The Role of Physical Activity and Outdoor Play in the Socio-Emotional Development of Children in Ireland

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Abstract

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Aims Physical activity and outdoor play is thought to have a number of benefits for healthy growth and development, both physically and psychologically. Recent decades have reported a decrease in active outdoor play for children. Meanwhile, a substantial number of children are presenting with social, emotional and behavioural difficulties. This research aimed to examine physical activity and outdoor play in middle childhood. It investigated whether children who spent more time engaged in these activities reported better socio-emotional outcomes both concurrently and longitudinally and whether children's socio-emotional development varied according to their involvement in structured versus unstructured outdoor play.

Method The first study involved longitudinal analysis of secondary data from the child cohort of the Growing Up in Ireland (GUI) national longitudinal study of children in Ireland to explore if time spent in physical activity play, exercise and sport at 9 years of age was related to socio-emotional development at 9 years old, 13 years old and 17-18 years old. The second study involved 108 participants aged between eight and ten years old who were recruited through primary schools. Parents of these children completed measures including a questionnaire on their child's involvement in physical activity and outdoor play, socio-emotional development and an optional time use diary.

Results Regression analyses indicated that time spent in physical activity and outdoor play at nine years old was significantly associated with peer relationship problems in middle childhood and early adolescence. While individual, family and environmental factors were significant predictors of other aspects of socio-emotional development, time spent in physical activity and outdoor play was not. No statistically significant difference was noted between time spent in structured physical activity and time spent in unstructured active outdoor play in terms of their impact on socio-emotional development.

Conclusion The findings from this study provide valuable information about patterns of physical activity and outdoor play in middle childhood and tentatively support an association between these activities and peer relationships in middle childhood and early adolescence. They further highlight the importance of adopting a holistic bioecological approach to understanding socio-emotional development. The implications of these findings for schools, policy and practice are outlined.

Declaration

I confirm that the work presented in this thesis is my own and has not been submitted for any other awards at this or at any other academic establishment. Where use has been made of the work of other people, it has been fully acknowledged and referenced.

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Date: 13.08.2020

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Lists of Acronyms and Abbreviations

APA	American Psychological Association
AMF	Anonymised Microdata File
BASC-2	Behaviour Assessment System for Children, Second Edition
BPS	British Psychological Society
CAPI	Computer Assisted Personal Interview
CDI	Children's Depression Inventory
DCYA	Department of Children and Youth Affairs
DES	Department of Education and Skills (Ireland)
DoH	Department of Health
DSM-IV	Diagnostic & Statistical Manual of Mental Disorders 4th Edition
EP	Educational Psychologist
ESRI	Economic and Social Research Institute
EST	Ecological Systems Theory
GDPR	General Data Protection Regulation
GUI	Growing Up in Ireland
HBSC	Health Behaviour in School-Aged Children
HSE	Health Service Executive
ISSDA	Irish Social Sciences Data Archive
NCCA	National Council for Curriculum and Assessment

NEPS	National Educational Psychological Service
PE	Physical Education
PSI	Psychological Society of Ireland
SDQ	Strengths and Difficulties Questionnaire
SPHE	Social Personal Health Education
SPSS	Statistical Package for the Social Sciences
UN	United Nations
WHO	World Health Organisation
WoE	Weight of Evidence

Chapter One: Introduction

1.1 Introduction to the Area of Study

The view that children's play is essential for healthy growth and development is widely held and this perspective has been influential for many years (Whitebread et al., 2017). A substantial body of literature suggests that play contributes to several aspects of development in the physical, cognitive, social and emotional domains (Gleave & Cole-Hamilton, 2012). Among its many proposed benefits, play is thought to develop creativity and imagination, improve attention, promote language development, enhance social competence and peer relationships and contribute to the development of emotional competencies such as confidence, resilience and self-regulation (Ginsburg, 2007; Pellegrini & Smith, 1998a; Whitebread et al., 2017; Yogman, Garner, Hutchinson, Hirsh-Pasek & Golinkoff, 2018).

Indeed, play is considered to be such an important element of healthy child development that it is recognised internationally as one of their human rights. Article 31 of the United Nations (UN) Convention of the Rights of the Child recognises this right of the child to rest and leisure and to engage in play and recreational activities appropriate to their age (UN Committee on the Rights of the Child, 2013). Accordingly, along with their most basic rights to an adequate standard of living, to education, healthcare and protection from harm, children across the globe have the right to play.

In recent decades, a growing body of research has reported changes in the ways that children spend their time. It is suggested that children today spend less time in unstructured and self-directed outdoor play than in generations past (Clements, 2004; Mullan, 2019; Rixon, Lomax & O'Dell, 2019). It is further suggested that these activities have been replaced with more structured and organised activities, time spent using digital media or engaged in other screen-based activities and that more time is now spent on academic endeavours such as homework (Frost 2012; Singer, Singer, D'Agostino and DeLong, 2009). In particular, children today appear to engage less in active outdoor play and the decline in this kind of play has been linked to concerns regarding child safety, injury prevention and a lack of appropriate play spaces (Brussoni et al., 2015; Clements, 2004). In the Irish context, recent data from Growing Up in Ireland (GUI), the national longitudinal study of children in Ireland, shows a similar trend with games that involve physical activity among the least popular types of play

and children reported to be spending more time on screen-based activities (Dobutowitsch, 2017; ESRI, 2016).

Meanwhile, recent decades have also seen substantial numbers of children presenting with social, emotional and behavioural difficulties. Estimates from recent Irish studies suggest that as many as one in four Irish children, aged 11–13 years, may be experiencing a mental health difficulty at any given time (Coughlan et al., 2014; Dooley, Fitzgerald & MacGiollabhui, 2015). Given the posited benefits of play for social and emotional development and the possibility that children may be missing out on opportunities to develop these skills due to changes in the way that children are spending their time, a theory linking these two situations has begun to emerge. This theory suggests that the increase in the number of children presenting with social, emotional and behavioural difficulties is strongly linked to the decline in the amount and quality of time that children have for play (Gray, 2011a; Whitebread, 2017).

While the literature describing the developmental benefits of play is abundant, the nature of much of this research is indicative, tending to hypothesise about how play might influence children's outcomes (Whitebread et al., 2017). However, empirical studies of children's physical activity and outdoor play which provide strong evidence to support the link between this type of play and social and emotional outcomes are more limited. The current research aims to address this gap through an exploration of physical activity and outdoor play and its association with socio-emotional development, in an Irish context, with a view to providing empirical evidence of a link between the two.

1.2 Theoretical Underpinnings

This study examines patterns of physical activity and outdoor play in middle childhood in Ireland, taking into consideration a range of factors that might impact on engagement in this type of play. It investigates the impact of children's engagement in this particular type of play on socio-emotional development in middle childhood and further explores whether engaging in physical activity and outdoor play in middle childhood is associated with better social and emotional outcomes later in adolescence. According to Carr (2017), "Social and emotional development involves the acquisition of skills for expressing emotions, regulating emotions and managing social relationships within the family, school and peer group" (Carr, 2017, p. 83). Middle childhood is an

important period for socio-emotional development as it sees increased focus on peer relationships and social skills as children learn to autonomously manage their feelings and relationships and develop competency in a range of important skills (Erikson, 1963).

The conceptual framework of this research adopted a holistic, bioecological perspective on development, drawing on Bronfenbrenner's Ecological Systems Theory (EST) (Bronfenbrenner, 1979, 2005). Bronfenbrenner's theory proposes that the ecological environment in which the developing child is situated consists of layers of nested structures referred to as the microsystem, mesosystem, exosystem, macrosystem and chronosystem. The microsystem refers to the child's immediate environment in which he or she has the most interactions and includes direct influences on the developing child such as family, school and neighbourhood. The mesosystem refers to the links and interactions that occur between two settings that the child is directly involved in, for example, home and school. The exosystem incorporates social settings that affect, but do not directly include the child, while the macrosystem refers to the culture in which the child lives including the broader influences of community, cultural norms, practices and beliefs, and policies governing the provision of services for children, youth, and families. Finally, the chronosystem refers to the transitions and continuities that occur over time and impact on development. These can include both normative and nonnormative life transitions as well as the sociohistorical conditions of the time. (Bronfenbrenner, 1979, 2005). In order to understand how the range of influences in a child's immediate and more distant environment impacts on their learning and development, EST acknowledges that every individual child's ecosystems are unique and it places the developing child at the centre of these unique, complex and interrelated systems. It highlights the importance of considering these various layered influences on a child's development and the ways in which these influences interact.

Bronfenbrenner's ecological model has evolved since its earlier iterations (Bronfenbrenner, 1979; 1994) into a more complex and dynamic structure (Bronfenbrenner, 2005). This later work on the model has proposed a bioecological theory of development which suggests that development occurs through processes of reciprocal interaction between the child's inherent biological disposition and the environmental influences at the ecosystemic levels (Bronfenbrenner & Morris, 2006). These processes, known as 'proximal processes' are seen as the primary engines of

development which vary as a function of the developing person's characteristics, their environment and the social continuities and changes that occur over time through the life course and the historical period during which the person has lived. These four elements - process, person, context and time - comprise the defining characteristics of the model. It is this later thinking and evolved bioecological model (Bronfenbrenner & Morris, 2006) that informs and underpins the current research which takes into consideration these elements as it explores the relationship between physical activity and outdoor play and the socio-emotional development of children in Ireland today.

In the current research, Bronfenbrenner's model is used as a framework to identify and structure potential influences on socio-emotional development. It is also drawn on as the context in which to understand the individual, social and environmental factors that might impact on levels of physical activity and outdoor play for children in Ireland. The use of this framework is in line with the professional practice of educational psychologists (EPs). In their work EPs have moved far beyond the perspective that problems of learning or development are 'within child' (Cameron, 2006). Instead, EPs adopt a systemic approach, recognising that learning and development is determined by interrelated and interdependent biological, psychological and socio-cultural factors and as such the cause of any difficulties may be complex and multi-faceted (National Educational Psychological Service (NEPS), 2010). Thus, EPs have a key role to play in bringing knowledge and expertise on socio-emotional development and wellbeing from this bioecological perspective to the children, families and schools they work with.

1.3 Epistemological Considerations

This research adopted a postpositivist paradigm. The postpositivist paradigm applies the lens of natural science to the social sciences and holds the view that reality exists and can be understood through the application of research methods which have the possibility of generating reliable and valid knowledge (Fox, 2003). However, it accepts that this reality is only knowable within a certain realm of probability due to the human limitations of the researcher (Mertens, 2015). Postpositive research therefore does not aim to prove anything explicitly, rather to make a case for a theory. Traditionally, EPs have relied on research and a strong evidence-base to inform their professional practice. This clear link between professional practice and its research base

is the fundamental tenet of evidence based practice (Fox, 2003). However, within the discipline of educational psychology value is placed not just on tightly controlled experimental studies but also on other research designs which take place in the real world thereby acknowledging the dynamic contexts and various influences on human experiences (American Psychological Association (APA) 2006; Fox, 2011). Such descriptive research is useful for understanding relationships, building theories and shaping interventions (Birch, Frederickson & Millar, 2015; Fox, 2003). One of the fundamental aims of this research is to provide further understanding of the relationship between physical activity and outdoor play and socio-emotional development in childhood. In so doing it aims to examine the theorised link between play and socio-emotional development with a view to informing policy and practice.

While the underlying assumptions of the postpositive paradigm include beliefs about the importance of objectivity and generalisability it is also recognises that knowledge is a result of social conditioning. This 'critical realist' position means that any understanding of social reality needs to be framed in certain contexts or social structures which exist within the social world (Wahyuni, 2012). It therefore purports that while only observable phenomena can provide credible data and facts, the focus should be on explaining these findings within a context. As outlined, the findings of this research will be situated within a holistic, bioecological framework which acknowledges that influences on development are multi-faceted and shaped by the interactions between an individual and their environment over time (Bronfenbrenner & Morris, 2006). The postpositive perspective on axiology holds that the researcher has an ethical obligation to conduct 'good' research. In line with this perspective the current study is guided by the ethical principles of beneficence, respect and justice (Mertens, 2015).

1.4 Researcher Positionality

Over the course of my professional training as an Educational and Child Psychologist my interest in the area of children and young people's mental health and wellbeing has been at the fore. This interest stems from my previous work as a post-primary school teacher. It was while working as a post-primary school teacher that I developed an increased awareness of the social, emotional and behavioural difficulties often encountered by young people and the challenges faced by these young people,

their families, schools and health services in addressing such difficulties. During my training, which has included professional placements in child disability, school psychology and mental health services, the importance of an early intervention approach which fosters healthy social and emotional development, builds resilience and promotes children's health and wellbeing at a universal level has become increasingly apparent to me. Furthermore, as a parent I am keenly aware of the changing face of childhood and traditional childhood experiences such as outdoor play and games are ones that I place value on. The opportunity to explore the impact of engagement in such activities on children's social and emotional development using data from the Growing Up in Ireland Study was of particular interest to me as I had previously been involved with the study as a fieldworker during the first waves of data collection. It was thus appealing to me to see how this data could be put to use to better understand children's experiences with a view to promoting better outcomes for children and young people in Ireland today.

1.5 Thesis Structure

This thesis is comprised of five chapters. This first chapter has introduced the area of study and outlined the theoretical underpinnings and epistemological considerations of this research. Chapter Two reviews the literature relating to physical activity and outdoor play in terms of policy, context and the rationale for the current research. It then reviews the existing evidence base for the relationship between physical activity and outdoor play and socio-emotional development. Chapter Three describes Study 1 of the current research under the headings; overview, methodology, results, summary of key findings and conclusion. Chapter Four describes Study 2 following the same format as Chapter Three. Finally, Chapter Five discusses the findings from both studies in light of the existing literature, theoretical context and methodological considerations. The thesis concludes with directions for future research and a discussion of the implications of this research for schools and educational policy and for the practice of educational psychology.

Chapter Two: Literature Review

This chapter sets out to review the literature relating to physical activity and outdoor play in terms of theory, policy, context and the existing evidence base for the relationship between these activities and socio-emotional development. The first section considers some key theories and characteristics of play, before outlining the different types of play with special consideration given to physical activity and outdoor play. The posited benefits of physical activity and outdoor play for healthy social and emotional development are then discussed. The second section outlines the context in which the current research is situated. It explores current international, national and educational policy in relation to children's play, mental health and wellbeing. It then considers reported changes in children's play behaviours in the context of how this may be one of a number of factors impacting on children's social and emotional development. The chapter then presents a systematic literature review of the research on physical activity and outdoor play and their relationship with social and emotional development or mental health outcomes. The chapter concludes with a summary and discussion of the key findings from the systematic review. In light of these findings, the rationale for the current study is highlighted and the research questions which it seeks to answer are outlined.

2.1 An Introduction to Play

2.1.1. The characteristics of play. Defining play is complex and has been a longstanding subject of academic and social debate. However, Pellegrini & Smith (1998a) argue that a definition of play is neither necessary nor sufficient. Instead, they propose that play is a "hallmark of childhood" that is reliably recognised by observers when they see it (Pellegrini & Smith, 1998a, p.51). Thus, play evidently has some key defining features which distinguish it from other childhood behaviours. The following are some of these features which theorists suggest are among the defining characteristics of play.

Firstly, play is a voluntary activity. It is argued that this defining characteristic of play underlies all others (Bruner, 1972). Play is self-initiated and self-directed in that a child exercises their choice and free will when deciding whether or not to engage in the activity. Thus, the child chooses to play, they cannot be made to do so (Bruce, 2011;

Gray, 2017). Vygotsky (1978) also characterised children's play in this way, suggesting that play is recognised as being any activity that is desired by the child. Furthermore, the child is also free to decide the terms on which they engage and ultimately, they are free to quit the activity at any time.

Secondly, play is intrinsically motivated. It is argued that when playing, children value the play activity and process more than the any result or outcome of the action (Gray, 2017; Pellegrini & Smith, 1998a). According to Bruner (1972), this dominance of means over ends is the essence of play. It follows from this that a further important feature of play is in the opportunity it provides for children to practice, to try out newly acquired skills and competencies, without the risk of failure (Bruce, 2011; Bruner, 1972). Play allows for experimentation and the freedom to substitute, elaborate and invent (Whitebread et al., 2017), as children practice what they have observed and learned and rehearse the skills required for their future (Bruce, 2011).

Thirdly, while play activities are freely chosen, play still has some structure in that it is guided by mental rules and concepts in the players' minds (Sylva, Bruner & Genova, 1974; Gray, 2017; Vygotsky, 1978). This rule-based element of play provides boundaries within which the playful actions take place. Among Tina Bruce's 'Twelve Features of Play', she too notes that children make up rules as they play in order to keep control (Bruce, 2011). However these rules do not precisely dictate each action leaving room for creativity which is the final characteristic of play to be considered. Play is creative, imaginative and spontaneous. The context in which play takes place is important. Play typically takes place in an environment that is familiar, safe and friendly for the child (Pellegrini & Smith, 1998a). Furthermore, Gray (2017) argues that play is conducted in an active and alert state of mind, which he refers to as a 'playful state of mind'. It is suggested that this 'playful state of mind' is crucial for human thinking and is the ideal state for creativity and insight which makes play, in Gray's words, "such a powerful vehicle for learning" (Gray, 2017, p217).

While many theorists have spent several decades debating and refining their understanding of the key characteristics of play, perhaps the most important understanding of play comes from the perspective of the players' themselves. When asked about their play activities, children highlight the importance of having fun, being with friends, choosing activities freely and being outdoors (National Council for Curriculum and Assessment (NCCA), 2009). There are many different types of play and

each offers a variety of skills to be learned and developed. These different types of play include exploration, fantasy or pretend play, constructive play, language or word play and physical or locomotor play (Kernan, 2007; Pellegrini & Smith, 1998a). Ultimately, any of these various activities and behaviours that children engage in during their free, unstructured time can be described as play (Pellegrini, 2009). The unstructured element of play is important. It is suggested that, "unstructured play allows children the space to choose and create their own playful activities, to navigate their social worlds, to make independent decisions and to experience the consequences of their own actions" (Gibson, Cornell & Gill, 2017, p.296). In order for unstructured play to occur, children's play environments should ideally have certain characteristics which facilitate exploration, movement and a variety of multisensory experiences. The outdoor environment provides all of these opportunities in a way that indoor environments are less able to do (Kilkelly, Lynch, Moore, O'Connell & Field, 2016). As such, consideration will now be given to outdoor play and its role in children's development.

2.1.2. Active outdoor play. Undoubtedly, being outdoors allows for a different range of play opportunities that cannot exist in an indoor play environment. Outdoor play affords children the opportunity to experience greater freedom of movement, to engage in larger and more boisterous movements and to have contact with natural elements (Bento & Dias, 2017). However it is important to note that outdoor play can involve almost every form of play that is also seen indoors such as fantasy or pretend play, constructive play, play with language, play with objects and any kind of social play thus making the outdoors an optimal environment for play (Kilkelly et al., 2016). Being outdoors tends to encourage more active forms of play, such as running, climbing, chasing and rough and tumble play. This kind of play, also known as physical activity play, is typically highly unstructured and informal and is thought to have a number of benefits for healthy growth and development, both physically and psychologically (Pellegrini and Smith, 1998b). These benefits are reported to include the promotion of healthy weight and cardiovascular fitness as well as decreases in stress, fatigue, injury and depressive symptoms and increases in concentration and attention (Yogman et al., 2018).

Recent research in the Irish context has also focused on the developmental benefits of active outdoor play for children and has found that children, when given the

option, prefer to play outdoors rather than indoors as they value the freedom and spontaneity of exploring and playing in this unstructured way (Kilkelly et al., 2016). In addition, research on children's after school experiences also highlighted that play is a priority for children and emphasised the value that they place on choice in play and on having opportunities for outdoor play (Horgan, O'Riordan, Martin & O'Sullivan, 2018). Such is the importance of outdoor play that a multidisciplinary review of active outdoor play in Canada resulted in a position statement being issued which stated that "Access to active play in nature and outdoors - with its risks - is essential for healthy child development." This position statement recommended increasing children's opportunities for self-directed play outdoors in all settings; at home, at school, in childcare, the community and nature (Tremblay et al., 2015, p.6476). Given such a recommendation it is important to consider what makes active outdoor play such an essential component of healthy child development.

