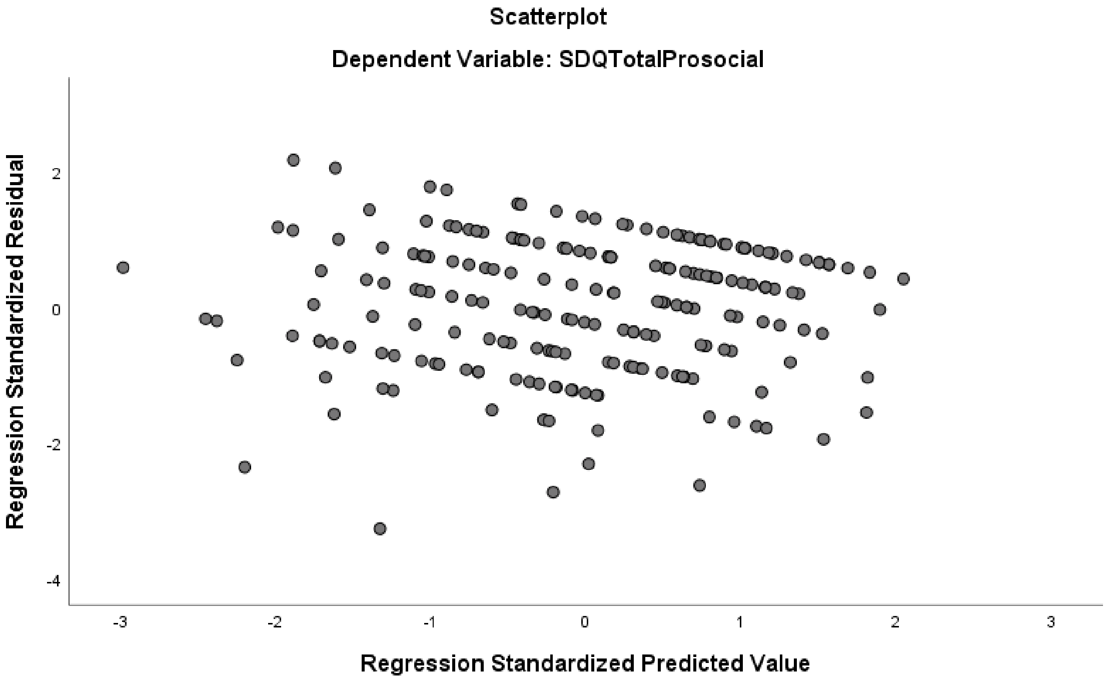
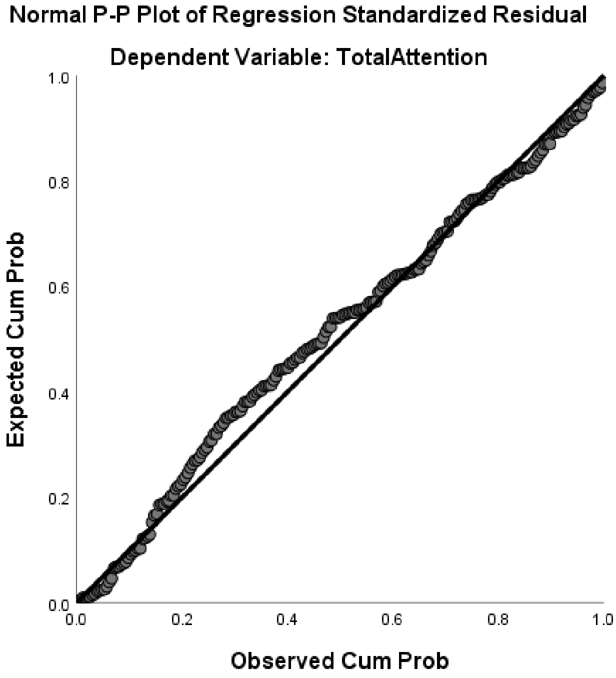
0.2
0.4
0.6
0.8
1.0

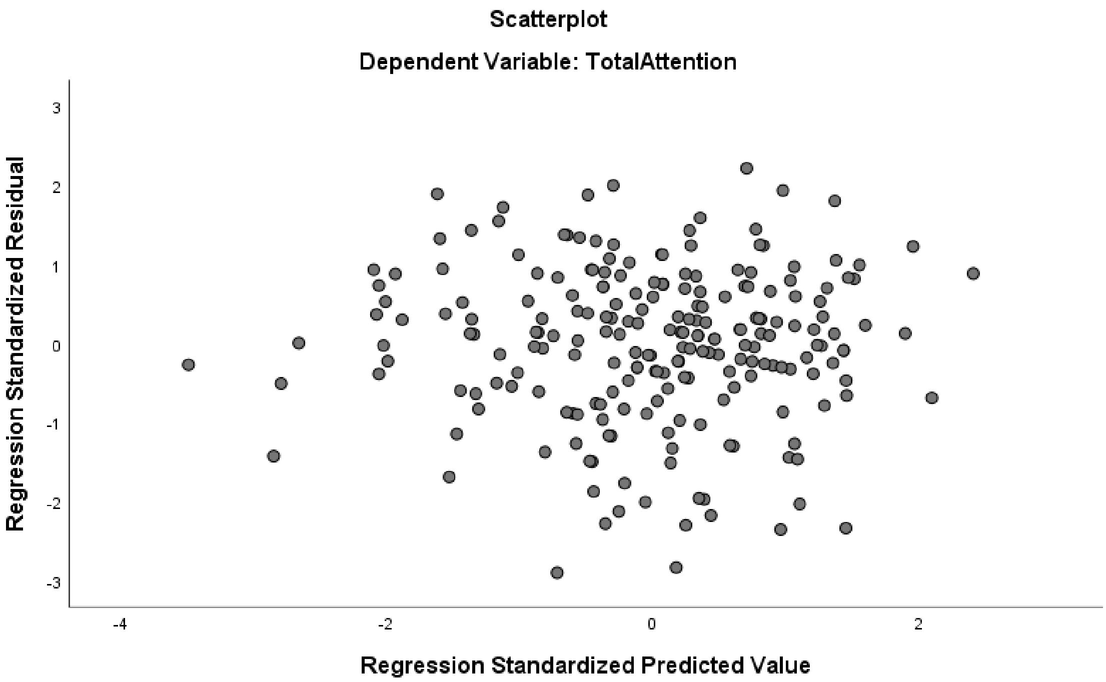

Scatterplot
Dependent Variable: SDQTotalExternalisingBehaviour
Regression Standardized Residual
Regression Standardized Predicted Value
-2
-1
0
1
2
3
4

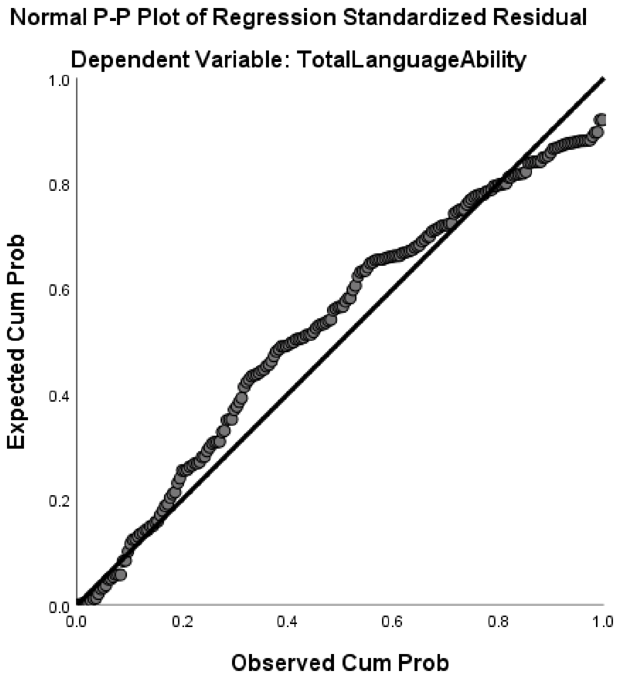

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: SDQTotalProsocial
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