2.1.3 Benefits of outdoor play for socio-emotional development. According to one of the earliest theories of play, play during childhood provides the youth of a species with the opportunity to practice the skills they need to survive and thrive in adulthood (Groos, 1896). This 'practice theory of play' was supported by subsequent play theorists, Piaget (1968) and Vygotsky (1978), who noted that while play is a fun and enjoyable childhood activity it also serves a crucial function in healthy child development. From a psychoanalytic perspective, a core function of play was thought to be in its potential for emotional expression and release. This perspective was adopted by educational psychologist, Susan Isaacs, who argued that play was particularly important for healthy social and emotional development. Isaacs argued that children's play provided the means by which children could safely release their feelings and rehearse ways to deal with a range of emotions (Isaacs, 1937). More recently, Tina Bruce (2011) has considered how play contributes to social and emotional development through helping children to develop abstract thought, to develop theory of mind and to imagine alternative worlds and ways of doing things. Bruce (2011) suggests that play provides children with the opportunity to wallow in ideas, feelings and relationships and to co-ordinate these ideas and feelings and make sense of relationships within families, friends and cultures. It is suggested thus that play, in all its forms, has a role in socio-emotional development. However, particular attention will now be paid to the

developmental benefits of physical activity and outdoor play for social and emotional development.

There are many different play activities that children can engage in outdoors and these provide various experiences which are thought to enhance socio-emotional development. Outdoor play provides children with opportunities to engage with their peers and it is through these experiences that children learn to make friends, work in groups, share, understand the perspectives of others and self-advocate when necessary (Ginsburg, 2007). In middle childhood the complexity of play and games is thought to increase and as such, social play with peers often involves problem solving about what to play, who can play, when to start and stop as well as deciding on the rules of the game to be played (Elkind, 2007; Pellegrini, Blatchford, Kato & Baines, 2004). This requires negotiation, compromise and cooperation. Burdette and Whitaker (2005) propose that the process of solving these kinds of dilemmas and conflicts during play contributes to the development of a number of social and emotional competencies including empathy, flexibility, self-awareness and self-regulation. In these interactions, children also learn to use more sophisticated language in order to get their needs met while also meeting the needs of others, thereby avoiding or resolving conflicts (Yogman et al., 2018). Research suggests that children express themselves more freely outdoors and use more complex language in outdoor play situations than they do indoors (Frost, 2004). It has also been suggested that children are less inhibited and more assertive outdoors (Kemple, Oh, Kenny & Smith-Bonahue, 2016).

An important feature of unstructured outdoor play is the relative lack of adult involvement or direction. Research suggests that children value having the time to play and interact with each other without adult involvement or supervision (Brockman, Jago & Fox, 2011). This has important implications for social development as when adults intervene in play, children are inclined to acquiesce to their rules and play loses some of its benefits, particularly in relation to creativity, leadership and group skills (Ginsburg, 2007). In addition to this, through unstructured outdoor play children also learn how to assess risk in relatively low risk settings, independent of adult input. This further enhances the development of social skills as children have to collaborate and collectively decide and learn how to manage risk (Gibson et al., 2017).

Furthermore, research has also considered the special value of age mixed play for developing social competence (Gray, 2017). Historically, children have always

played in age mixed groups and this was often seen in outdoor environments such as local neighbourhoods. Age mixed play is mutually beneficial as younger children learn from older children by watching, listening and emulating their actions. Older children also learn from these experiences as they develop a sense of maturity through caring, protecting and leading (Gray, 2011b). The research suggests that age mixing in play can help socially withdrawn children to become more socially active and competent (Gray, 2011b). Ultimately, getting along with peers is a skill that cannot be explicitly taught but is one that is best learned through experience. Play affords children this experience.

With regard to the benefits of play for emotional development an equally wide range of benefits are suggested in the literature. Play allows children to be creative and develop their imagination, to discover their interests and passions and to engage in these of their own free will. Through play, children explore the world around them, conquer fears and develop mastery (Elkind, 2008; Ginsburg 2007). As with development in other domains, the mastery of early skills related to emotional development, such as how to regulate one's own emotions, affects a child's ability to manage the future challenges they may face (Saarni, 2011). During outdoor play, which often presents more risks and challenges, children learn to deal with fear and practice decision making and this affords them the opportunity to practice skills which may be needed in future potential emergency situations in adulthood. In this way play enhances children's confidence as they develop new competencies and it builds resilience as children learn to problem-solve and deal with new challenges (Malone, 2007; Ginsburg, 2007).

It is also suggested that physical activity play outdoors has the potential to improve many aspects of emotional health and wellbeing including minimising anxiety, depression, aggression, stress and sleep difficulties (Burdette & Whitaker, 2005). It is well documented that physical activity and exercise can have a positive impact on symptoms of depression and anxiety and can alleviate stress in adults. Moreover, studies investigating the health benefits of physical activity for school-aged children and adolescents have found small to modest associations between physical activity and symptoms of depression (Janssen & LeBlanc, 2010; Korezak, Madigan & Colasanto, 2017). Further research in this area is indicated. In addition to the potential benefits of physical activity generally, a growing body of research suggests that outdoor play in natural environments is particularly beneficial for healthy emotional development. Spending time in natural outdoor environments is thought to reduce stress and promote

an overall sense of wellbeing (Louv, 2008) while exposure to natural sunlight outdoors facilitates the secretion of serotonin, the hormone related to preventing depression and to promoting a sense of wellbeing and calmness (Kemple et al., 2016).

2.2 Context

2.2.1 International and national policy. The previous section has outlined some of the characteristics and developmental benefits of play. It is evident from the literature how widely accepted it is that play serves an important function in all aspects of child development. At an international level, play is considered to be such an important element of healthy child development that the right to play has been enshrined in the United Nations (UN) Convention of the Rights of the Child. Article 31 of this Convention recognises the right of the child to rest and leisure, to engage in play and recreational activities appropriate to their age and to participate freely in cultural life and the arts (Children's Rights Alliance, 2010). The UN Committee on the Rights of the Child defined play in this context, as 'any behaviour, activity or process initiated, controlled and structured by children themselves; it takes place whenever and wherever opportunities arise' (UN Committee on the Rights of the Child, 2013, p.5). This committee also noted the innate urge that children have to play and suggested that children will always seek out opportunities to play even when circumstances or the environment do not favour it.

Arising from the work of this UN committee was the obligation of the states who ratified this convention to endeavour to create the conditions which enable children to realise their right to engage in play. These conditions include space and opportunities to play outdoors with limited adult involvement in various and challenging physical environments. The importance of opportunities to experience, interact with and play in natural environments was also highlighted (Kilkelly et al., 2016). The UN Convention on the Rights of the Child was ratified by the Irish government in 1992. Due to the impact of this convention and its ratification, there was a shift in Irish policy toward recognising play as a need and a right in the lives of children in Ireland (Kernan, 2007).

Ireland's first National Children's Strategy 2000-2010, 'Our Children – Their Lives' had among its objectives, the need to support children's development and experience of childhood through access to play and recreation opportunities (Department of Health & Children, 2000). Arising from this was the development of a

national policy on play. Ireland's National Play Policy 'Ready, Steady, Play!' was launched in March 2004. The aim of this policy was to improve play facilities for children, thereby enhancing their quality of life by providing them with better play opportunities (National Children's Office, 2004). The policy also set out to give children a voice in the design and implementation of play policies and facilities so as to raise awareness of the importance of play. Thus, the process leading to the publication of this policy involved consultation with Irish children. Through this consultation process, children identified the importance of play in their lives stating that play and recreation were major quality of life issues for them. Children reported that they lacked ample opportunities for play and that adults did not realise the importance of play in their lives (National Children's Office, 2004).

In addition to an increased focus on the role of play in children's lives, Ireland's national policies have, in recent times, increased their focus on children's health and wellbeing. The most recent national policy framework for children and young people 2012-2020, 'Better Outcomes, Brighter Futures' has, as its first national outcome, the active and healthy physical and mental wellbeing of all children (Department of Children and Youth Affairs (DCYA), 2014). This policy framework was developed by the DCYA on behalf of the Irish government. Two of the aims incorporated in this first national outcome are good mental health and initiatives that enable children to enjoy play, recreation, sport, arts, culture and nature to promote this (DCYA, 2014). The second national outcome of this framework relates to children achieving their full potential in all areas of learning and development while further outcomes relate to safety and protection from harm, economic security and opportunity and feeling connected and respected (DCYA, 2014). Incorporated within these outcomes, access to play and recreation activities remains a key objective of Ireland's national policy framework for children and young people.

2.2.2 Educational policy and curricula. From an educational policy perspective in Ireland, the publication of An Curaclam na Bunscoile in 1971 recognised the importance of the full and harmonious development of the child, placing value on activity and discovery methods in children's learning during their primary school years. In so doing, the benefits of play for children's cognitive and social development were acknowledged (National Council for Curriculum and Assessment (NCCA), 1999).

When the Primary School Curriculum was revised and subsequently published in 1999 it subsumed the principles of the 1971 curriculum and stated that its core aims were to develop the full potential of each individual child, to enable each child to develop socially so as to contribute to the good of society and to prepare each child for further education and lifelong learning (NCCA, 1999). While an emphasis was placed on the child as an active agent in their own learning and the importance of play in early childhood education in particular was acknowledged, play as a vehicle for learning and development received relatively little attention in relation to older children (NCCA, 1999). However, with regard to the role of physical activity, the revised Physical Education (PE) curriculum highlighted the importance of physical activities including games and outdoor and adventure activities and noted the importance of these activities for children's personal, social and emotional development (NCCA, 1999).

Despite the somewhat marginalised position of play beyond the early years in the Primary School Curriculum, the publication of the aforementioned National Play Policy, 'Ready, Steady, Play!' (2004) drew attention to school settings and their role in promoting the importance of play. Among its actions, this policy outlined that the Department of Education and Science (DES) would request that the Boards of Management of all primary schools should include a statement about the value of play and opportunities for play in the school environment in their school plans, while teacher training should promote the benefits of play both in the schoolyard and in the classroom (Kernan, 2007).

The publication of Aistear: the Early Childhood Curriculum Framework for children from birth to six years in 2009 acknowledged the value and importance of play in children's learning and development. Across the four interconnected themes of Wellbeing, Identity and Belonging, Communicating, and Exploring and Thinking, play holds a key role in how it supports and contributes to children's development in all domains (NCCA, 2009). In recent years, the Primary School Curriculum (NCCA, 1999) has undergone a review and a new Draft Primary Curriculum Framework for Consultation has been newly published (NCCA, 2020). This new draft curriculum framework places emphasis on the importance of skills such as resilience, creativity and imagination and aims to give greater opportunities to children to be involved in decision making about their own learning. It further aims to provide opportunities for playful and

inquiry-based learning and acknowledges the importance of diverse learning environments, including the outdoors (NCCA, 2020).

In addition to an increased focus on play in educational curricula, curriculum developments in Ireland over the past decade have also shifted their focus toward the concept of wellbeing and the key role that schools and other educational settings have in promoting and protecting the healthy socio-emotional development and wellbeing of children and young people (Department of Education and Skills (DES), 2018). The concept of wellbeing evades precise definition and is therefore open to many different interpretations. In Ireland, the DES, in an effort to encapsulate the multidimensional nature of wellbeing, has described it as being present when,

> "a person realises their potential, is resilient in dealing with the normal stresses of life, takes care of their physical wellbeing and has a sense of purpose, connection and belonging to a wider community. It is a fluid way of being and needs nurturing throughout life" (DES, 2018, p.6)

While a consensus definition of wellbeing might be difficult to arrive at, it is clear that the development of social and emotional skills is crucial if children are to be happy, receptive to other areas of learning and achieve their potential.

As previously mentioned, Aistear: the Early Childhood Curriculum Framework (2009) was the first curriculum framework to include wellbeing as a central theme, highlighting the role that education has to play in promoting and protecting it. Following this, the National Educational Psychological Service (NEPS) in conjunction with the DES, the Department of Health (DoH) and the Health Service Executive (HSE) published wellbeing guidelines for both primary and post-primary schools. These guidelines were heavily focused on the promotion of mental health and acknowledged that wellbeing is critical to success in school and life (NEPS, DES, DoH & HSE, 2013, 2015). At the post-primary level, the revised Framework for Junior Cycle published in 2015 saw the inclusion of wellbeing as one of the core principles underpinning education in the first three years of post-primary school (DES, 2015), while the aforementioned new Draft Primary Curriculum Framework (NCCA, 2020) also includes wellbeing as a core curriculum area. At an overarching level, the DES published the Wellbeing Policy Statement and Framework for Practice in 2018 which aims to put wellbeing at the core of the ethos of every school and education centre in Ireland. This policy outlines the crucial role the education system has to play in equipping children

with the knowledge, skills and competencies they need to deal with the challenges that may impact on their wellbeing (DES, 2018).

2.2.3 Changes in children's play. Despite the myriad of benefits of play for healthy child development that have been discussed in the literature and the recent focus on the importance of play in national and international policy, recent years have seen a shift in the way that children spend their time. Research suggests that children today spend less time in unstructured, outdoor play than in previous generations (Chudacoff, 2011; Clements, 2004; Elkind, 2007; Frost, 2012; Gray, 2011a). A global study of children's pastimes and play in countries from North America, South America, Africa, Europe and Asia found similarities in children's play across these nations. Findings indicated that a lack of unstructured outdoor play was a consistent feature of childhood and that today, children's major free-time activity is watching television (Singer, Singer, D'Agostino & DeLong, 2009). In addition, more recent research from the UK explored how school-age children currently spend their time and how this has changed over the past thirty years. Results of this exploration show that over this time period, children increased their time at home and spent more time in screen-based activities and doing homework. Concurrently, they spent less time in unstructured play while time spent in organised exercise or sport was also seen to increase (Mullan, 2019).

Several reasons for this decline in time for play have been suggested. Firstly, children today appear to engage less in unsupervised, outdoor play and this has been linked to concerns about risks relating to child safety, injury prevention and a lack of appropriate play spaces (Brussoni et al., 2015; Chudacoff, 2011; Clements, 2004). In addition, the traditional structure of households has changed in recent decades with a substantial increase in families where both mothers and fathers work outside the home and children spend more time in childcare or alternative adult led structured activities (Chudacoff, 2011; Ginsburg, 2007). Regardless of parents' working arrangements, structured activities such as music lessons and sports activities are a larger part of children's lives today as parents often strive to do their best for their children by building skills and aptitudes from a young age (Chudacoff, 2011; Ginsburg, 2007; Gray 2011a). Furthermore it is suggested that academic demands now start at a younger age with a focus on literacy and numeracy in schools and homework taking up increasing amounts of time outside of the school day (Gray, 2011a; McCoy, Byrne & Banks,

2012). Finally, it is difficult to ignore the passive entertainment offered by television, smart phones and other digital media as another key factor in the changing habits of children today.

In the Irish context, recent data from Growing Up in Ireland (GUI), the National Longitudinal Study of Children in Ireland offers some insight into the current play behaviour of Irish children. This data shows that the most popular forms of play for seven to eight-year-old children in Ireland are reading for pleasure, playing computer games and make-believe play. Conversely, games with physical activity, including running and riding a bicycle were amongst the least popular, particularly for girls. It is also reported that Irish children are spending a substantial amount of time on screen-based activities which would in turn imply a reduction in the amount of time spent in active outdoor play for Irish children (Economic & Social Research Institute (ESRI), 2016). Kernan (2007) also notes a change in the site of children's unstructured play over the past fifty years, reporting that the location of play has shifted from public spaces outdoors to semi-public spaces to taking place mainly indoors.

2.2.4 Social, emotional and behavioural difficulties. While recent decades have seen a change in the way that children spend their free time it has also witnessed a significant number of young people presenting with social, emotional and behavioural difficulties. In Ireland, the mental health and wellbeing of our children and adolescents is an ongoing concern. The first My World Survey (Dooley & Fitzgerald, 2012) reported on data from a national survey of 12 – 19 year olds and their mental health. This survey found that mental health difficulties emerged in early adolescence and peaked in the late teenage years and that mental health difficulties coincided with a decrease in protective factors such as self-esteem, optimism and positive coping strategies (Dooley & Fitzgerald, 2012). The recently published second My World Survey, observed a notable increase in anxiety and depression among adolescents with 40% experiencing depression outside of the normal range and 49% experiencing anxiety outside of the normal range. Findings also indicated a link between physical activity and better mental health (Dooley, O'Connor, Fitzgerald & O'Reilly, 2019). Further Irish studies report that as many as one in four Irish children, aged 11–13 years, may be experiencing mental health difficulties at any given time and that by age of 13 one in

three will have experienced some kind of mental health disorder (Cannon, Coughlan, Clarke, Harley & Kelleher, 2013; Dooley, Fitzgerald & MacGiollabhui, 2015).

A wide range of factors are thought to influence social and emotional development and problems that might occur in this area. Research would suggest the importance of adopting a holistic and bioecological model to explore these dynamic factors and influences (Birch et al., 2016; Cooper, Bilton & Kakos, 2012; Dobutowitsch, 2017). As outlined in the introduction, Bronfenbrenner's bioecological model of development is used as the framework that underpins the current research which aims to provide a better understanding of the role that physical activity and outdoor play has in socio-emotional development. As such, physical activity and outdoor play is situated within this framework along with a range of other factors that are thought to influence socio-emotional development. These factors can be organised and grouped within the relevant ecological systems.

At the individual or biological level influences on socio-emotional development might include genetic factors, temperament, cognitive ability or experience of illness and disability (Carr, 2017). Carr (2017) suggests that children who have easy temperaments, adequate cognitive abilities to understand feelings, emotions and relationships and are in good health are more likely to experience positive and healthy socio-emotional development. At the microsystem level, family factors such as parental physical or mental health, parenting style and family functioning as well as school related factors and peer group relationships are also likely to influence socio-emotional development (Carr, 2017; Nixon, 2012). Finally, environmental factors at the macrosystem level, such as socioeconomics and wider cultural and community influences, may also affect the development of social and emotional skills. Data from the GUI national longitudinal study of children in Ireland continues to find a link between a number of these systemic factors and the social and emotional development of children in Ireland (Watson, Maître, Whelan, & Williams, 2014; Williams et al., 2018).

2.3 Rationale

As evidenced thus far, the benefits of physical activity and outdoor play for children's physical, cognitive, social and emotional development are well documented and widely accepted (Gibson et al., 2017; Ginsburg, 2007; Janssen & LeBlanc, 2010;

Pellegrini & Smith, 1998a; Whitebread et al., 2017; Yogman et al., 2018). It is suggested that engaging in these kinds of activities helps children to develop a range of social and emotional skills that will serve them both immediately and into the future (Burdette & Whitaker, 2005). Gray (2017a) argues that if unstructured outdoor play has such a crucial role in how children learn, practice and develop these skills, then a decline or change in children's play, such as the one described in the literature (Chudacoff, 2011; Clements, 2004; Frost, 2012), would be expected to have serious consequences.

Based on research documenting the decline in the amount and quality of time that children have to engage in unstructured outdoor play and the growing numbers of children and adolescents presenting with social, emotional and mental health difficulties a proposed link between these two situations has been suggested (Jarvis, Newman & Swiniarski, 2014; Gray, 2011a; Whitebread, 2017). This theory suggests that the psychological consequences of a decline in unstructured outdoor play might include an increase in symptoms of depression and anxiety in young people and a decline in children and adolescents' resilience and sense of control over their lives (Gray, 2013). Studies of play deprivation, although limited, lend support to this theory. Research in this area has found that play deprivation, particularly in the early years has been linked to impaired brain development, poor social skills and an increase in the presentation of symptoms of depression and aggression (Hughes, 2003).

With such a focus now on the active and healthy physical and mental health and wellbeing at a policy level for children in Ireland, and with the suggestion that physical activity and outdoor play serves an important function in achieving this, it seems pertinent to explore the empirical literature relating this type of play and social and emotional development in more detail. In 1998, Pellegrini & Smith noted that while the role of play in child development had been written about extensively, empirical studies of children's play had not yet provided strong or unequivocal evidence to support the relationship between play and developmental outcomes (Pellegrini & Smith, 1998a). More recently, Whitebread and colleagues (2017) in a review of the developmental benefits of physical play, have suggested that the evidence base for conclusions on physical activity play is not extensive. Furthermore, while there is good evidence of the physical health benefits of active play, direct evidence of the social and emotional benefits is more limited (Gibson et al., 2017).