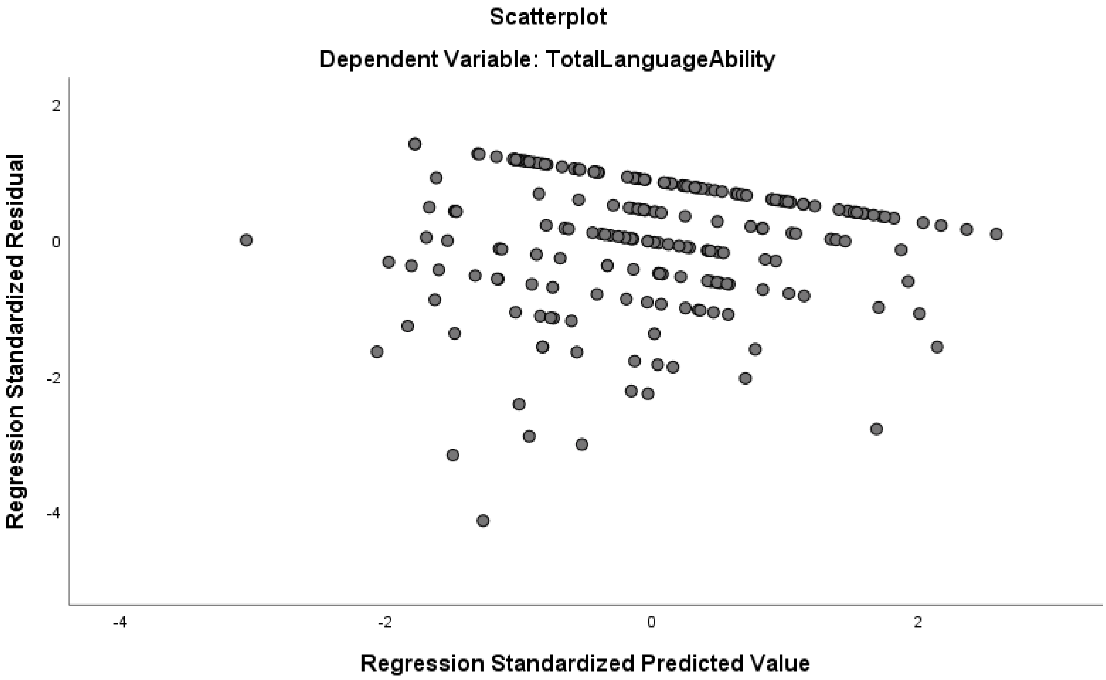

Scatterplot
Dependent Variable: SDQTotalProsocial
Regression Standardized Residual
Regression Standardized Predicted Value
2
0
-2
-4
-3
-2
-1
0
1
2
3

Appendix Q P-P Plots and Scatter Plots for Parent Engagement for Cognitive Outcomes (PLEY)