As such, the focus of the following systematic review is to critically examine the literature that exists which explores physical activity and outdoor play in terms of how it relates to social and emotional development or mental health outcomes with a view to providing direct evidence of a link between the two.

2.4 Systematic Review

2.4.1 Review question(s). A systematic review aims to find out what is already known about a topic and how this has been found out which leads to the questions of what more there is to know and how it can be known (Gough, Oliver & Thomas, 2012). The aim of this review is to provide a critique of the existing literature that examines the association between physical activity and outdoor play and social and emotional outcomes. To that end, the following research questions were developed to guide this review.

1. Is there an association between physical activity and outdoor play and socio-emotional or mental health outcomes in children and young people?
2. What is the impact of physical activity and outdoor play on socio-emotional or mental health outcomes in children and young people?

Additionally, while answering these questions, this review also aims to address the following broader question about research in this area; how has physical activity and outdoor play and its relationship with social and emotional outcomes been studied previously, in terms of study designs and measures?

2.4.2 Literature search. The following databases were selected for the search: Academic Search Complete, PsycArticles, PsycINFO, MEDLINE and ERIC. Several scoping searches were initially carried out to refine the search terms and results from these searches were scanned for relevance. Relevant articles returned by these searches were used to identify any additional key words to include in the final search. The first searches were carried out in July – August 2018 and these were updated in August – September 2019 and again in January 2020. The final list of search terms used are outlined in Table 1 below.

Table 1

Search Terms used in Online Databases

Exposure	“outdoor play” or “unstructured outdoor play” or “unstructured play” or “active play” or “physical play” or “physical activity play” or “physically active play” or "outdoor games" or "physical games"
Outcome	"social development" or "emotional development" or "socio-emotional development" or “mental health” or “prosocial” or "peer relationships" or “wellbeing”

The database search returned 442 results. A filter was applied to limit the search to documents that were published in English and in peer reviewed journals. This brought the total number of titles to 335. Ninety-nine titles were removed as duplicates. The remaining 236 articles were screened by title for relevance to the review and those that were obviously irrelevant were excluded at this point. Following title screening, 104 articles were retained for abstract screening. The abstracts of these documents were examined to determine whether the articles could be immediately excluded in line with the inclusion and exclusion criteria or whether they should be retained for full text screening. This resulted in 83 articles being excluded at this point. Full text copies of the remaining 21 articles were then downloaded for close review according to the inclusion and exclusion criteria which are outlined in Table 2 below. These criteria were guided by the review questions and by some practical considerations.

Table 2

Inclusion and Exclusion Criteria with Rationale

	Inclusion Criteria	Exclusion Criteria	Rationale
1. Type of publication	Peer reviewed journal	Material from non-peer reviewed journal	To ensure a high methodological standard
2. Language	Full text article is available in English	Articles written in languages other than English or unavailable	Translation services not available to the reviewer
3. Participants	Children and adolescents of school-going age (aged 6 – 18 years)	Children of pre-school age, adults over the age of 18	Target population of proposed research is middle childhood and adolescence
4. Type of study	Empirical study that involves analysis of primary or secondary data	Study does not analyse primary or secondary data	To allow the reviewer to examine the relationship between the variables of interest
5. Measures/ Outcomes	i. Study must contain a measure or evaluation of physical activity and/or outdoor play	i. Study does not contain a measure or evaluation of physical activity and/or outdoor play	Area of interest for this review is physical activity and outdoor play
	ii. Study must contain a measure of social and emotional or mental health related outcomes	ii. Study does not contain a measure of social and emotional or mental health related outcomes	Area of interest for this review is social and emotional and/or mental health related outcomes

A total of six articles were deemed eligible for inclusion following full text review. One further article was identified for inclusion from the reference list of one of the included articles. In total, seven articles were included in this systematic review. Details of included articles are listed in Table 3. Articles that were excluded following full text screening are listed in Appendix A with the rationale for their exclusion. A flow chart of this literature search process is illustrated in Figure 1 below.

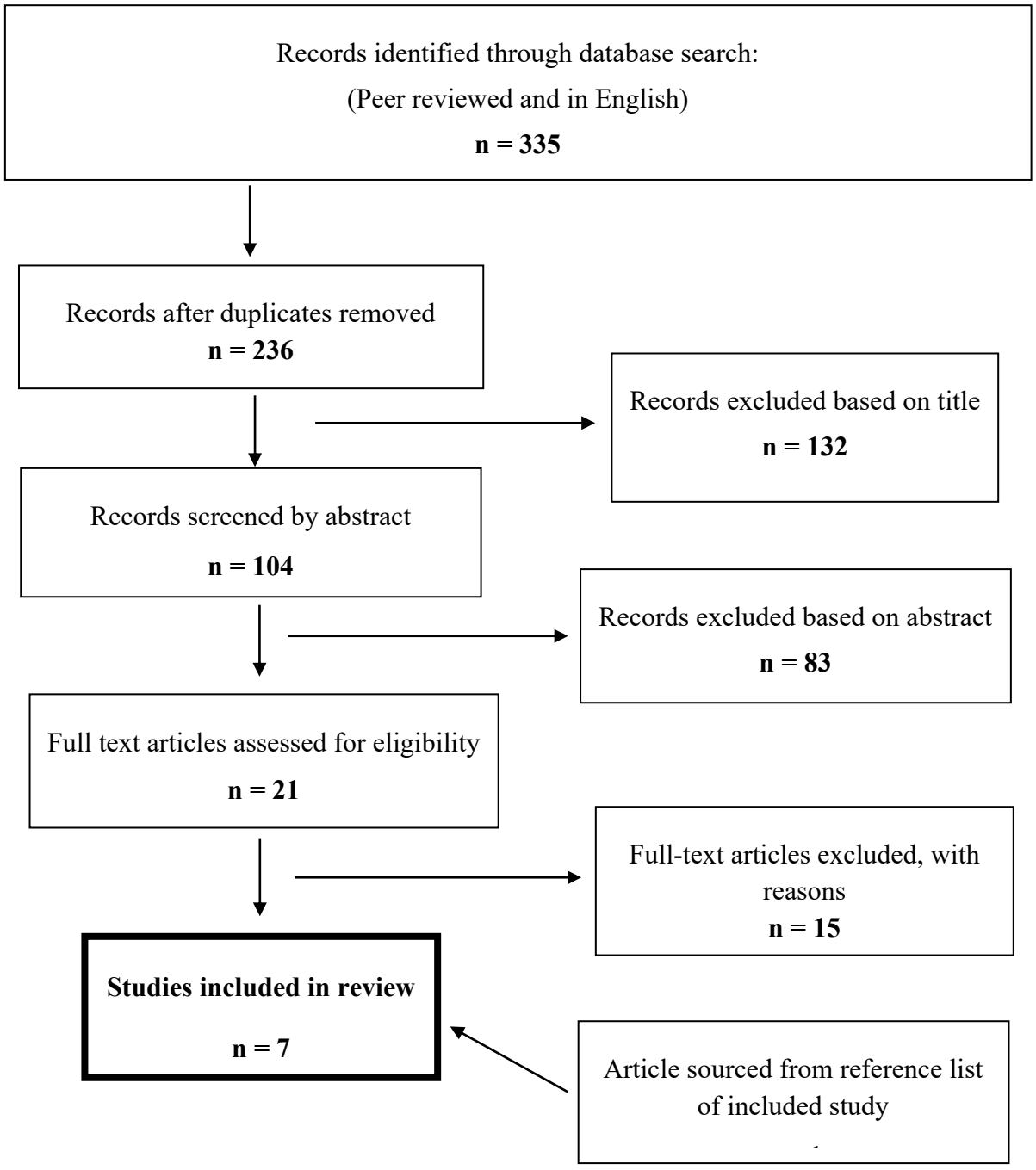

Figure 1. Flow chart of literature search and selection process

Table 3

Full References of Included Studies

Full references of included studies
1. Aggio, D., Gardner, B., Roberts, J., Johnstone, J., Stubbs, B., Williams, G., Sánchez, G.F.L. & Smith, L. (2017). Correlates of children's independent outdoor play: Cross-sectional analyses from the Millennium Cohort Study. *Preventive medicine reports*, *8*, 10-14.
2. Janssen, I. (2016). Estimating whether replacing time in active outdoor play and sedentary video games with active video games influences youth's mental health. *Journal of Adolescent Health*, *59*(5), 517-522.
3. Larouche, R., Garriguet, D., Gunnell, K. E., Goldfield, G. S. & Tremblay, M. S. (2016). *Outdoor time, physical activity, sedentary time, and health indicators at ages 7 to 14: 2012/2013 Canadian Health Measures Survey*. Statistics Canada Health Reports, 27(9), 3-13.
4. Lehrer, J. S., Petrakos, H. H. & Venkatesh, V. (2014). Grade 1 students' out-of-school play and its relationship to school-based academic, behavior, and creativity outcomes. *Early Education and Development*, *25*(3), 295-317.
5. McHale, S. M., Crouter, A. C., & Tucker, C. J. (2001). Free-time activities in middle childhood: Links with adjustment in early adolescence. *Child development*, *72*(6), 1764-1778.
6. Piccininni, C., Michaelson, V., Janssen, I. & Pickett, W. (2018). Outdoor play and nature connectedness as potential correlates of internalized mental health symptoms among Canadian adolescents. *Preventive medicine*, *112*, 168-175.
7. Reid, M. A., MacCormack, J., Cousins, S. & Freeman, J. G. (2015). Physical activity, school climate, and the emotional health of adolescents: findings from 2010 Canadian Health Behaviour in School-Aged Children (HBSC) study. *School Mental Health*, *7*(3), 224-234.

2.4.3 Framework for assessing quality and relevance. All of the studies included in this review were published in peer-reviewed journals. For the purposes of this review the studies were evaluated for quality and relevance using Gough's Weight of Evidence (WoE) framework (Gough, 2007). This framework provides a clear approach for appraising research under three headings; 1) Weight of Evidence A (WoE A) which considers the methodological quality of the study, 2) Weight of Evidence B

(WoE B) which evaluates the methodological relevance of the study and 3) Weight of Evidence C (WoE C) which is a review specific judgement about how appropriate the focus of the evidence is in answering the review question. An overall assessment can then be made about the extent to which each study contributes evidence towards answering the review question by averaging the Weight of Evidence A, B and C scores to give an overall weight of evidence, Weight of Evidence D (WoE D).

Weight of Evidence A (WoE A) was assessed using a study quality criteria checklist derived from the Study Quality Assessment Tool for Observational Cohort and Cross-sectional Studies developed by the National Heart, Lung and Blood Institute (NLHBI) at the US Department of Health and Human Services. Using this study quality criteria checklist, each study was awarded a ranking of high (3), medium (2) or low (1) for WoE A. The criteria used to assign these rankings are included in Appendix B.

Weight of Evidence B (WoE B) refers to the methodological relevance of the study. It is a review-specific judgement about the appropriateness of the form of evidence for answering the review question. For the purposes of this review, a study was awarded a high (3) rating for methodological relevance if it met all of the following criteria; (i) the study had a large, representative sample, (ii) social and emotional development or mental health outcomes were the primary outcome measured and (iii) participants were children with a mean age in middle childhood. A study was awarded a medium (2) rating for methodological relevance if it met two or three of the criteria outlined. A study was awarded a low (1) rating for methodological relevance if it only met one of the outlined criteria for methodological relevance.

Weight of Evidence C (WoE C) involves a review specific judgement about the extent to which the focus of the study contributes towards answering the review question. In order to score high (3) for topic relevance the primary aim of the study should be to investigate the relationship between physical activity and/or outdoor play on children's social and emotional development or mental health outcomes in middle childhood. To score medium (2) for topic relevance one of the study's aims, but not necessarily its primary aim, should be to investigate the relationship between physical activity and/or outdoor play on children's social and emotional development or mental health outcomes in middle childhood or early adolescence. A low score (1) was awarded to studies that indirectly examined the relationship between physical activity and/or

outdoor play and social and emotional development or mental health outcomes in children under the age of 18.

The scores awarded in the different weight of evidence categories, A, B and C are outlined in Table 4 and averaged so that each study is assigned an overall weight of evidence score, Weight of Evidence D (WoE D). Following appraisal of the studies, it was evident that the differences in the quality and relevance of the studies included in this review small. Therefore, each study will be afforded relatively equal weight in the synthesis of findings.

Table 4

Weight of Evidence Ratings

Study	WoE A	WoE B	WoE C	WoE D
Aggio et al. (2017)	2 medium	2 medium	1 low	1.7 medium
Janssen (2016)	3 high	2 medium	1 low	2 medium
Larouche et al. (2016)	3 high	2 medium	2 medium	2.3 medium
Lehrer et al. (2014)	2 medium	2 medium	2 medium	2 medium
McHale et al. (2001)	2 medium	2 medium	2 medium	2 medium
Piccininni et al. (2018)	3 high	2 medium	3 high	2.6 high
Reid et al. (2015)	3 high	2 medium	3 high	2.6 high

WoE scores in the range of 2.6 to 3 are awarded a high weighting, those in the range 1.5 to 2.5 are awarded a medium rating and those 1.4 or below are awarded a low weighting.

2.5 Findings from the Systematic Review

The following section of this chapter discusses the findings from the systematic review in terms of the methodologies used to provide an overview of the existing research in this area and to address the question of how the relationship between physical activity and outdoor play and socio-emotional development has previously been studied. The key findings from each study are then summarised and synthesised so as to address the main questions guiding this review.

2.5.1 Participants. In accordance with the outlined inclusion and exclusion criteria, for a study to be included in this review, participants had to be children or adolescents of school going age, between the ages of six years old and 18 years old. Much of the research exploring play and developmental outcomes has focused on early childhood and as the proposed research aims to explore physical activity and outdoor play in middle childhood and outcomes both concurrently and in adolescence, it was considered pertinent to review the existing literature in relation to this age group. Table 5 provides a summary of participant characteristics including details of sample size, age and gender of participants and where the sample was drawn from.

Sample sizes ranged from 56 (Lehrer et al., 2014) to over 20,000, for the Canadian cross-sectional epidemiologic studies (Janssen, 2016; Piccininni et al., 2018; Reid et al., 2015). It is important to note that in two of these studies the sample for analysis was drawn from the same cohort, a nationally representative sample of public-school students who took part in the Canadian Health Behaviour in School-aged Children (HBSC) study in 2014. The HBSC is a cross-sectional survey administered every four years to gather information on the physical, social, emotional and spiritual health of adolescents aged 11 to 15 years (Currie, Gabhainn & Godeau, 2009). As these two studies used different mental health indicators as outcome measures, both were included in this review. The sample recruited for these two studies was considered to be representative of public-school students in Canada which accounts for more than 93% of the population and a 77% participation rate was obtained at the individual student level (Piccininni et al., 2018). One other study included in this review drew on data from the Canadian HBSC study, however this data was collected as part of the 2009/2010 study and so represents a different cohort of children and adolescents. In five of the studies, the sample was recruited through schools (Janssen, 2016; Lehrer et al., 2014; Piccininni et al., 2018; McHale et al., 2001; Reid et al., 2015). While all studies

reviewed reported data on the gender of participants, data on ethnicity and socioeconomic status was not reported consistently across the studies making it difficult to aggregate this information.

Table 5

Summary of Participant Characteristics

Study	Sample size(n=)	Age & Gender	Where was the sample drawn from?
Aggio et al. (2017)	3856	7 years old; Gender not reported	Nationally representative sample - UK Millennium Cohort Study (MCS)
Janssen (2016)	20,122	11 – 15 years; 47% female, 53% male	Nationally representative sample – 2014 Canadian Health Behaviour in School-aged Children (HBSC) study
Larouche et al. (2016)	1159	7 – 14 years; 48.6% female, 51.4% male	2012/2013 Canadian Health Measures Survey
Lehrer et al. (2014)	56	6 – 7 years; 38 boys, 18 girls	Larger 2 year longitudinal research project on children's transition to school Suburban neighbourhoods of Montreal, Canada
McHale et al. (2001)	198	Mean age: 10.9 years 102 girls, 96 boys	Longitudinal study of family influences on development Rural and small urban school in Northeastern USA
Piccininni et al. (2018)	20,697	11 – 15 years; 47.3% female, 52.7% male	Nationally representative sample – 2014 Canadian Health Behaviour in School-aged Children (HBSC) study
Reid et al. (2015)	26,052	Grades 6 - 10 50.5% female, 49.5% male	Nationally representative sample – 2009/2010 Canadian Health Behaviour in School-aged Children (HBSC) study

2.5.2 Study design. In terms of study design, all of the studies adopted an observational cohort approach. Five of the studies involved analysis of secondary data from large national cohort studies (Aggio et al., 2017; Janssen, 2016; Larouche et al., 2016; Piccininni et al., 2018; Reid et al., 2015). The remaining two studies drew on data gathered as part of smaller scale longitudinal studies (Lehrer et al., 2014; McHale et al., 2001). While some studies used a correlational approach to first establish whether a relationship existed between physical activity and outdoor play and socio-emotional or mental health outcomes, all studies, except one, used regression analysis to predict whether time spent in physical activity and/or outdoor play impacted on these outcomes. This exception was the study by Aggio and colleagues (2017). While this study also used regression analysis to explore the relationship between independent outdoor play and socio-emotional development, in the case of this study, socio-emotional development was used as the predictor variable while outdoor play was used as the outcome variable. In the study by Janssen (2016), the focus was on estimating whether replacing time spent in active outdoor play with time spent playing active video games would be associated with changes in adolescents' mental health. This was investigated using isotemporal substitution models, however, in order to do this the study first needed to explore the relationship between active outdoor play and indicators of mental health using regression analysis.

2.5.3 Measures. The studies included in this review differed somewhat in the measurement tools they used, however methodological approaches were shared across the studies with most using questionnaires or surveys to collect information. As noted, the data used in three studies (Janssen, 2016; Piccininni et al., 2018; Reid et al., 2015) was drawn from the Canadian HBSC study. All of the items in the HBSC questionnaires are developed, validated and pilot tested by the HBSC study team. As such, these three studies analysed data gathered from the same or highly similar questionnaires. However different measures from within these questionnaires were used across these studies. In terms of the exposure variable, three studies measured both physical activity and outdoor play (Aggio et al.,2017; Larouche et al., 2016; McHale et al., 2001), three studies measured only outdoor play (Janssen, 2016; Lehrer et al., 2014; Piccininni et al., 2018) and one measured only physical activity (Reid et al.,2015).

Five of the studies investigated outcomes related to socio-emotional development including, prosocial behaviour, peer relationship problems, emotional problems, and conduct problems (Aggio et al.,2017; Janssen, 2016; Larouche et al., 2016; Lehrer et al., 2014; Reid et al.,2015) The remaining two studies focused on mental health related outcomes such as psychological complaints, somatic complaints and depressive symptoms (McHale et al., 2001; Piccininni et al., 2018).

With regard to the measurement of the exposure variable of physical activity or outdoor play, studies did not tend to report the reliability and validity of measures used. The study by Lehrer and colleagues (2014) directed the reader to references pertaining to the reliability and validity of time-use diaries as a measure of daily activities. Only one study directly reported the reliability of their physical activity measure, the Physical Activity Index ($\alpha = 0.82$) (Reid et al., 2015). In terms of outcome measures, studies which used the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997) noted that it was a valid and reliable instrument with good psychometric properties, details of which were not directly reported (Aggio et al., 2017; Larouche et al., 2016). In the study by Lehrer and colleagues (2014), the Behaviour Assessment System for Children (BASC-2) is reported to have excellent psychometric properties with a test-retest reliability from .87 to .94 and coefficients for internal consistency exceeding .90. The Children's Depression Inventory (CDI) used by McHale and colleagues (2001) as an outcome measure reports its reliability, with Cronbach's α between .74 and .75.

The remaining studies used data from the Canadian HBSC study. In the study by Janssen (2018) the validity of questionnaire items is not reported, however the author notes that to comply with international HBSC protocol questionnaire items must demonstrate good psychometric properties and be well understood by the target population. The study by Piccininni and colleagues measured psychosomatic symptoms as an indicator of mental health using an eight-item scale assessing psychological complaints and somatic symptoms (Piccininni et al., 2018). The authors report that this composite scale has good internal consistency ($\alpha = 0.84$) and acceptable test-retest reliability as a whole ($r = 0.79$). In the final study the authors report good reliability of the Emotional Well-Being Index ($\alpha = .73$) and the Emotional Problems Index ($\alpha = .84$) (Reid et al., 2015. Details relating to the measures used in each of the studies are outlined in Table 6.

Table 6

Summary of Measures Used

Study	Measures used	
	Physical Activity/Outdoor Play	*Socio-Emotional Development/Mental Health*
Aggio et al. (2017)	Independent outdoor play; - Survey questions Physical activity - Accelerometer	Strengths and Difficulties Questionnaire (SDQ)
Janssen (2016)	Active outdoor play; - Survey questions (hours per day, weekdays and weekends)	Survey questions designed to measure; - Emotional problems - Pro-social behaviour
Larouche et al. (2016)	Outdoor play; - Survey questions (15 min intervals on weekdays, total estimate at weekends)	Strengths and Difficulties Questionnaire (SDQ)
Lehrer et al. (2014)	Active Play; - Time-use diary – 'Daily Activities Questionnaire' (DAQ)	Behaviour Assessment System for Children, Second Edition (BASC-2)
McHale et al. (2001)	Free time activities including sports and outdoor play; - Cued recall procedure – report in phone interviews (x7)	Strengths and Vulnerabilities Questionnaire Children's Depression Inventory (CDI)
Piccinnini et al. (2018)	Outdoor play; - Survey questions (hours per day, weekdays and weekends)	Psychosomatic symptoms measured using 8-item scale; - psychological complaints - somatic complaints
Reid et al. (2015)	Physical activity; - Physical activity index; derived from all physical activity related items on HBSC survey	Emotional Well-Being Index Emotional Problems Index

2.6 Synthesis of Findings from the Systematic Review

Having summarised the methodological approaches used across the seven studies included in this review the findings of these studies will now be considered. The key findings of these seven studies are summarised in Table 7 and discussed further below.

Table 7

Summary of Key Findings

Study	Key Findings
Aggio et al. (2017)	Independent outdoor play was associated with having fewer internalising problems, more externalising conduct problems and fewer pro-social behaviours.
Janssen (2016)	Time spent in active outdoor play was associated with a decreased probability of high emotional problems and an increased probability of high prosocial behaviour.
Larouche et al. (2016)	Spending time outdoors was associated with increased levels of physical activity and with lower odds of negative socio-emotional outcomes, specifically peer relationship problems and total difficulties scores.
Lehrer et al. (2014)	No significant association between active physical play and internalising or externalising problems. Active physical play was positively associated with adaptive skills including social and communication skills.
McHale et al. (2001)	Time spent in sports at aged 10 was associated with lower depression scores at aged 12. Time spent in outdoor play at age 10 was positively associated with conduct problems concurrently and at age 12.
Piccinnini et al. (2018)	Outdoor play was associated with a reduction in psychosomatic symptoms such as feeling low, irritability, feeling nervous, difficulty sleeping for girls.
Reid et al. (2015)	Physical activity contributed significantly to both emotional well-being and emotional problems.

Studies varied in relation to the account they took of potential covariates. Most studies, particularly the larger cohort studies included a more robust awareness of covariates (Janssen, 2016; Larouche et al., 2016; McHale et al., 2001; Piccininni et al., 2018; Reid et al., 2015). Covariates accounted for in the analysis of these studies included a range of factors including age, gender, ethnicity, family factors, school factors, health habits, peer relationships and environmental factors. Studies justified their selection of covariates based on existing literature.

2.6.1 Findings on physical activity and outdoor play. It is interesting to compare the data collected on physical activity and outdoor play in terms of daily and weekly averages across the studies reviewed. In total, three studies presented findings on the amount of time that children and young people spent in these activities in this way (Janssen, 2016: Larouche et al., 2016; Piccininni et al., 2018). Janssen (2016) reports that, on average, participants accumulated more than two hours per day in active outdoor play. Similarly, Larouche and colleagues (2016) reported that children and young people averaged 2.3 hours per day of outdoor time and further, found that 59 minutes of this time was spent engaged in moderate to vigorous physical activity. The study by Piccininni and colleagues (2018) estimated a weighted average of weekday and weekend hours spent in outdoor play and converted this to hours of exposure per week. In this way, participants reported playing outdoors outside of school for a mean of 15 hours per week (95% CI: 14.9, 15.9). Average weekly outdoor time was higher among males (16.8 hours) than females (13.5 hours) and decreased slightly as age increased (Piccininni et al., 2018). In contrast, McHale and colleagues (2001) reported that girls spent more time in outdoor play than boys while boys spent more time in structured physical activities like sports than girls.

Two studies further examined whether children's physical activity increased in line with time spent outdoors and found an association between independent outdoor play and objectively measured physical activity using accelerometers (Aggio et al., 2017; Larouche et al., 2016). Lehrer and colleagues (2014) reported that younger children, aged between six and seven, averaged 1 – 1.5 hours per day engaged in play activities outside of school hours and that active physical play was the most common type of play for this sample of children. In addition, they reported that active physical play typically occurred outside, either in the yard or on the street, alley or sidewalk. In contrast, McHale and colleagues (2001) reported that the most common free time

activity outside of school hours was watching television. Taken in congruence, these findings suggest that children from middle childhood up to early adolescence are spending more than the recommended 60 minutes per day in physical activity and/or outdoor play (World Health Organisation (WHO), 2011) and that time spent outdoors is associated with increases in physical activity.

2.6.2 Outdoor play and social development. In terms of the impact of physical activity and outdoor play on social development some inconsistency of findings was observed across the studies included in this review. For younger children, active physical play, which typically took place outdoors, was found to be positively associated with adaptive skills ($p <. 05$) which included adaptability, communication and social skills. While active physical play was not associated with other measures of socio-emotional development it is interesting to note that having the choice of what kind of activity to engage in was a significant predictor of these outcomes (Lehrer et al., 2014). Across middle childhood and into early adolescence, time spent in outdoor play was associated with fewer peer relationship problems and fewer socio-emotional difficulties in general. Findings from one study suggest that each additional hour spent in outdoor play was associated with a 31% lower score on the peer relationships problems scale of the SDQ and a 22% lower score on the total difficulties score of the SDQ (Larouche et al., 2016). In adolescents, Janssen (2016) reported that, after adjusting for the influence of possible confounding factors, time spent in active outdoor play was associated with an increased probability of positive prosocial behaviour. Furthermore, using isotemporal substitution models the author predicted that replacing time spent in active outdoor play with time spent playing active video games would reduce the probability of positive prosocial behaviour by 6% (Janssen, 2016).

However, two of the studies included in this review reported findings which conflict somewhat with those reported above. In the UK study, which used socio-emotional development as the variable to predict engagement in outdoor play, it was reported that having more externalising conduct problems and fewer prosocial behaviours was associated with a higher probability of engaging in outdoor play (Aggio et al., 2017). One other study found that time spent playing outdoors was linked to less adaptive functioning including more conduct problems (McHale et al., 2001). In

contrast, this study found that time spent in structured activities such as sports was more positively associated with aspects of social development. (McHale et al., 2001).

2.6.3 Outdoor play and emotional development. All of the studies included in this review presented findings with regard to the relationship between physical activity and outdoor play and emotional outcomes, with varying results. Firstly, an association between engaging in outdoor play and having fewer emotional and peer relationship problems, as measured by the SDQ, was observed for younger children (Aggio et al., 2017). Furthermore, engaging in structured physical activities such as sports at ten years of age was found to significantly predict scores on measures of childhood depression two years later. This suggests that children who engage in more sports activities at ten years old have fewer emotional problems at twelve years old (McHale et al., 2001). The study by Lehrer and colleagues (2014) found no significant association between active physical play and internalising problems.

In the studies that looked at early adolescence, Piccininni and colleagues (2018) found that after adjusting for covariates, outdoor play averaging more than 0.5 hours per week was associated with a 24% reduction in the prevalence of psychosomatic symptoms in girls only. No statistically significant relationship was observed for boys. Outdoor play was most strongly related to psychological complaints such as feeling low or depressed, irritability or bad temper, feeling nervous and difficulty sleeping. Janssen (2016) did not report on gender differences in the association between active outdoor play and emotional outcomes. However, it was reported that time spent in active outdoor play was associated with a decreased probability of emotional problems. Similar to findings relating to active outdoor play and prosocial behaviour, it was also suggested that replacing active outdoor play with playing video games would result in a 7% increase in the probability of emotional problems (Janssen, 2016). The final study with an adolescent population looked at the impact of physical activity on emotional wellbeing and emotional problems (Reid et al., 2015). This study found that physical activity significantly predicted both emotional wellbeing and emotional problems although it was a better predictor of emotional wellbeing. A comparison of age groups found that physical activity was equally important for both younger and older adolescents despite differential levels of emotional wellbeing being reported for these groups (Reid et al., 2015).

In interpreting the findings from the systematic review, it is necessary to take into consideration the strengths and limitations of the studies reviewed. A key strength of many of the included studies lay in their large sample sizes which were nationally representative making findings highly generalisable. In addition, the use of such datasets allowed for a range of covariates to be accounted for in the investigation of the relationship between play and development. A further strength of the studies was their use of reliable and validated measures of socio-emotional development. However, a limitation of the studies is noted in the reliability and validity of their measures of outdoor play which mostly relied on self or parent report raising concerns about potential biases such as social desirability. A further limitation is noted in the cross-sectional design of these studies. In all studies, the exposure and outcome variables were measured at the same time point with only one study looking at outcomes longitudinally, albeit over a relatively short, two-year period (McHale et al., 2001). This gives rise to questions about the bi-directional nature of the relationship between physical activity and outdoor play and socio-emotional outcomes as it is difficult to determine whether play is impacting on socio-emotional development, or whether it is the other way around.

This systematic review set out to explore the existing evidence base for an association between physical activity and outdoor play and to examine what, if any, impact these activities have on socio-emotional development or mental health outcomes. In summary, while some inconsistency of findings is noted, the evidence reviewed tentatively suggests that an association does exist between physical activity and outdoor play and socio-emotional development with these activities generally having a positive impact on social, emotional and mental health outcomes . However, further exploration of this relationship is warranted.

2.7 Conclusion and Implications

2.7.1 Key conclusions from the review. The literature reviewed at the outset of this chapter drew attention to the importance of physical activity and outdoor play for health, development and wellbeing. The findings from the subsequent systematic review provide some direct empirical evidence of a link between these activities and socio-emotional development lending some support to the assertion that children and young people who spend more time engaged in physical activity and outdoor play report better

social, emotional and mental health outcomes. Findings also support the suggestion that children are more physically active when they are outdoors (Aggio et al., 2017, Lehrer et al., 2014; Larouche et al., 2016). It was also noted that time spent in structured physical activities such as sports or in unstructured outdoor play is associated with better social and emotional outcomes than time spent watching television or using other digital media (McHale et al., 2001; Janssen, 2016). It appears thus that engagement in physical activity and outdoor play has a role in improving peer relationships and prosocial behaviour and in improving emotional wellbeing while decreasing the prevalence of emotional problems in children and adolescents. While these findings are encouraging, it is important to note they were inconsistent across the studies reviewed, with findings also suggesting that outdoor play was associated with fewer prosocial behaviours and increased conduct problems (Aggio et al., 2017; McHale, 2001).

Nevertheless, it appears that providing children with the opportunities to engage in this kind of play may have the potential to make a positive impact on children's socio-emotional development. These make for particularly interesting findings when considered in the context of recent research suggesting a decline or change in children's activities. International research suggests a decline in outdoor play and an increase in time spent in screen-based activities (Singer et al., 2009; Mullan, 2019), while in the Irish context, data from the GUI national longitudinal study of children reported similar preferences and patterns (ESRI, 2016). Evidence for the relationship between physical activity and outdoor play and social, emotional and mental health outcomes lends tentative support to the hypothesised link between the decline in play and the rise in socio-emotional and mental health difficulties in children and adolescents (Gray, 2011a).

2.7.2 Implications for policy and practice. The findings of this review raised some implications for practice worth consideration, particularly in the context of educational environments now being increasingly focused on the promotion of mental health and wellbeing as well as on academic learning (DES, 2018). In addition to the findings of the systematic review, the earlier part of this chapter highlighted the importance of outdoor play for improved self-control, self-regulation and more focused attention (Kemple et al., 2016). These skills are essential when it comes to academic achievement and better classroom behaviour (Yogman et al., 2018). Schools therefore

have an important role in providing opportunities for outdoor play that maximises children's involvement and enjoyment. Studies have found that providing this kind of high-quality outdoor play environment for children does not require expensive equipment or complicated interventions to have a significant positive impact on children's mental health and wellbeing (Brussoni et al., 2017; Bundy et al., 2017).

In addition to the evidence of a relationship between outdoor play and positive social and emotional outcomes, it is also worth noting that an association has been found to exist between negative feelings, such as anxiety, and not being afforded adequate time for play (Howard, Miles, Rees-Davies & Bertenshaw, 2017). These findings have further implications in educational settings where common behaviour modification strategies can include disallowing a child to go out to the playground at breaktime or restricting unstructured or choice time often used as a reward in behaviour management systems. Research has shown that breaktimes in school provide the opportunity for active games and social interactions with peers in a safe environment that is relatively free of adult control (Blatchford, 1998; Blatchford, Baines & Pellegrini, 2003). Given the posited benefits of physical activity and outdoor play suggested by the current review, coupled with the reported decline in children's unstructured outdoor play outside of school, it is important that school breaktimes are protected within the school day and valued for their importance in socio-emotional development and wellbeing. For the educational psychologist (EP) working with schools and providing consultation and support at a whole school and at an individual level, the value of outdoor play and games at unstructured times during the school day should be promoted.

2.7.3 Directions for future research. The literature suggests that children's experiences of play influences their social and emotional development and further claims have been made linking a decline in opportunities for unstructured outdoor play in recent decades to a rise in socio-emotional and mental health difficulties in children and adolescents (Gray, 2011a; Jarvis et al., 2014; Whitebread, 2017). However, as this systematic review has reported, empirical evidence that directly supports the existence of a relationship between outdoor play and socio-emotional development exists but is not extensive. One observation about the evidence base regarding outdoor play is the comparative lack of research studies exploring patterns of physical activity and outdoor

play in middle childhood. Studies of the developmental benefits of outdoor play in early childhood are more common (Bento & Dias, 2017; Brussoni et al., 2017) and it is evident that outdoor play is important in early childhood when social and emotional skills are developing. Yet research would suggest that outdoor play retains its social and emotional importance during middle childhood (Howard et al., 2017).

Middle childhood sees a transition to more formal educational experiences with increasing academic demands. In the Irish context, pupils transition from the infant classes which are guided by Aistear: the Early Childhood Curriculum Framework (NCCA, 2009) which focuses on learning and development through play into classes guided by the Primary School Curriculum where the focus is on more traditional classroom learning. However, a review of this curriculum for primary schools is currently underway which proposes a greater focus on wellbeing and potential for more play-based learning both in the classroom and outdoors (NCCA, 2020). Research in the Irish context is therefore warranted and timely in order to further explore patterns of physical activity and outdoor play in middle childhood and to investigate how engagement in these activities may be associated with socio-emotional development.

A further area for consideration arising from this research has emerged in relation to the design of studies exploring outdoor play and social and emotional development. Quantitative research studies into physical activity and outdoor play and interventions to promote this kind of play have been carried out and there is a growing evidence base for the role of play in increasing physical activity. However, outcomes in other domains, such as social and emotional development have received less attention using a quantitative approach (Gibson et al., 2017). As noted, the studies that were included in this systematic review mainly adopted a cross-sectional design. Thus they are limited in that they measure both the exposure and the outcome at the same time point thus not allowing for assessment of temporal associations between the exposure and the outcome variables. Similar studies to those included in this review have highlighted the need for future research to include a longitudinal component which would allow temporal associations between play and indicators of socio-emotional development to be assessed. Furthermore, they suggest that the use of national datasets, where possible, would add substantially to this body of literature (Hinkley, Brown, Carson, & Teychenne, 2018).

Finally, the physical activity element of outdoor play warrants further investigation. Research has found that physical activity is linked to improved physical and mental health and academic achievement (Gibson et al., 2017; Janssen & LeBlanc, 2010; Korezak et al., 2017). The evidence from this review suggests that children's levels of physical activity increase when they are outdoors, so it remains uncertain whether the benefits of outdoor play are attributable to physical activity or to other factors specific to unstructured outdoor play (Picininni et al., 2018). The study by Janssen (2016) reported that the level of physical activity experienced during outdoor play is similar to that experienced when playing active video games. However, in this study active outdoor play was more strongly and consistently associated with improved mental health indicators than active video games (Janssen, 2016). This suggests that there is something special about outdoor play, as opposed to physical activity, that benefits children's social and emotional development and this too is an area that future research needs to address.

2.8 The Current Study and Research Questions

It is the aim of the current research to address the issues raised through this review of the literature. Firstly, it focuses on middle childhood, exploring patterns of physical activity and outdoor play at this developmental stage with a view to how these activities impact on socio-emotional development. Secondly, through the use of a national, longitudinal data set, it allows for the temporal exploration of the relationship between physical activity and outdoor play and socio-emotional development as it investigates whether time spent in these activities in middle childhood impacts on socio-emotional outcomes both concurrently and longitudinally. Thirdly, it aims to investigate whether a difference exists between structured physical activities and unstructured outdoor play in terms of their impact on socio-emotional development. Finally, given the potential benefits of outdoor play for children's socio-emotional development, it aims to explore barriers and enablers of this type of play.

To address these aims, the current research set out to answer the following research questions:

1. What are the current levels of physical activity and outdoor play in middle childhood in Ireland?

2. Is there a relationship between the amount of time children spend in physical activity and outdoor play and their socio-emotional development in middle childhood?
3. Do children who spend more time engaged in physical activity and outdoor play in middle childhood report better socio-emotional outcomes in their teenage years?
4. Is there a difference between children's involvement in structured physical activity and unstructured active outdoor play in terms of their impact on social and emotional development?
5. What factors affect levels of physical activity and outdoor play for children in Ireland today?

Chapter 3: Study 1 – Investigating the Impact of Physical Activity Play, Exercise and Sport on Socio-Emotional Development

3.1 Overview

This chapter describes the first study that was carried out as part of the current research. The aim of this study to explore physical activity play, exercise and sport in middle childhood and to examine the relationship between these activities and children's socio-emotional development, both concurrently and longitudinally. It involved secondary analysis of data collected as part of the Growing Up in Ireland (GUI) study. This data was used to investigate the amount of time nine-year-old children in Ireland spent in physical activity play, exercise or sport on a typical day and to explore whether a relationship existed between time spent in these activities and socio-emotional development outcomes both at the same time point and later in adolescence.

The Growing Up in Ireland (GUI) study is a national longitudinal study of children in Ireland which began in 2007. The GUI study was commissioned by the Irish government and is being carried out on an ongoing basis by researchers from the Economic and Social Research Institute (ESRI) and Trinity College, Dublin (TCD). The study focuses on two cohorts of children: the infant cohort, which began collecting data when the study child was nine months old, and the child cohort, which began collecting data when the study child was nine years old. The data collected for the GUI study is archived in the Irish Social Science Data Archive (ISSDA), in the form of an Anonymised Microdata File (AMF) and is available to researchers on request.

Data from the child cohort of the GUI study provided the opportunity to investigate this relationship between the amount of time children in Ireland spent in physical activity play, exercise or sport and their socio-emotional development. For the purposes of the current study, analysis was carried out on the data collected during the first wave of the study, when the study children were nine years old. Further longitudinal analysis of data collected during the second and third waves of the GUI study was also carried out to explore whether time spent in physical activity play, exercise and sport at nine-years-old impacted on later socio-emotional outcomes measured when participants were aged 13, during the second wave of data collection, and aged 17/18, during the third wave of data collection.