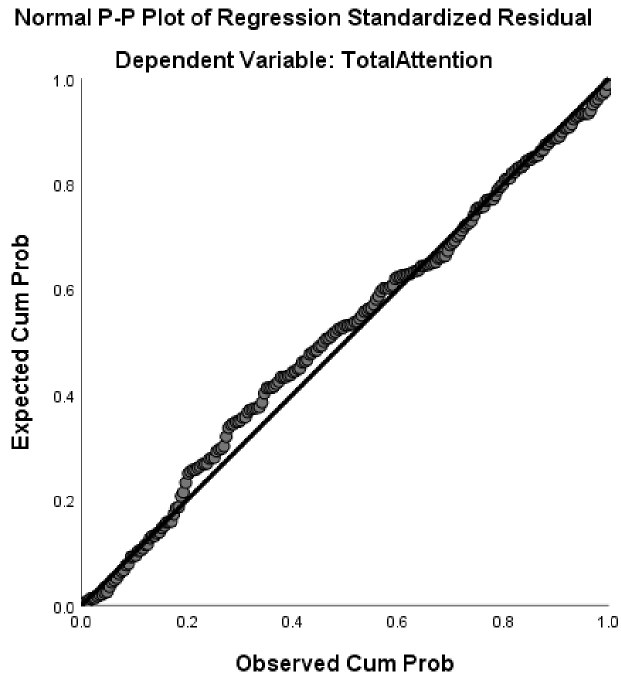


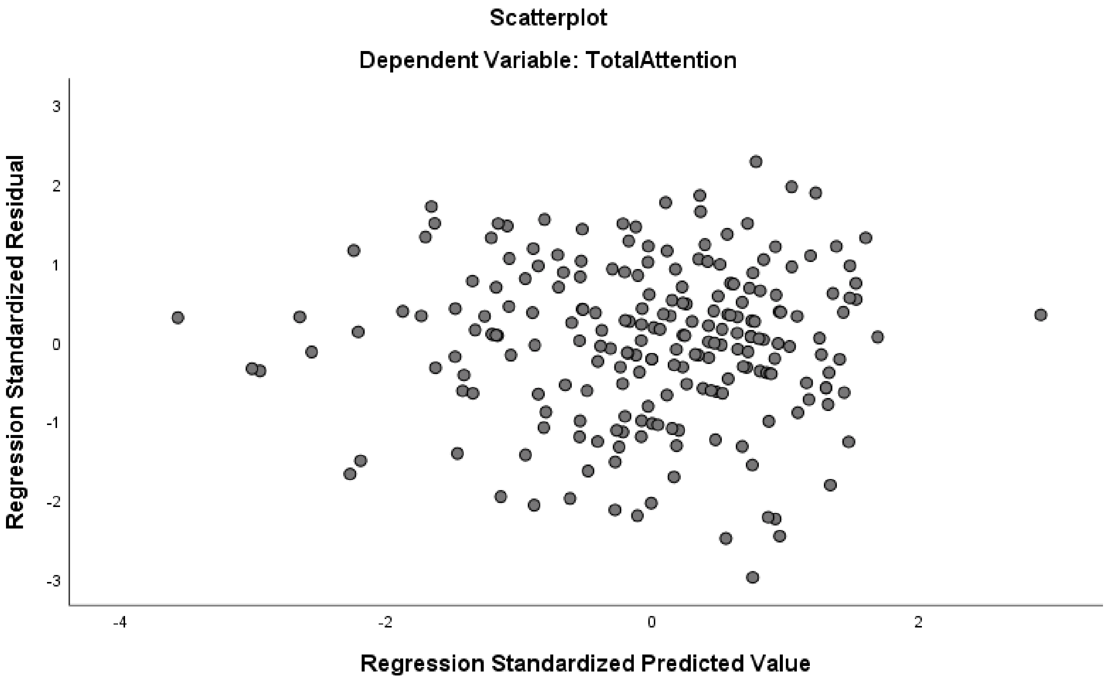


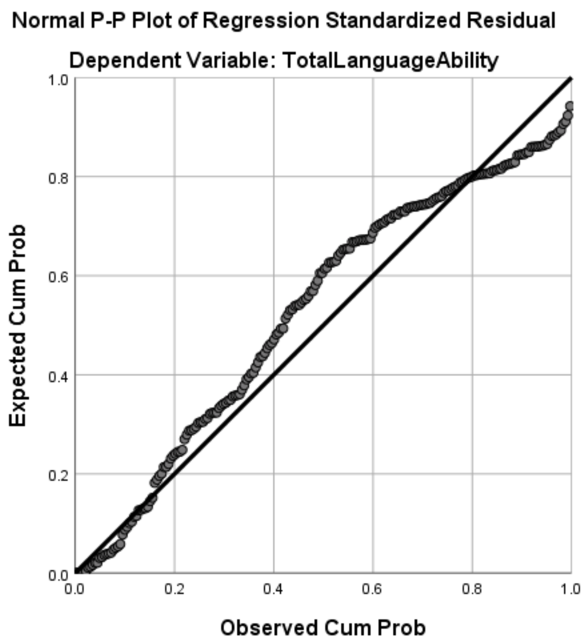

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: TotalLanguageAbility
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

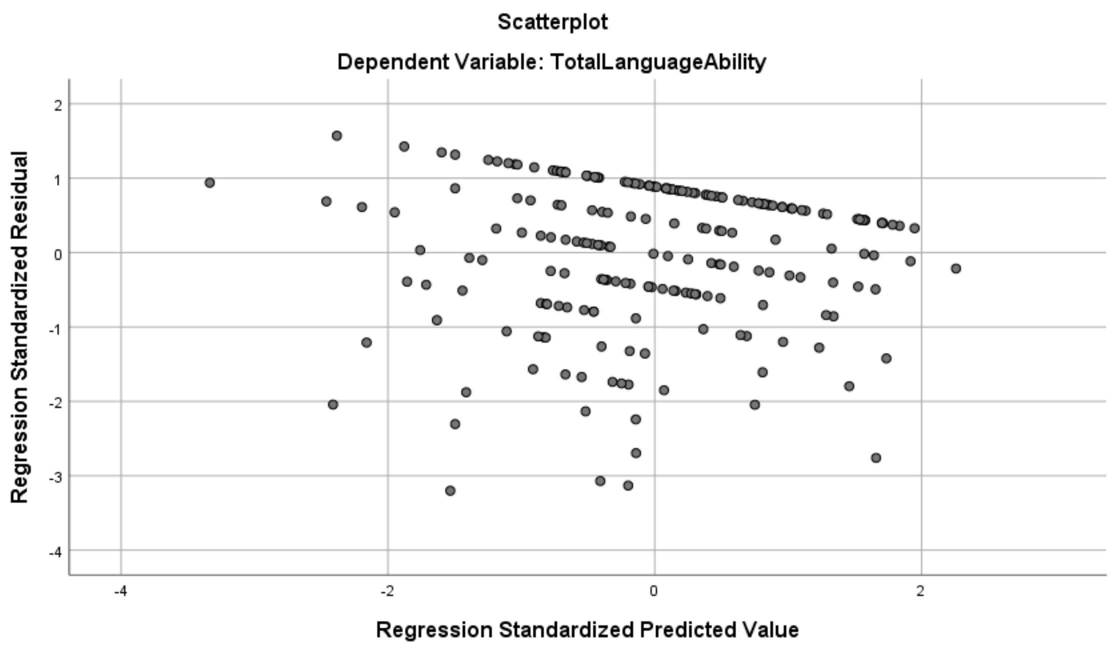

Scatterplot
Dependent Variable: TotalLanguageAbility
Regression Standardized Residual
Regression Standardized Predicted Value
2
0
-2
-4

Appendix R- P-P Plots and Scatter Plots for Child Engagement for Cognitive Outcomes (PLEY)






Normal P-P Plot of Regression Standardized Residual
Dependent Variable: TotalLanguageAbility
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


Scatterplot
Dependent Variable: TotalLanguageAbility
Regression Standardized Residual
Regression Standardized Predicted Value
2
1
0
-1
-2
-3
-4