The use of a national longitudinal dataset to explore how physical activity and outdoor play relates to socio-emotional development has been indicated by previous research for a number of reasons (Hinkley et al., 2018). Firstly, the GUI data was gathered from a nationally representative sample of children in Ireland allowing for generalisability of findings. Furthermore, families who participated in the study provided a vast amount of information about the children included in the study and their daily lives. In the current study, this rich and informative data allows for greater depth of analysis of the relationship between physical activity play, exercise or sport and socio-emotional development through the inclusion of a range of covariates in the final analysis. These covariates include other factors that may be impacting on socio-emotional development at the individual, microsystem and exosystem levels. Finally, the use of this data set addresses one of the core limitations of previous research in this area. Previous studies have relied on cross-sectional design and analysis therefore they are limited in that physical activity and outdoor play and socio-emotional outcomes were measured at the same time point making it difficult to understand the directionality of the relationship (Aggio et al., 2017; Janssen, 2016; Larouche et al., 2016; Piccininni et al., 2018; Reid et al., 2015). The current study addresses this limitation through its investigation of the impact of physical activity and outdoor play on socio-emotional outcomes over time.

This chapter describes the methods used in Study 1 providing information on the sample included, data collection procedures, measures used in the GUI study that are relevant to the current research and ethical considerations. It then reports on the results of the analysis conducted using the GUI data. The chapter concludes with a summary of key findings from Study 1.

The following research questions are addressed in Study 1:

1. What are the reported levels of physical activity and outdoor play in middle childhood in Ireland?
2. Is there a relationship between the amount of time children spend in physical activity and outdoor play and their socio-emotional development?
3. Do children who spend more time engaged in physical activity and outdoor play in middle childhood report better socio-emotional outcomes in their teenage years?

3.2 Methodology

3.2.1 Sample. The sample for the child cohort of the GUI study was generated through the Irish national school sector which is made up of three types of schools; mainstream national schools, special schools and private primary schools. Both mainstream national schools and special schools are funded by the Department of Education and Science (DES) while private primary schools are fee-paying and privately funded. Using a two-stage sampling design, a nationally representative sample of 1,105 schools was first selected and approximately 82% of these (910 schools) consented to participate in the study. The response rate at the school level was higher for mainstream national schools (82%) and special schools (91%) than it was for private schools (44%) (Murray et al., 2010). In the second stage, the sample of children and their families were then randomly generated from within those schools with a response rate at the family level of 57% which was consistent across the three types of school (McCoy, Quail & Smyth, 2012; Murray et al., 2010). This yielded a total sample of 8,568 study children, their primary and secondary caregivers and their school principals and teachers who provided the data for this cohort of the GUI study.

For the purposes of the current research, the sample included for analysis was comprised of participants in the child cohort of the GUI study who completed the main surveys and subsequently returned self-completion time-use diaries. A total of 6,412 time-use diaries were returned from the 8,568 nine-year-old children who were interviewed during Wave 1 of the GUI study. 184 of these diaries were deemed to be unusable by the GUI study team due to reasons such as too much missing information or implausible information given. This left a total of 6,228 usable time-use diaries, representing an effective response rate of 72.6% of participation in the main study. For the purposes of this study, a further seven time-use diaries were deemed unusable due to implausible information such that the study child was reported to be engaged in several other activities whilst also reported to be engaged in physical activity play, exercise or sport.

Thus, the final file for analysis of data collected during Wave 1, when the study child was nine years old, contained 6221 children and their families who completed the survey and returned the time use diary. The sample for analysis of data at Wave 2 contained 5673 participants who had returned time use diaries at Wave 1 and completed the surveys at Wave 1 and Wave 2. The final sample for analysis of data at Wave 3

contained 4626 participants who had returned time use diaries at Wave 1 and successfully completed surveys at Waves 1, 2 & 3. This information, as well as the gender breakdown of participants, is summarised in Table 8 below.

Table 8

Final Sample Sizes for Study 1 Analysis

	Wave 1 (Age 9)		**Wave 2 (Age 13)**		**Wave 3 (Age 17/18)**	
Sample size	n = 6221		n = 5673		n = 4626	
	male n=3091	*female* n=3130	*male* n=2828	*female* n=2847	*male* n=2282	*female* n=2344

3.2.2 Data collection procedures. Data collection in the GUI study was carried out by fieldworkers who had received specific training by the GUI study team in advance of meeting participating families. Data for the child cohort of the GUI study was collected firstly in the school setting and then in the study child's home. Having completed the school-based phase of the project, participating families were then visited in their homes by the trained interviewers. The respondents in the home included the primary caregiver, who was the main respondent to the survey, and the study child. In 98% of cases, the primary caregiver was the study child's biological mother. Where possible, the resident spouse or partner of the primary caregiver was also interviewed in the home. In cases where there was a non-resident parent of the study child, a self-completion questionnaire was sent to this non-resident parent, with the consent of the primary caregiver.

The main interview with the primary caregiver was carried out on a face to face basis using a Computer Assisted Personal Interview (CAPI). Respondents were also asked to self-complete a paper-based questionnaire which included potentially sensitive questions. At the end of the interview a paper-based self-completion time-use diary was left with the respondent who had completed the main primary caregiver questionnaire. They were asked to fill out the time-use diary with the study child on an agreed date. A worked example of the time-use diary was explained by the interviewer and left with the respondent. Participants were asked to return the time-use diary, once completed, to the

study team by post in a prepaid envelope. Full details of the data collection procedures are available in technical reports issued by the GUI study team (Murray et al., 2010; Thornton, Williams, McCrory, Murray & Quail, 2016; Murphy, Williams, Murray & Smith, 2019).

3.2.3 Measures. For the purposes of the current study, the main outcome measured was the study child's socio-emotional development while the predictor variable was the amount of time the study child spent in physical activity play, exercise or sport on a typical day. Details on the measures used for these variables and covariates included in the final analysis are provided below.

Socio-emotional development measure. Socio-emotional development was measured using the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997). The SDQ is a social, emotional and behavioural screening questionnaire which is widely used in both research and clinical practice. It was selected for use in the GUI study to provide an outcome measure across behavioural and psychosocial domains. There are versions available for completion by parents or teachers of children aged 3–16 years old and a self-rated version for children aged between 11 and 16 years old. The questionnaire contains 25 items and produces scores on five subscales with a subscale score range of 0-10. The subscales measured are: Emotional symptoms (e.g. often unhappy, downhearted or tearful), Peer relationship problems (e.g. rather solitary, tends to play alone), Conduct problems (e.g. often fights with other children), Hyperactivity/inattention (e.g. thinks things out before acting), and Prosocial behaviour (e.g. considerate of other people's feelings) . Each subscale comprises five items. A 'Total Difficulties' score can be calculated by adding the scores on the Emotional symptoms, Peer relationships problems, Conduct problems and Hyperactivity/inattention subscales. These four subscales can also be grouped into internalising problems, which combines scores from Peer relationship problems and Emotional symptoms subscales and externalising problems, which combines scores from the Hyperactivity/inattention and Conduct problems.

To complete the Strengths and Difficulties Questionnaire, respondents were asked to what extent they agreed with each item on a three-point rating scale of 'Certainly true', 'Somewhat true' or 'Not true'. Item scores vary from 0 to 2, individual subscale scores range from 0 to 10 and the total difficulties score ranges from 0 to 40. Responses given by the primary caregiver were used as the main outcome measure of

socio-emotional development as primary caregivers completed the SDQ during all three waves of data collection when the study child was aged nine, 13 and 17/18 respectively.

Information pertaining to subscales and combined scales of the SDQ is summarised in Figure 2 below.

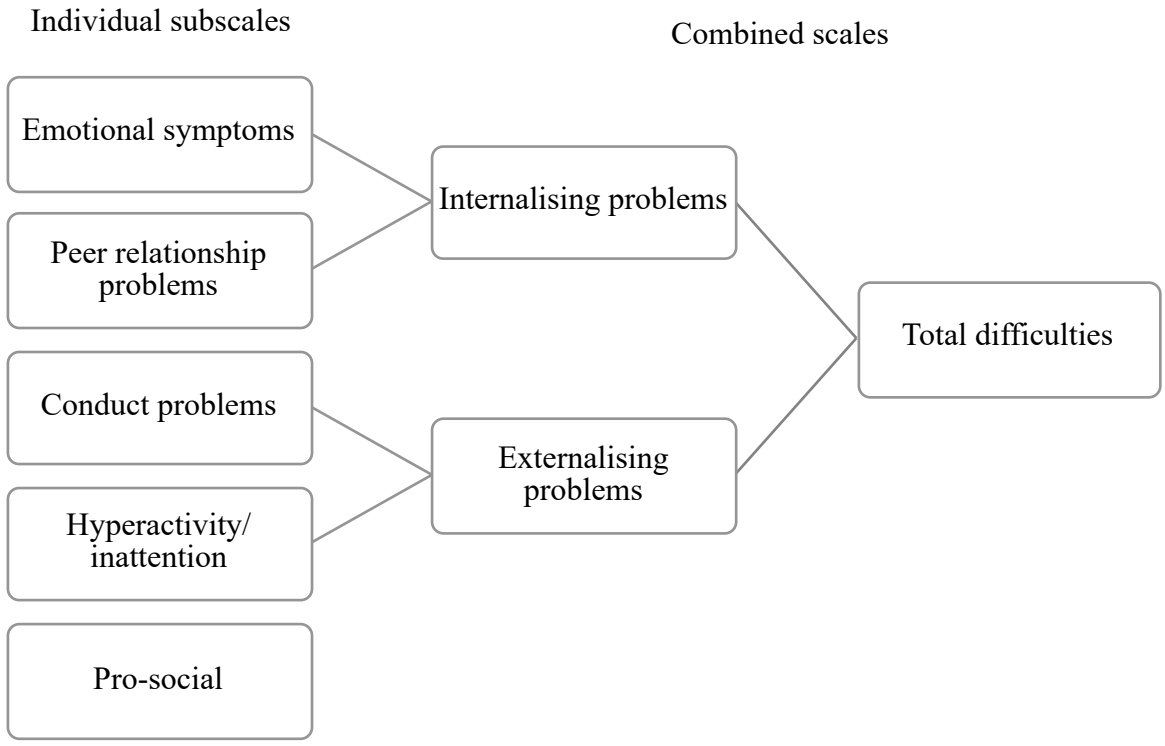

Figure 2. Individual Subscales and Combined Scales of the SDQ

The SDQ has good psychometric properties and has been used previously in large scale longitudinal research studies around the world (Murray et al., 2010). With regard to validity, it has been shown to correlate highly with the Child Behaviour Checklist (Goodman & Scott, 1999). The SDQ has been shown to differentiate well between clinical and community based samples when used as a screener and to assess socio-emotional health and problem behaviours in children (Goodman, 1997; Goodman & Scott, 1999). In an evaluation of the internal reliability of the SDQ in a large sample of British children, aged 5-15 years, moderate to strong coefficient alphas were reported for the parent version. The mean alpha across all scales and all versions was good at .73 (Goodman, 2001). The SDQ has also been found to have stable test-retest reliability over a 12-month period (Hawes & Dadds, 2004). Reliability analyses have been carried

out on the SDQ sub-scales and total difficulties score for the GUI Wave 1 (Age 9) and Wave 2 (Age 13) sample and alpha coefficients have been reported in publications by the GUI study team (Nixon, 2012; Williams et al., 2018). This information is summarised in Table 9 below.

Table 9

Reliability of primary caregiver rated SDQ subscales and total difficulties score

	Cronbach's alpha	
	Wave 1	**Wave 2**
SDQ subscale;		
Emotional symptoms	.67	.69
Peer relationship problems	.74	.55
Conduct problems	.57	.59
Hyperactivity/Inattention	.74	.77
Total difficulties (total of four sub-scales)	.79	.67
Pro-social	.63	.64

Time-use diary. The independent or predictor variable used in this analysis was the amount of time that the study child spent in physical activity play, exercise or sport on a given day. This was calculated using the information provided by participants in the GUI study in the time-use diaries that were completed during the first wave of data collection at age 9 years. The purpose of the time-use diaries was to record what the study child did over a 24-hour period, from 12.00 midnight until 12.00 midnight. As such, the diary day was divided into 96 15-minute intervals or time slots. The time-use diaries contained 22 pre-coded activities, examples of which included things like sleeping, personal care, at school, physical activity play/exercise/sports, watching TV, on a family outing and so on. Respondents were asked to tick to indicate which activities the study child was involved in during each of the time slots, with the option to record up to five activities concurrently.

The GUI study team combined 'physical activity play, exercise and sport' into one category, and this was given as one of the pre-coded activities within the time-use diary. The examples listed as a guide for this category included playground, running, chasing, football, judo, ballet and dance. As such, this category did not distinguish between structured activities such as football practice or dance classes and unstructured activities such as playground or chasing. For the purposes of analysis in the current study the number of time slots where respondents ticked this physical activity play/exercise/sports category was summed for each participant to give an overall total of the amount of time that participants spent engaged in this activity during their diary day. This new variable was used as the predictor variable in the analysis.

Covariate measures. As outlined in the previous chapter, the literature indicates a number of individual and systemic factors which are thought to impact on socio-emotional development. Based on this literature, these factors were included as covariates in the analysis for this study. The measures used to gather information about these covariates are described below.

Four individual child variables were included as covariates in the analysis: the study child's gender, whether the study child had a learning difficulty (yes/no), whether the study child had been the victim of bullying in the past year (yes/no) and the study child's temperament. Data for all of these variables was obtained during the interview with the primary caregiver. The temperament variable was measured using the Emotionality, Activity and Sociability (EAS) Temperament Survey for Children: Parental Ratings (Buss & Plomin, 1984). The EAS is a 20-item questionnaire which was designed to measure aspects of temperament that are related to developmental differences in personality and behaviour. It produces scores on four scales: Emotionality (α = .80), Activity Level (α = .69), Sociability (α = .54) and Shyness (α = .68) (Nixon, 2012). Each scale consists of five items and respondents were asked to indicate their level of agreement with each item on a five-point scale which ranged from 'not characteristic' to 'very characteristic', resulting in a score ranging from 0 to 5 on each of the four scales.

Three family related variables were included as covariates in the analysis: primary caregiver's health status, parental depression and the parent-child relationship. These variables were based on primary caregiver reported data. The primary caregiver health status variable was created from a question which asked whether the respondent

currently had, or had in the past, suffered from any chronic illness or disability which made it difficult for them to look after the study child. The responses available to this question were ‘in the past’, ‘currently’ and ‘no’. These responses were recoded into two categories, ‘yes’ and ‘no’, for the purposes of this analysis.

Parental depression was measured using the Centre for Epidemiological Studies Depression Scale (CES-D). The CES-D is a widely used self-report measure that is used as a screening instrument for depression in the general population and the short eight-item version was used in the GUI study. This instrument was included in the sensitive supplementary section of the questionnaire for the primary caregiver to self-complete using paper and pen. Sample items include: “I felt that I could not shake off the blues even with help from my family and friends”, and “I thought my life had been a failure”, which were answered on a four-point Likert-scale ranging from 0 (<1 day) to 3 (5–7 days), with reference to the previous seven-day period. A composite score is calculated by summing item responses. Composite scores of 7 and above are classified as depressed with scores < 7 defined as not depressed (Murray et al., 2010). Internal reliability of the CES-D with the current sample was good ($\alpha = .89$) (Nixon, 2012).

The parent-child relationship variable described the nature of the relationship between the primary caregiver and the study child and was measured using the Pianta Child-Parent Relationship Scale (CPR-S) (Pianta, 1992). This instrument is comprised of 30 statements which form three subscales; Conflicts ($\alpha = .85$), Positive Aspects of the Relationship ($\alpha = .58$) and Dependence (Nixon, 2012). The Conflicts subscale is comprised of 12 items relating to the parent’s perception of difficulties in their relationship with their child and the interpersonal temperament traits of their child. The Positive Aspects subscale includes 10 items relating to getting on with their child and feelings of effectiveness in the parent. The Dependence subscale is comprised of four items mainly relating to the parent’s perception of the child’s dependence on him/her. Thus, The Pianta CPR-S taps into both positive and negative aspects of the parent-child relationship. Respondents indicated the extent to which each of 30 statements applied to their current relationship with the study child, in the form on a 5-point scale: ‘Definitely does not apply’, ‘Not really’, ‘Neutral’, ‘Not sure’, ‘Applies somewhat’, and ‘Definitely applies’. A score on each subscale can then be calculated.

Two environmental variables were included as covariates in the analysis: life events and socio-economic status (SES), as measured by household income. Information on these variables was collected during the primary caregiver interview. The life events variable was created from a question which provided the respondent with a list of potentially disturbing, unsettling or traumatic events. Items on this list included things like moving to a new house, parental separation, the death of a parent, as well as providing the respondent with the opportunity to describe a disturbing event not covered in this list. Respondents indicated which, if any of these events, the study child had experienced. For the purposes of the analysis in the current study, the number of life events that each study child had experienced was summed to create the life events variable. The SES variable used net household income as a measure of socio-economic status. Respondents were provided with a card displaying 10 categories of net household income and asked to select which category their household fell into. These categories were coded in deciles from 1 – 'lowest' up to 10 – 'highest' and these deciles were used as the measure of SES for the purposes of this analysis.

3.2.4 Ethical Considerations. Ethical approval for the GUI study was granted by the Research Ethics Committee (REC) of the Health Research Board in Ireland. The parent or guardian and the study child provided written informed consent prior to beginning the data collection process. Procedures relating to child protection were informed by the Children First Guidelines (Department of Health and Children, 1999). All interviewers, as well as other staff working on the Growing Up in Ireland study, were vetted by An Garda Siochána. Further, more detailed information on the ethical considerations in the GUI study are available in technical reports issued by the research team (Murray et al., 2011). The current study involved the use of anonymised data from the GUI study which ensured that the participants could not be identified. This data is archived in the Irish Social Science Data Archive (ISSDA) in the form of an Anonymised Microdata File (AMF). In order to access this file, the researcher applied to the ISSDA for permission to use the data, briefly outlining the purpose of the current research. This permission was granted and the AMF was forwarded to the researcher to be downloaded for use.

3.3 Results

3.3.1 Statistical analysis. Secondary analysis on the Growing Up in Ireland datasets was performed using IBM SPSS® Statistics, Version 26. *P*-values less than 0.05 were considered statistically significant. The dataset was cleaned for outliers or missing data. As previously reported, 184 time-use diaries were excluded by the GUI study team due to missing or implausible information. A further seven time-use diaries were excluded for the purposes of the current analysis due to implausible information recorded. Thus, the final sample sizes for analysis were 6221 at Wave 1, 5673 at Wave 2 and 4626 at Wave 3.

Preliminary analyses were conducted on potential covariates. These variables included the study child's gender, health status, temperament, presence of a learning difficulty, experience of being bullied, the primary caregiver's physical and mental health, the nature of the parent-child relationship, the study child's experience of adverse life events and socioeconomic status as measured by household income. Information pertaining to these potential covariates was collected during Wave 1 when the study child was nine years old[1]. In order to determine that each of the covariates included in the final analyses were significantly impacting on SDQ scores, preliminary analyses were carried out using either independent samples t-tests or correlations. The findings of these preliminary analyses are reported in Appendix C. The variables which were found to be significantly associated with the total difficulties scores on the SDQ were included as co-variates within the final analysis which is reported below.

Hierarchical Linear Regressions were conducted as the main analyses to examine the association between time spent in physical activity play, exercise or sport at nine years old and scores on the Strengths and Difficulties Questionnaire (SDQ) at the three different time points; age 9 (Wave 1), age 13 (Wave 2) and age 17 (Wave 3). All analyses were conducted with the score on each of the individual subscales of the SDQ; emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and pro-social; and with the SDQ total difficulties score. The total difficulties

[1] To account for variances in each of the covariates that may have occurred at the different time points, additional analyses were conducted to include the same or similar covariates as measured when the study child was 13 years old, when running the analysis on Wave 2 data and as measured when the study child was 17 years old when running the analysis on Wave 3 data. No notable variations in the results were observed and as such results are presented as above with covariates measured at age 9.

score was calculated be adding scores on the emotional symptoms, peer relationship problems, conduct problems and hyperactivity/inattention subscales.

At block one of the regression model, the predictor variable, time spent in physical activity play, exercise or sport was entered. At block two individual level factors were entered; gender, health status, presence of a learning difficulty, temperament, experience of bullying. At block three family level factors were entered; primary caregiver's health status, primary caregiver's experience of depression, parent-child relationship. Finally, at block four environmental level factors were entered; adverse life events and socio-economic status. Figure 3 provides an illustration of this model. Standardised regression coefficients (β) are reported throughout.

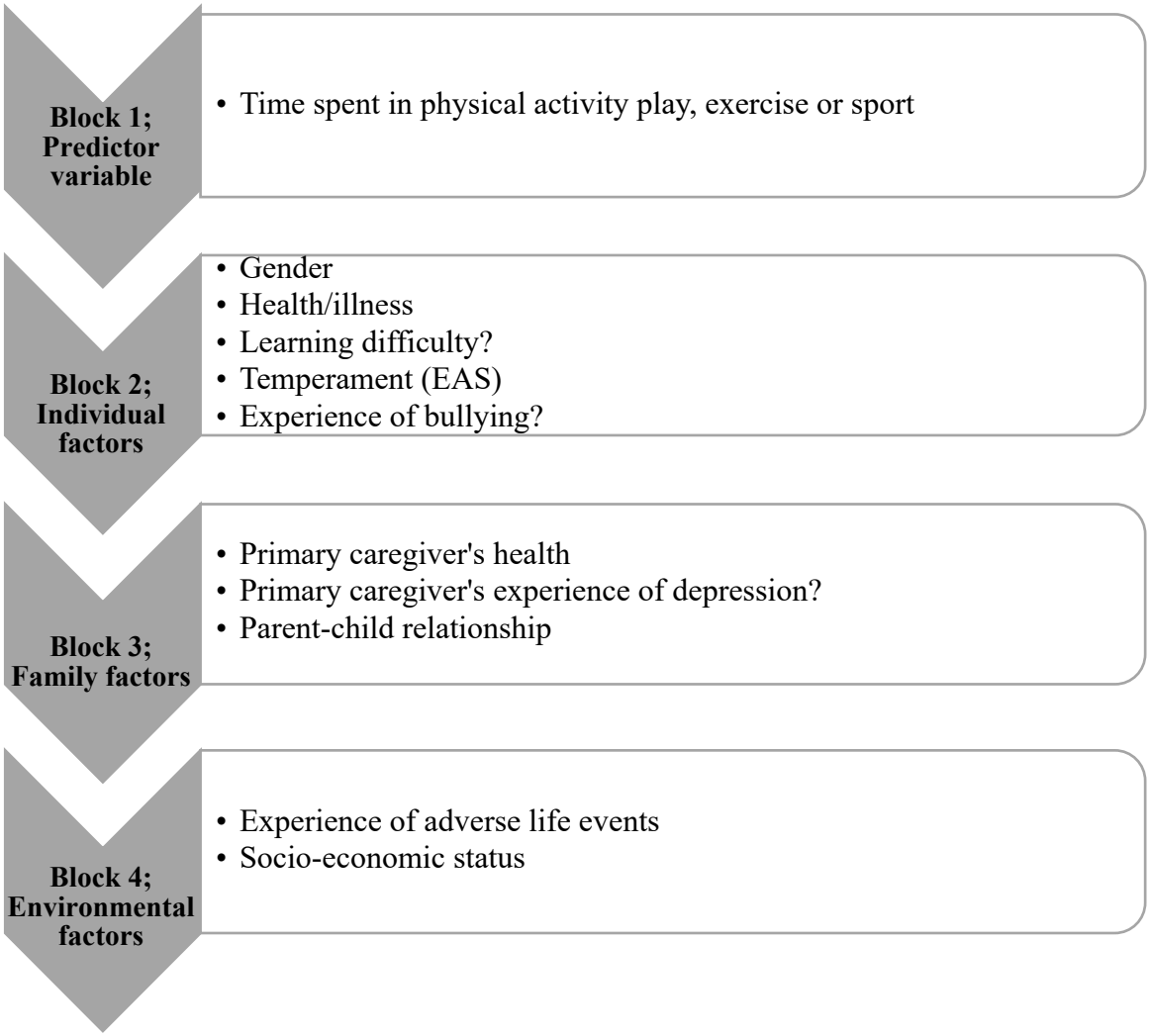

Figure 3. Hierarchical Linear Regression Model

3.3.2 Descriptive statistics. The predictor variable in the regression analysis was the amount of time the study child spent in physical activity play, exercise or sport on a given day. The average amount of time reported to be spent in this activity by nine-year-old children in Ireland at the time of measurement was 1.3 hours (SD = 1.37). There was a significant difference between the amount of time spent engaged in these activities for boys (M = 1.54, SD = 1.47) and girls (M = 1.06, SD = 1.22); $t(6219)$ = 14.19, $p \leq .001$. No difference in the time spent in these activities was noted for children who had an ongoing chronic illness or disability (M = 1.26, SD = 1.38) and those who did not (M = 1.30, SD = 1.37); $t(6219)$ = -.74, $p \leq .001$. The outcome variables in the regression analyses were the scores reported by the primary caregiver on the Strengths and Difficulties Questionnaire (SDQ). See Table 10 for further details of SDQ scores.

Background information pertaining to the covariates controlled for in the final analysis are outlined in Table 11 and Table 12. Frequencies are provided for gender, health status, learning difficulty, experience of bullying and primary caregiver health status. Means and standard deviations are recorded for scores on the relevant scales; EAS Temperament Survey, Pianta CPR-S, Primary caregiver depression score (CES-D) and number of adverse life events.

Table 10

Means, Standard Deviations and Range for SDQ Scores (Wave 1, Wave 2, Wave 3)

Wave 1 (n = 6221)	**Mean**	**Std. Deviation**	**Range**
Total difficulties;	7.18	4.95	37
- Emotional symptoms	1.96	1.94	10
- Peer relationship problems	1.10	1.39	9
- Conduct problems	1.21	1.42	10
- Hyperactivity/inattention	2.92	2.40	10
Pro-social	8.87	1.42	9
Wave 2 (n = 5675)			
Total difficulties;	6.31	4.91	35
- Emotional symptoms	1.71	1.89	10
- Peer relationship problems	1.06	1.34	10
- Conduct problems	1.06	1.43	10
- Hyperactivity/inattention	2.48	2.30	10
Pro-social	8.79	1.50	10
Wave 3 (n = 4626)			
Total difficulties;	6.49	4.96	33
- Emotional symptoms	1.94	2.10	10
- Peer relationship problems	1.36	1.49	10
- Conduct problems	0.94	1.25	10
- Hyperactivity/inattention	2.24	2.17	10
Pro-social	8.68	1.64	10

Table 11

Descriptive Statistics for Categorical Covariates

	n	*Percentage %*
Gender;		
Boys	3091	49.7
Girls	3130	50.3
Study child health status;		
Ongoing chronic illness/disability	599	9.6
No chronic health problems	5622	90.4
Diagnosis of learning difficulty?		
Study child has learning difficulty	517	8.3
No learning difficulty	5704	91.7
Study child has been the victim of bullying?		
Yes	1288	20.7
No	4929	79.2
Don’t know	4	.06
Primary caregiver health status;		
Ongoing chronic illness/disability	785	12.6
No chronic health problems	5435	87.4

Table 12

Means and Standard Deviations for Continuous Covariates

	Mean	*Std. Deviation*
Temperament (EAS Temperament Survey);		
- Shyness	2.28	0.75
- Emotionality	2.08	0.87
- Activity level	4.05	0.78
- Sociability	3.63	0.63
Parent-child relationship (Pianta CPR-S);		
- Conflicts	21.65	8.39
- Positive aspects of the relationship	44.73	3.81
- Dependence	10.20	3.43
Primary caregiver depression score (CES-D)	1.92	3.04
Number of adverse life events	1.85	1.09

3.3.3 Regression analysis. ***Wave 1 Analysis.*** Hierarchical linear regressions were conducted to test the association between time spent in physical activity play, exercise or sport, as recorded at nine years old, and scores on the various scales of the SDQ at the same time point. The results of this analysis found that the predictor variable significantly predicted scores on the emotional symptoms subscale of the SDQ, R^2 = .002, $F(1, 4113) = 8.01$, $p = .005$, and the peer relationship problems subscale of the SDQ, $R^2 = .005$, $F(1, 4109) = 19.719$, $p < .001$, before adding the covariates to the model. No significant effects were noted on scores on each of the other individual subscales or on the SDQ total difficulties score at this stage of the analysis (Total difficulties: R^2=.00, $F(1, 4104) = 1.34$, $p = .25$; Conduct problems: R^2=.00, $F(1, 4110) = 1.36$, $p = .24$; Hyperactivity/inattention: R^2=.001, $F(1, 4108) = 3.22$, $p = .07$; Prosocial: R^2=.001, $F(1, 4113) = 2.38$, $p = .12$).

After controlling for the influence of the covariates, results showed that time spent in physical activity play, exercise or sport continued to significantly predict scores

on the peer relationships subscale (β = -.03, *SE* = .01, *p* = .04 , 95% CI [-.06, -.002]). This finding suggests that children who spent more time engaged in physical activity play, exercise or sport were reported to have fewer difficulties in their peer relationships. Results showed the predictor variable did not continue to significantly predict scores on the emotional symptoms subscale after accounting for the influence of the covariates (β = .01, *p* = .25, 95% CI [-.01, .06]. Results also showed no statistically significant impact of the predictor variable on the other SDQ scores after covariates were controlled for (Total difficulties; β = .01, *p* = .59, 95% CI [-.06, .10]; Conduct problems: β = .02, *p* = .22, 95% CI [-.01, .04]; Hyperactivity/inattention: β = .01, *p* = .61, 95% CI [-.04, .06]; Prosocial: β = -.02, *p* = .24, 95% CI [-.05, .01]).

Table 13

Percentage of Variance (R^2) in the SDQ Outcome Variables at Age 9 (Wave 1) Explained at each Block of the Regression Model

	Emotional symptoms	Peer problems	Conduct problems	Hyper/ inattention	Total difficulties	Pro-social
Block 1: *(predictor variable)*	.002**	.005***	.000	.001	.000	.001
Block 2: *(Block 1 + individual factors)*	.379***	.314***	.185***	.189***	.415***	.107***
Block 3: (*Block 2 + family factors)*	.406***	.332***	.420***	.266***	.532***	.243***
Block 4: *(Block 3 + environ-mental factors)*	.409***	.341***	.424***	.270***	.541***	.244

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

While the predictor variable did not significantly predict SDQ scores after covariates were added to the regression models (with the exception of the peer relationships problems subscale), results of the regression analyses highlighted the significant impact of individual, family and environmental factors on SDQ scores on all scales. For emotional symptoms, peer relationship problems, hyperactivity/inattention and the total difficulties scores the largest contribution to the regression models were made by individual factors. For the conduct problems and pro-social subscale the largest contribution to the regression models were made by family factors. Details of the percentage of variance (R^2) explained by each block of the regression model are summarised in Table 13 above. Full details of the regression analysis and the proportion of variance accounted for by each of the covariates in the SDQ subscale scores and total difficulties score at Wave 1 is included in Appendix D.

Wave 2 analysis. Hierarchical linear regressions were then conducted to test the association between time spent in physical activity play, exercise or sport at nine years old and SDQ scores when the study child was 13 years old. Similar to the findings of the analysis of Wave 1 data, the results of this analysis found that the predictor variable significantly predicted scores on the emotional symptoms subscale of the SDQ when the study child was 13 years old, R^2= .001, $F(1, 3767) = 4.12$, $p = .04$, and the peer relationship problems subscale of the SDQ when the study child was 13 years old, R^2 = .004, $F(1, 3767) = 14.77$, $p < .001$, before controlling for the covariates. No significant effects were noted on scores on each of the other individual subscales or on the SDQ total difficulties score at this stage of the analysis (Total difficulties: R^2=.00, $F(1, 37637) = 1.34$, $p = .25$; Conduct: R^2=.00, $F(1, 3767) = .03$, $p = .86$; Hyperactivity: R^2=.001, $F(1, 3767) = 2.33$, $p = .13$; Prosocial: R^2=.000, $F(1, 3767) = 1.05$, $p = .31$).

After controlling for the influence of the covariates, results showed that time spent in physical activity play, exercise or sport at nine years old continued to significantly predict scores on the peer relationship problems subscale of the SDQ at 13 years old (β = -.04, $SE = .02$, $p = .01$, 95% CI [-.08, -.01]). This is similar to the findings at 9 years of age and suggests that children who spent more time engaged in physical activity play, exercise or sport at nine years old were reported to have fewer difficulties in their peer relationships at 13 years old. Also similar to the findings at age nine, results showed the predictor variable did not continue to significantly predict scores on the emotional symptoms subscale at 13 years old once covariates had been accounted

for (β = .01, *p* = .52, 95% CI [-.03, .05]). Results showed no statistically significant impact of the predictor variable on other SDQ scores at 13 years old after controlling for the covariates (Total difficulties: β = -.01, *p* = .51, 95% CI [-.13, .06]; Conduct: β = .002, *p* = .90, 95% CI [-.03, .03]; Hyperactivity: β = -.003, *p* = .84, 95% CI [-.05, .04]; Prosocial: β = -.005, *p* = .74, 95% CI [-.04, .03]).

Consistent with the findings of Wave 1 analysis, the findings of regression analyses conducted with Wave 2 data also highlighted the significant impact of individual, family and environmental factors included as covariates on SDQ scores at age 13. Details of the percentage of variance (R^2) explained by each block of the regression model are summarised in Table 14 below. Full details of the regression analysis and the proportion of variance accounted for by each of the covariates in the SDQ subscale scores and total difficulties score at Wave 2 are included in Appendix D.

Table 14

Percentage of Variance (R^2) in the SDQ Outcome Variables at Age 13 (Wave 2) Explained at each Block of the Regression Model

	Emotional symptoms	Peer problems	Conduct problems	Hyper/ inattention	Total difficulties	Pro-social
Block 1: *(predictor variable)*	.001*	.004***	.000	.001	.000	.000
Block 2: *(Block 1 + individual factors)*	.188***	.141***	.099***	.172***	.243***	.075***
Block 3: (*Block 2 + family factors)*	.213***	.154***	.220***	.230***	.323***	.148***
Block 4: *(Block 3 + environ-mental factors)*	.217***	.159***	.226***	.235***	.334***	.149

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

Wave 3 Analysis. Results of a hierarchical linear regression conducted to assess the impact of time spent in physical activity play, exercise or sport at nine years old on SDQ scores recorded when the study child was 17 years old showed no statistically significant findings. (Total difficulties: $R^2 = .00$, $F(1, 3068) = .33$, $p = .57$; Emotional: $R^2 = .001$, $F(1,3068) = 1.93$, $p = .16$; Peer relationship problems: $R^2 = .00$, $F(1,3068) = .46$, $p = .50$; Conduct: $R^2 = .002$, $F(1, 3068) = 4.73$, $p = .03$; Hyperactivity: $R^2 = .001$, $F(1, 3068) = 3.28$, $p = .07$; Prosocial: $R^2 = .00$, $F(1, 3068) = .003$, $p = .95$.)

After controlling for the covariates no association was found between the predictor variable and the SDQ total difficulties score (β = -.01, *p* = .69, 95% CI [-.16, .11]). No significant effects were noted on each of the other subscales (Emotional: β = .02, *p* = .20, 95% CI [-.02, .09]; Peer: β = .02, *p* = .42, 95% CI [-.02, .06]; Conduct: (β = -04, *p* = .03, 95% CI [-.07, -.01]); Hyperactivity: β = -.03, *p* = .17, 95% CI [-.10, .02]; Prosocial: β = -.01, *p* = .59, 95% CI [-.06, .03]). Furthermore, individual, family and environmental factors included as covariates did not significantly predict SDQ scores at age 17, all *p*'s > .05. Table 15 below outlines the percentage of variance (R^2) in the outcome variables (SDQ scores) at the three different time points explained by the predictor variable (the amount of time the study child spent in physical activity play, exercise or sport at nine years of age).

Table 15

Percentage of Variance (R^2) in the SDQ Outcome Variables at age 9, 13 and 17/18 Explained by the Predictor Variable (Physical Activity Play, Exercise and Sport at Age 9)

	Emotional symptoms	Peer problems	Conduct problems	Hyper/ inattention	Total difficulties	Pro-social
Wave 1 – Age 9	.002**	.005***	.000	.001	.000	.001
Wave 2 – Age 13	.001*	.004***	.000	.001	.000	.000
Wave 3 – Age 17/18	.001	.000	.002	.001	.000	.000

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

3.4 Summary of Key Findings

Based on the data analysed in this study, the findings showed that children in middle childhood in Ireland spent approximately 1.3 hours engaged in physical activity, exercise or sport on a typical day. It is promising to note that this finding was consistent for children who experienced good health and for children who experienced an ongoing illness, disability or special educational need. However, consistent with previous findings, on average boys spent more time engaged in these activities than girls (Piccininni et al., 2018). The types of activities included in this category of physical activity include structured activities such as football training, dance classes and martial arts and unstructured active outdoor play activities such as running, chasing and playing in a playground. Given that the sample used in this study comes from a nationally representative sample of nine year old children this is an encouraging finding. The current recommended guidelines for physical activity by the Department of Health for this age group is at least 60 minutes per day (Department of Health and Children & Health Service Executive, 2009). This finding suggests that, on average, nine year old children in Ireland were meeting this recommendation at the time of data collection. However, it is worth noting that this data was collected between August 2007 and May 2008 and that patterns and habits may have changed since this time.

With regard to physical activity and outdoor play and the association between time spent in these activities and socio-emotional development, findings from this study suggest that children who spend more time in these kinds of activities at nine years old have fewer emotional difficulties and fewer difficulties in their peer relationships. However, analysis of data also highlighted the impact of a range of other individual, family and environmental factors on socio-emotional development. When these factors were controlled for in the analysis only the association between physical activity and outdoor play and peer relationship problems remained significant. The amount of physical activity and outdoor play a child engaged in was not associated with other aspects of socio-emotional development such as emotional problems, conduct problems, hyperactivity, inattention or pro-social behaviour when other confounding influences on socio-emotional development were taken into consideration.

Longitudinal analysis of the data found a similar pattern at age 13. Children who engaged in more physical activity and outdoor play in middle childhood also reported fewer emotional difficulties and peer relationship problems in their early teenage years.

However, when the same range of individual, family and environmental factors were controlled for in this analysis, again only the association between physical activity and outdoor play and peer relationships remained significant. Again, levels of physical activity and outdoor play did not impact on other aspects of socio-emotional development. Furthermore, there was no significant association between time spent in physical activity and outdoor play in middle childhood and socio-emotional development in the later teenage years at age 17/18. These key findings will be discussed further in Chapter Five in light of the previous literature, theoretical context and methodological considerations.

3.5 Conclusion

The current study used data from a national longitudinal study of children. Using this dataset allowed for longitudinal analysis, which facilitated an exploration of the impact of children's engagement in a particular type of play on their socio-emotional development over time. While using this dataset provided insight into the relationship between the variables in a large sample, one area for consideration that arises from the findings of this study pertains to the type of play that this study explored and the way in which it was measured. The use of this dataset, and in particular the time-use diaries which recorded children's activities over the course of a typical day, meant that categories of play were determined by the GUI study team. The GUI study placed structured physical activity such as organised exercise or sport into the same category as unstructured outdoor play such as chasing or playground games thereby not taking into account that each of these types of activity may have benefits distinct from each other. Therefore, Study 2 which is described in Chapter Four aims to address this limitation by separating this category of play into structured physical activities and unstructured active outdoor play with a view to investigating the impact of both of these activities separately on socio-emotional outcomes. Furthermore, Study 2 also aims to include the measurement of wider factors relating to the outdoor environment and neighbourhood which were not included in this first study in order to address the impact of these factors on outdoor play from a bioecological perspective. Study 2 is described in the following chapter.

Chapter 4: Study 2 - Comparing Structured Physical Activity and Unstructured Outdoor Play and their Relationship with Socio-Emotional Development

4.1 Overview

This chapter describes the second study of the current research. Findings from Study 1 indicated a small but statistically significant impact of time spent in physical activity and outdoor play on certain aspects of social and emotional development, particularly peer relationships. Physical activity and outdoor play were not found to be associated with other aspects of social and emotional development. However, the data collected and analysed in Study 1 did not separate structured physical activity such as organised exercise or sport from unstructured active outdoor play such as running, chasing and playground games.

Physical activity of all kinds, be it structured or unstructured is thought to be beneficial for health and development (Gleave & Cole-Hamilton, 2012). Yet, it is worthwhile exploring whether there is a difference between children's engagement in structured physical activity (exercise or sport), which is typically adult led, and unstructured, child-led, active outdoor play in terms of their impact on socio-emotional development. As described in the earlier literature review, one of the core defining features of play is that it is freely chosen and child-directed. Coupled with this, the posited benefits of this kind of unstructured play, in the outdoors particularly, were outlined. It is therefore possible that looking at these two kinds of physical activity separately may yield different findings in relation to their impact on socio-emotional development.

Consequently, the second phase of this study aimed to separate structured physical activity and unstructured outdoor play into two distinct categories. It sought to investigate current patterns of these activities in middle childhood and to explore the impact of each on socio-emotional development. A further aim of this phase of the research was to investigate the individual and systemic factors that impact on levels of physical activity and outdoor play in middle childhood in Ireland today.

This chapter outlines the methods used in Study 2 beginning with a methodology section which includes information pertaining to the sample, data collection procedures, measures used and ethical considerations. It then reports on the

data analysis and results from this study. Finally, the chapter concludes with a brief summary of key findings from Study 2. These key findings will be discussed in detail, with the findings from Study 1, in the subsequent discussion chapter.

The following research questions are addressed in Study 2:

1. What are the current levels of physical activity and outdoor play in middle childhood in Ireland?
2. Is there a difference between children's involvement in structured physical activity and unstructured active outdoor play in terms of their impact on social and emotional development?
3. What factors affect levels of physical activity and outdoor play for children in Ireland today?

4.2 Methodology

4.2.1 Sample. This study is concerned with the play behaviours and socio-emotional development of children in middle childhood. In line with the Study 1 described in the preceding chapter, the sample included children in middle childhood, aged between 8 and 10 years old, and their parents or guardians. The sample for this study was recruited through Irish primary schools in September 2019. Two schools agreed to participate in the study and by doing so allowed the researcher to approach the relevant classes. To target the required age group, families who had children in 3rd or 4th class at this time were approached and asked to participate in the study. One of the two schools was located in a satellite urban town and had three parallel groups of 3rd and 4th class. The other school was located in an independent urban town and had two parallel groups of 3rd and 4th class. In total, ten class groups were approached, and 280 surveys were distributed. 108 surveys were returned representing a response rate of 39%. The minimum number of participants required was determined by an a priori power analysis using the G*Power Statistical Power Analyses tool (Faul, Erfelder, Buchner & Lang, 2009). The sample size was estimated on the basis of a medium effect size and this minimum number was reached. The sample used in the regression analysis was still within range after the reduction in sample size from 108 to 84 based on the number of time-use diaries returned.

Background information was collected on the gender and age of participating children. Frequencies for these characteristics are provided in Table 16 below.

Table 16

Gender and Age of Participants in Study 2

	n	Percentage %
Gender;		
- boys	51	47.2
- girls	57	52.8
Age;		
- 8 years	18	16.7
- 9 years	51	47.2
- 10 years	37	34.3
- not provided	2	1.8

4.2.2 Data Collection Procedures. School principals were initially contacted via telephone call. The purpose of this initial contact was to briefly explain the research and identify whether the principal was interested and willing for families in their school to be approached to participate in the research project. Once interest was established, school principals were sent an information pack containing an information letter outlining the project in further detail. A copy of this information letter is included in Appendix E. This information pack also contained letters and consent forms for parents and children, the questionnaires and time-use diary. Subsequent telephone contact was made to clarify any issues and to obtain permission from the school principals to proceed with the research in their school. An appropriate time to deliver the materials to the school was also arranged at this time.

Following this, an information pack about the project was provided for every pupil in 3rd and 4th class to take home. The information packs included: a letter and information sheet for parent/guardian (see Appendix F), an informed consent form for parent/guardian (see Appendix G), an information sheet for children (see Appendix H), a child assent form (see Appendix I), the questionnaires and time use diary and an

envelope in which to return the documents. Pupils were asked by their class teacher to take the information packs home and give them to their parent or guardian. Having read the information provided, those who wished to participate in the research signed consent forms and completed the measures. Participants were asked to complete all three measures, detailed in the following section, if time allowed. However, it was acknowledged in the information provided, that as the time-use diary was relatively time consuming to complete, families could still participate in the study by completing and returning the other two measures only. Completed measures were then returned to the school, in the sealed envelope provided, and collected by the researcher. Families who did not wish to participate in the research were asked to return the information pack to the school for the researcher to collect.

4.2.3 Measures. The measures completed in this study included a range of questions aimed at capturing information about children's levels of structured physical activity and unstructured active outdoor play and their socio-emotional development. They also sought to gather information about the factors that encourage and preclude children from engaging in physical activity and outdoor play.

Socio-emotional development measure. In line with Study 1, the Strengths and Difficulties Questionnaire (SDQ): Parent Report (Goodman, 1997) was used as a measure of children's socio-emotional development. The SDQ is a brief emotional and behavioural screening questionnaire which captures information about a child's emotional symptoms, conduct problems, hyperactivity/inattention, peer relationships and prosocial behaviour. This SDQ is widely used and standardised measure with good psychometric properties (Goodman, 1997), as described in the previous chapter.

Time-use diary. Consistent with the measures used in Study 1 which drew on data from the Growing Up in Ireland (GUI) study, participants were asked to complete a time-use diary to record the activities children were engaged in throughout a typical day. Research has indicated that this type of measure where participants are asked to provide diary-type information for the preceding 24-hour period has been found to be reliable and valid (Ben Arieh & Ofir, 2002). This measure used in the current study was adapted from the one used in the GUI study. This amended time-use diary covered a 15-hour period from 07:00 until 22:00 which was divided into 15-minute intervals. This

differs from the time-use diary used in the GUI study which covered a 24-hour period. The time-use diary was streamlined in this way, for ease of completion, based on the assumption that the participating children would usually be sleeping between the hours of 22.00 and 07.00.

The amended time-use diary contained 21 pre-coded activities. These activities were much the same as the activities listed in the GUI time-use diary. The key adaptation of the amended time-use diary was that it separated the category of 'physical activity play, exercise or sport' used in the GUI time-use diary into two distinct categories; 'physical exercise or sport' and 'active outdoor play', thereby making the distinction between structured or organised physical activity and unstructured outdoor play. Examples provided for physical exercise and sport included football training/match, swimming lesson etc while those provided for active outdoor play included chasing, outdoor games, playing ball etc. Respondents were asked to mark the diary to indicate which of the 21 pre-coded activities the child was involved in during each of the 15-minute time slots across the diary day. Where the child was engaged in more than one activity at a given time, respondents were asked to record whichever activity they felt to be the main activity at that time. A copy of the amended time-use diary used in this phase of the study, with instructions for completion, is provided in Appendix J.

Physical activity and outdoor play questionnaire. Information about the child's involvement in physical activity and outdoor play was also gathered using a questionnaire made up of two sections, adapted from questions used in the GUI study. In the first section, respondents were asked to rate how much time their child usually spends in active outdoor play on a typical school day and on a typical weekend day. Response options were divided into 30-minute blocks ranging from 'not at all' to '4+ hours'. Respondents were asked to provide estimates for school days and weekend days separately to account for the different commitments and schedules that might occur on a typical weekday as opposed to a typical weekend day. Examples of active outdoor play were given, which included 'chasing, trampolining, outdoor games, riding a bike, playing ball etc'. The phrasing of this question and the response options were adapted from measures used in the GUI study which asked participants to provide an estimate of how much time they spend in moderate to hard exercise daily.

Using the same format, the next questions asked respondents to rate how much time their child spends in structured physical activities such as organised exercise or sport on a typical school day and on a typical weekend day. Examples of organised physical exercise or sport were provided, and these included 'football training or match, swimming lessons, dance class etc'. The examples given of both unstructured active outdoor play activities and structured physical activities were derived from examples given questionnaires used in the first wave of data collection in the GUI study and from the examples given in the physical activity play, exercise or sport category in the time-use diaries, also used in the first wave of data collection in the GUI study. Given that the GUI data was used in Study 1, examples were drawn from the measures used in the GUI study to ensure a level of consistency with the data collection measures in Study 2.

The second section of this questionnaire explored supports and barriers to outdoor play, through two questions. In the first part of this section participants were asked to tick to indicate, from a provided list, which factors prevented their child from engaging in outdoor play and which factors encouraged their children to play outdoors. Examples of these factors included availability of play spaces, weather, neighbourhood safety, traffic, homework, having other children to play with, involvement in clubs/activities and access to outdoor play equipment. A number of these factors were identified from previous research on outdoor play using data from the GUI infant cohort (Egan & Pope, 2018) and from other Irish research evaluating children's health (Safefood, 2017).

In the second part, participants were asked to indicate the extent to which they agreed or disagreed with nine statements relating to their child's engagement in physical activity and outdoor play. Some of these statements drew on similar items and response options used with the infant cohort of the GUI study at age 5. Examples of statements included 'It is safe for children to play outside in my area during the day' and 'My child has access to outdoor play equipment (e.g., trampoline, bike, skates, etc.)' Responses were rated on a 4-point scale ranging from 'Strongly agree' to 'Strongly disagree'. A copy of this questionnaire is provided in Appendix K.

4.2.4 Pilot Study. A pilot study was carried out with six families before commencing data collection. The purpose of this pilot study was to ensure clarity and understanding

of the instructions and questionnaire items. The information packs containing information and consent/assent forms for parents and children, questionnaires and the time-use diary were distributed directly to these families by the researcher. Families read the material and completed the questionnaires and time-use diaries at their convenience and returned them to the researcher in a sealed envelope with an accompanying feedback sheet whereby any suggestions or concerns could be noted. Some suggestions were made regarding some of the phrasing of the information for parents and this was incorporated prior to commencing data collection. No issues emerged with completion of the questionnaires or time-use diary.

4.2.5 Ethical Considerations. This study received ethical approval from the Mary Immaculate College Research Ethics Committee (MIREC). A copy of this ethical approval is included in Appendix L. The Psychological Society of Ireland (PSI) Code of Professional Ethics (PSI, 2010) and the Guidelines for Developing Ethical Research Projects Involving Children (DCYA, 2012) were adhered to in the design of this phase of the current research. Key ethical considerations identified in this phase of the project included the inclusion of a vulnerable sample (i.e. children under the age of 18), gaining informed consent of participants and ensuring anonymity and confidentiality in relation to the handling of data in line with GDPR regulations. The practical application of these considerations are outlined below.

Inclusion of child participants. The focus of this study is children under the age of 18. In line with the Guidelines for Developing Ethical Research Projects Involving Children (DCYA, 2010) this study has adopted a child friendly inclusive approach to the research process. As this study concerns the lives of children, in addition to the informed consent given by their parent/guardian, the child was provided with age appropriate information about the study. This information was explained in a child friendly manner, and their assent for the sharing of details about them and their activities was sought. The information provided also informed children that they did not have to be involved in the project if they did not want to be.

Informed consent. In line with the PSI Code of Professional Ethics, (1.3.4) the researcher obtained the informed consent of the parent/guardian by providing the information necessary to make an informed decision about participating in the research

study (PSI, 2010). This information was relayed in accessible language and participants were provided with the contact details of the researcher should any further clarification be required. Participants were given adequate time to review all of the information regarding the study and could come to a decision of their own accord whether or not they wished for their family to participate. This ensured that consent was not given under conditions of duress (PSI, 2010). Participants were reminded that their participation was voluntary and could be withdrawn without giving a reason and without consequence.

Anonymity and confidentiality. To ensure anonymity and confidentiality each participating family was given a unique code at the outset of data collection. All data stored, both in hard copy and electronic format, was anonymised using the unique identifying code and stored securely. To further protect participants no specific naming of schools or geographical locations is mentioned in this final report. In accordance with the Mary Immaculate College's Record Retention Schedule, anonymised research data may be held indefinitely.

4.3 Results

4.3.1 Statistical analysis. Statistical analysis was carried out using IBM SPSS® Statistics, Version 26. *P*-values less than 0.05 were considered statistically significant. A total of 108 families completed and returned the questionnaire on physical activity and outdoor play and the Strengths and Difficulties Questionnaire (SDQ). Of this total, 84 of the participating families also completed the time-use diary.

Multiple regression was used to examine the association between scores on the Strengths and Difficulties Questionnaire (SDQ) and time spent in structured physical activity (exercise or sport) and in unstructured active outdoor play. Similar to Study 1, the predictor variables were time spent in structured physical activity (exercise or sport) and time spent in unstructured active outdoor play, as recorded in the time use diaries. The outcome variables were scores on the Strengths and Difficulties Questionnaire (SDQ), which were provided by the child's parent or guardian. All analyses were conducted with the SDQ total difficulties score and with scores on each of the individual subscales - emotional symptoms, peer relationship problems, conduct problems, hyperactivity/inattention, and pro-social. The total difficulties score on the SDQ is calculated by summing the scores on the emotional symptoms, peer relationship

problems, conduct problems and hyperactivity/inattention subscales. Standardised regression coefficients (β) are reported throughout. Descriptive statistics were used to summarise information provided in the questionnaire on physical activity and outdoor play. This information pertains to estimated amounts of time spent in these activities on typical school and non-school days, as well as further information on the individual, social and environmental factors that impact on physical activity and outdoor play.

4.3.2 Descriptive statistics. A standard multiple regression was used to predict the total difficulties score and scores on the individual subscales of the Strengths and Difficulties Questionnaire (SDQ) from the amount of time the study child spent in organised physical exercise or sport and the amount of time he or she spent in active outdoor play on a typical day, as recorded in the time-use diaries. In total, 84 participants completed the time-use diary (40 boys, 44 girls). 70 diaries were completed on a typical school day for the child and 14 were completed on a typical weekend day. The average amount of time reported to be spent in organised exercise or sport per day was 45.6 minutes (*SD* = 0.72). The average amount to time reported to be spent in active outdoor play per day was 40.8 minutes (*SD* = 0.80). Further information pertaining to average amounts of time spent in unstructured active outdoor play and in organised exercise or sport on both school days and weekend days is outlined in Table 17 below.

Table 17

Descriptive Statistics for Predictor Variables (Means and Standard Deviations); Study 2*

	School Day (n=70)		Weekend Day (n=14)	
	Active outdoor play	*Exercise or sport*	*Active outdoor play*	*Exercise or sport*
Time-use diary	*M* = 40 *SD* = .83	*M* = 42 *SD* = .72	*M* = 45 *SD* = .65	*M* = 64 *SD* = .71

*Mean is reported in minutes

The outcome variables used in the regression analysis were the scores provided by the child's parent or guardian on the Strengths and Difficulties Questionnaire (SDQ). Table 18 below outlines further details of these SDQ scores including the mean, standard deviation and range of scores on each of the individual subscales as well as on the total difficulties scale.

Table 18

Means, Standard Deviations and Range for SDQ scores (Study 2)

	Mean	**Std. Deviation**	**Range**
Total difficulties	10.16	4.35	18
- Emotional symptoms	1.91	1.94	7
- Peer relationship problems	2.57	1.15	6
- Conduct problems	1.84	1.15	5
- Hyperactivity/inattention	3.83	1.89	8
Pro-social	8.67	1.54	8

4.3.3. Regression analysis. The results of the regression indicated that the model with physical exercise and outdoor play did not significantly predict total difficulties scores, $R^2 = .01$, $F(2, 81) = .53$, $p = .59$. Neither of the variables added statistically significantly to the prediction, with time spent in active outdoor play recording a higher beta value ($\beta = -.11$, $p = .31$) than time spent in physical exercise or sport ($\beta = -.04$, $p = .72$). Follow up analysis on each of the individual subscales of the SDQ also indicated no significant findings. (Emotional symptoms: $R^2 = .03$, $F(2, 81) = 1.34$, $p = .27$, Peer relationship problems: $R^2 = .01$, $F(2, 81) = .38$, $p = .68$, Conduct problems: $R^2 = .02$, $F(2, 81) = .95$, $p = .39$, Hyperactivity/inattention: $R^2 = .01$, $F(2, 81) = .24$, $p = .79$, Pro-social: $R^2 = .02$, $F(2, 81) = .66$, $p = .52$.) No covariates were included in this regression analysis.

To provide further information about the proportion of variance accounted for by each of the predictor variables; time spent in organised exercise or sport and time

spent in active outdoor play. Table 19 below outlines the beta (β) values and *p* values for each of these two variables.

Table 19

Beta (β) values for Predictor variables; Time Spent in Exercise or Sport and Time Spent in Active Outdoor Play

	Predictor variables			
	Exercise or sport		**Active outdoor play**	
Outcome variables	β	***p***	β	***p***
Total difficulties	-.04	.72	-.11	.31
- Emotional symptoms	-.02	.89	-.18	.11
- Peer relationship problems	.07	.56	-.06	.58
- Conduct problems	-.13	.23	.05	.64
- Hyperactivity/inattention	-.04	.72	-.07	.52
Pro-social subscale	.11	.32	-.05	.68

4.3.4 Further findings on physical activity and outdoor play. The questionnaire on physical activity and outdoor play provided further information about current levels of these two activities in middle childhood in Ireland. In this measure, parents provided an estimate of the amount of time their child spends in organised physical exercise or sport and in active outdoor play on a typical school day and on a typical weekend day. This data illustrates that on a typical school day, 80% of parents estimated that their child spends up to two hours engaged in active outdoor play, while 18% estimated that their child spends more than two hours playing outdoors. Only 2% said that their child typically does not engage in any outdoor play on a typical school day. Similarly, 83% of parents estimated that their child engaged in organised exercise or sport for up to two hours on a typical school day, while 10% estimated that their child spends more than two hours engaged in these activities. 7% of children do not take part in any organised exercise or sport on a school day. Figure 4 and Figure 5 below provide further details of the estimated amount of time that children spend in these activities on school and non-school days.

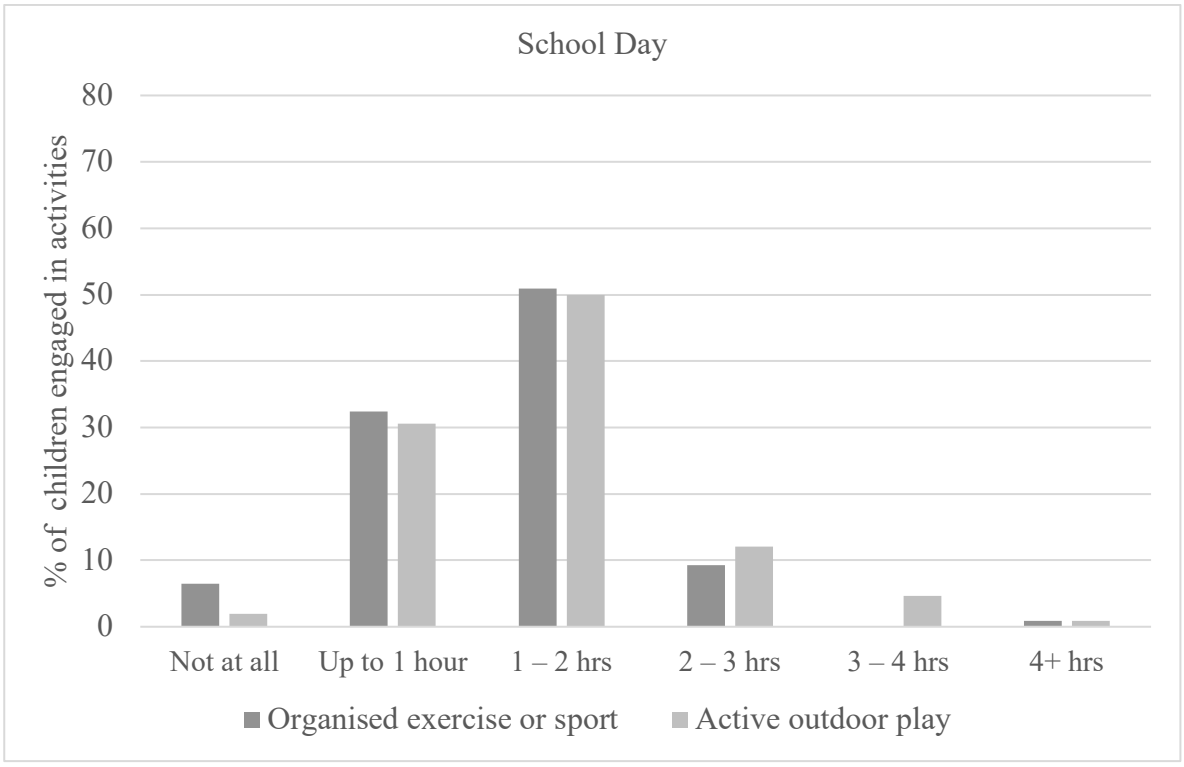

Figure 4. Estimates of Time Spent in Structured Physical Activity and Unstructured Outdoor Play; School Day

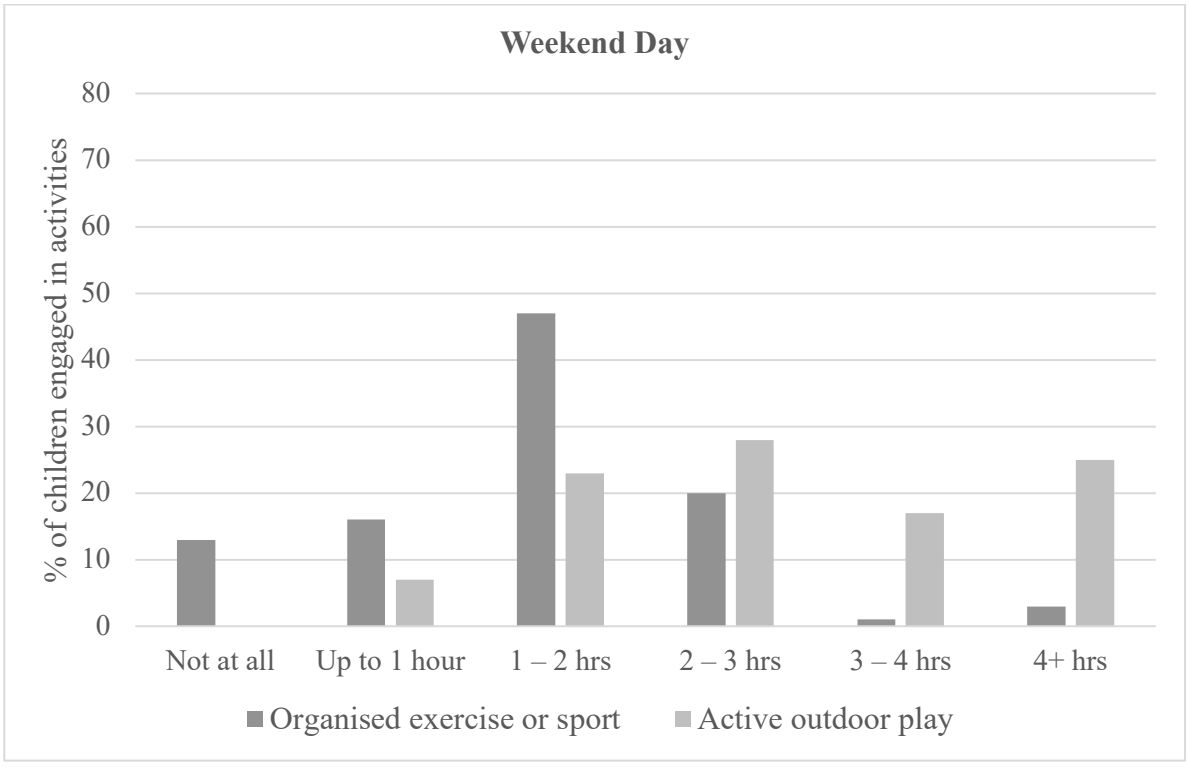

Figure 5. Estimates of Time Spent in Structured Physical Activity and Unstructured Outdoor Play; Weekend Day

On the weekends, all children were reported to engage in active outdoor play for at least some period of time, with 23% of children playing outdoors for more than four hours and only 8% of children playing outdoors for less than one hour. 61% of children were reported to engage in organised exercise or sport for up to two hours on the weekends while 27% are engaged in these kinds of activities for more than two hours. 12% of children did not participate in any organised exercise or sport on the weekends.

Factors affecting levels of physical activity and outdoor play. In addition to information about the amount of time that their child spends in physical activity and outdoor play, parents also answered questions pertaining to their perception of the factors that prevented and encouraged their child from engaging in outdoor play in their area. The most prominent barrier to outdoor play reported by parents was bad weather, with 84% indicating that this stopped their children from engaging in outdoor play. A substantial minority (31%) reported that homework acted as a barrier to their child playing outdoors. Further information regarding other barriers to outdoor play is illustrated in Figure 6 below.

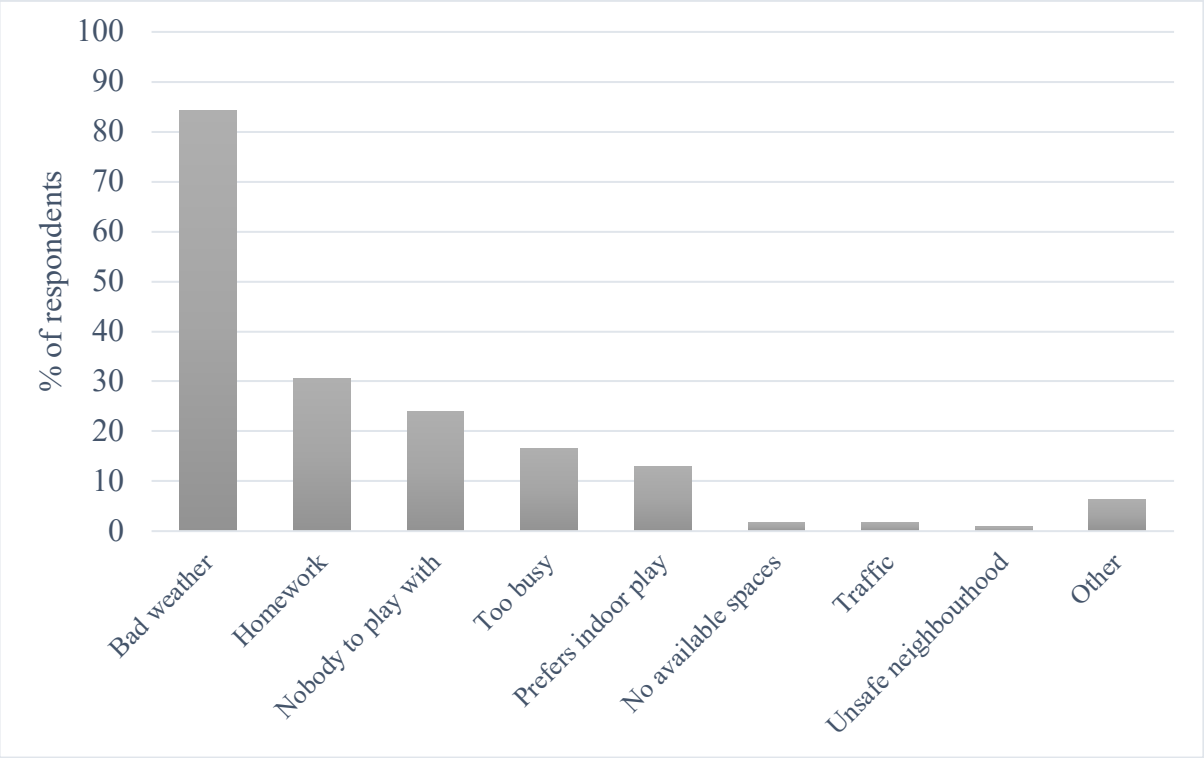

Figure 6. Individual, Social and Environmental Barriers to Outdoor Play

In terms of the factors that encouraged children to play outdoors, 86% of parents reported that having other children to play with was important while 85% reported that good weather facilitated outdoor play. 69% of parents reported that access to outdoor play equipment, such as trampolines, bikes and skates, encouraged their children to play outdoors and 62% reported that the availability of green areas and play spaces was a facilitator of outdoor play for their child. 57% of parents reported that living in a safe neighbourhood encouraged their child to engage in outdoor play. This information is illustrated in Figure 7 below.

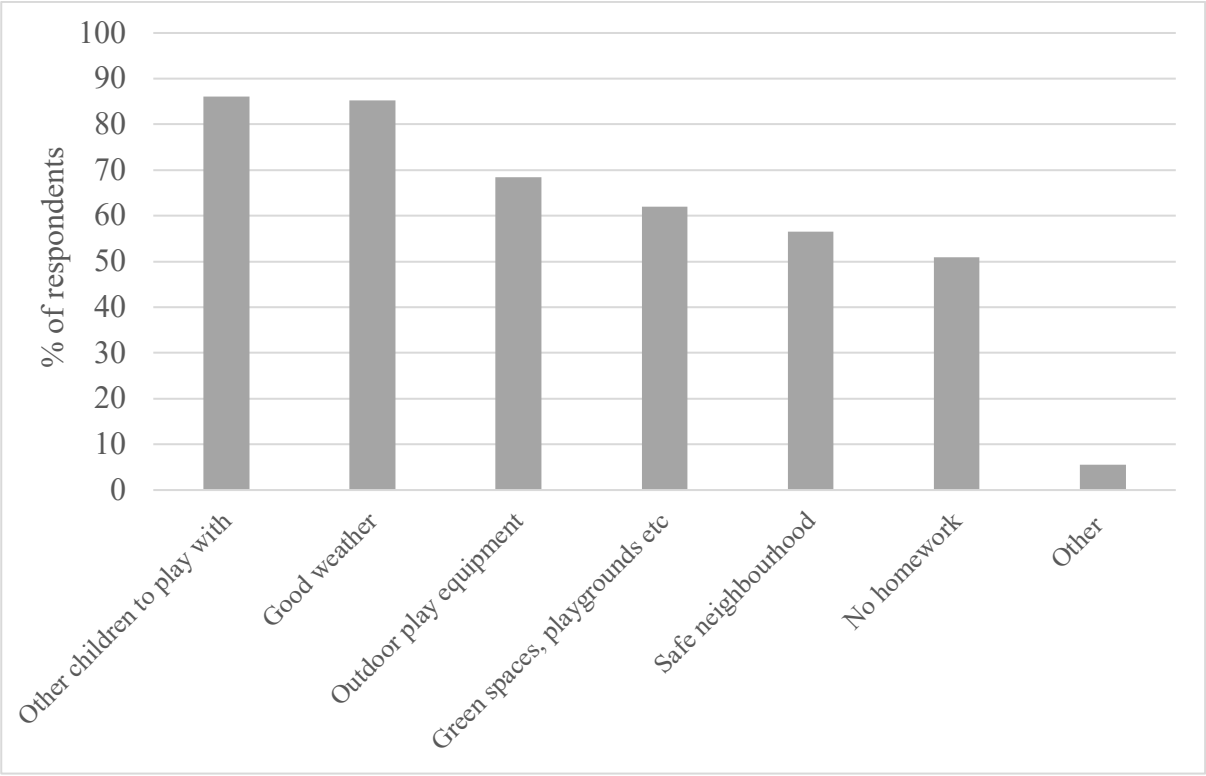

Figure 7. Social and Environmental Supports of Outdoor Play

Parents also indicated the extent to which they agreed or disagreed with a series of statements about individual, social and environmental factors that relate to their child's engagement in physical activity and outdoor play. This information is outlined in Table 20 below. As Table 20 shows parents reported that there were good social and environmental supports for outdoor play in their neighbourhood. For example, the majority of parents agreed or strongly agreed that it is safe for their children to play outside (96%), there are other children to play with (88%) and that there is good access

to play spaces nearby (90%). For some children educational and sporting activities influence outdoor play with 39% agreeing or strongly agreeing that homework acts as a barrier to outdoor play while 73% indicated that organised sports activities and clubs encouraged their child to play outdoors.

Table 20

Parents' Perception of Factors relating to Physical Activity and Outdoor Play

	Strongly Agree %	Agree %	Disagree %	Strongly Disagree %
It is safe for children to play outside in my area during the day	56.1	41.1	2.8	-
There is good access to green areas, playgrounds and play spaces nearby	50.5	41.9	5.7	1.9
There are other children outside to play with	31.8	57.0	7.5	3.7
Organised sports activities and clubs encourage my child outdoors	29.9	43.9	19.6	6.5
My child has access to outdoor play equipment (e.g. trampoline, bike, skates etc)	63.6	35.5	-	.9
My child prefers to play indoors	4.7	15.9	59.8	19.6
My child is too busy with other activities and clubs to play outside	1.9	11.2	64.5	22.4
There is heavy traffic on my street	5.7	6.6	50.9	36.8
Homework acts as a barrier to my child playing outdoors	10.	29.2	44.3	16.0

4.4. Summary of Key Findings

This study first sought to establish current patterns and levels of physical activity and outdoor play in middle childhood. Precise information about the amount of time spent in organised exercise or sport and in active outdoor play on a typical day was gathered using time-use diaries while a questionnaire gave families the opportunity to provide a more general indication and estimate of their child's involvement in these activities overall. Both the time-use diary and the questionnaire suggested that relatively equal amounts of time were spent in each activity on a school day. Based on information provided in the time-use diaries, children spent approximately 40 minutes in both organised exercise or sport and in active outdoor play on a typical school day for a total of approximately 80 minutes. The questionnaire returned similar information in terms of patterns of exercise or sport and active outdoor play with relatively equal amounts of time spent in both activities. However, the levels of involvement differed to those provided in the time-use diaries with the majority of children reported to be spending up to two hours engaged in each activity.

On the weekends it appeared that children engaged in higher levels of active outdoor play than in organised exercise or support based on findings from the questionnaire, yet exercise or sport remained a popular activity at the weekends. Again, a discrepancy is noted whereby the time-use diaries reported higher levels of exercise or sport than active outdoor play. However, this discrepancy can perhaps be explained due to the comparatively small number of time-use diaries that were completed on a weekend day. Further possible reasons for these discrepancies are discussed in the methodological considerations section of the next chapter. Despite these discrepancies, it is interesting to note that according to both measures, the majority of children included in this study continue to meet the recommended daily amount of physical activity (WHO, 2011; Department of Health and Children & Health Service Executive (HSE), 2009).

In terms of the comparison between structured physical activity and unstructured outdoor play in terms of their impact on socio-emotional development no significant association between either activity and socio-emotional outcomes was noted. While unstructured outdoor play was more strongly associated with total social and emotional difficulties than structured physical activity such as exercise or sport, these findings did not reach significance. Finally data from the questionnaire used in Study 2 highlighted a

range of individual and systemic factors that impact on engagement in physical activity and outdoor play. Bad weather emerged as the strongest barrier to children engaging in outdoor play, while at the mesosystem level, homework was also highlighted as an important factor. Other barriers to outdoor play included social factors such as having nobody to play with or being too busy with other activities and individual factors such as preferring indoor play. Conversely, in terms of the factors that encouraged children to play outdoors having other children to play with, good weather and having no homework were influential. At the macrosystem level, further supports of outdoor play include neighbourhood safety and having access to green spaces and playgrounds. The implications of these findings in relation to barriers and supports of physical activity and outdoor play will be considered in Chapter Five.

4.5. Conclusion

The study reported on in this chapter aimed to build on the findings from Study 1 described in Chapter Three and provide more up to date information regarding current levels of physical activity and outdoor play for children in Ireland. It also aimed to make a clear distinction between structured physical activity such as exercise or sport and unstructured outdoor play. This distinction was made to enable comparison between these activities in terms of their impact on socio-emotional development. This lack of distinction between structured physical activity and unstructured outdoor play arose as a limitation from Study 1. While no significant difference was observed between these two activities with regard to their association with socio-emotional development the findings from Study 2 do provide valuable information about current patterns of physical activity and outdoor play for children in Ireland. Furthermore these findings shed light on the factors that influence engagement in these activities at the individual, microsystem, mesosystem and macrosystem levels. The following chapter will discuss the findings from Study 2 in conjunction with those from Study 1 in further detail.

Chapter 5: Discussion

This chapter begins with a review of the aim of this research and the research questions which it sought to investigate. Following this, the key findings are described in relation to each of the stated research questions and considered in light of previous literature which explored physical activity and outdoor play and how these activities relate to socio-emotional development. Findings are also considered in light of the theoretical context which formed the basis of this research. Methodological considerations are then discussed in terms of research design, measures and sample and the strengths and limitations of this research are outlined. Directions for future research are outlined, followed by the implications of the findings of this research for schools, educational policy and the practice of educational psychology. Finally, conclusions are drawn to close this chapter and thesis.

5.1 Summary of Findings

The aim of this study was to explore physical activity and outdoor play in middle childhood and to investigate the relationship between these activities and socio-emotional development, with a view to providing empirical evidence of a link between the two. In light of this aim, the following research questions were posed:

1. What are the current levels of physical activity and outdoor play in middle childhood in Ireland?
2. Is there a relationship between the amount of time children spend in physical activity and outdoor play and their socio-emotional development in middle childhood?
3. Do children who spend more time engaged in physical activity and outdoor play in middle childhood report better socio-emotional outcomes in their teenage years?
4. Is there a difference between children's involvement in structured physical activity and unstructured active outdoor play in terms of their impact on socio-emotional development?
5. What factors affect levels of physical activity and outdoor play for children in Ireland today?

The view that play, and in particular outdoor play, serves an important function in all aspects of development – physical, cognitive, social and emotional – is influential and a substantial body of literature exists which argues for these developmental benefits of play (Ginsburg, 2007; Kemple et al., 2016; Pellegrini & Smith, 1998a, Yogman et al., 2018). However, it has been suggested that while the literature on these developmental benefits of outdoor play is extensive, empirical studies of children's play have not provided strong or extensive evidence to support this claim (Pellegrini & Smith, 1998a; Whitebread et al., 2017) The current research aimed to address this gap.

It was hypothesised that children who spend more time in physical activity and outdoor play would report better social and emotional outcomes, both in middle childhood when levels of play were measured, and later in adolescence, thereby providing evidence of a relationship between this particular type of play and socio-emotional development. This research also sought to explore whether there was a difference between structured physical activity, such as organised exercise or sports, and unstructured active outdoor play, which is self-directed and freely chosen by the child, in terms of their impact on social and emotional development.

This research adopted a holistic, bioecological perspective to socio-emotional development, acknowledging that play may be one of a whole range of interacting factors that impact on development (Bronfenbrenner & Morris, 2006). In light of this framework, the use of hierarchical linear regression as a method of analysis in Study 1 allowed for the exploration of physical activity and outdoor play and how these activities relate to socio-emotional development, while controlling for a range of other factors specific to the child, their family and their environment. These factors included individual child factors such as gender, health and illness or disability, temperament, family factors such as the primary caregiver's physical and mental health and the parent-child relationship and environmental factors such as socioeconomic status and experience of adverse life events. All of these factors were found to be significantly associated with socio-emotional development hence their inclusion in the analysis. In keeping with this framework, further individual, social and environmental factors were considered during Study 2 in terms of how these impacted on children's involvement in physical activity and outdoor play.

5.1.1 Patterns of physical activity and outdoor play. The first research question sought to provide an estimate of levels of physical activity and outdoor play in middle childhood in Ireland and was addressed by both of the studies that make up the current research. In Study 1 structured physical activity and unstructured active outdoor play were combined. This category of physical activity and outdoor play incorporated activities such as playground, running, chasing, football, judo, and dance and was referred to as 'physical activity play, exercise or sport' in the measures used. As such, a distinction between physical activity play that is self-directed or child led such as chasing or playground activities and structured physical activity that is more organised and often adult led, such as football practice or a dance class was not made at this stage.

Findings from Study 1 indicated that on average, nine-year-old children in Ireland spent approximately 1.3 hours per day engaged in these types of activities. In line with the World Health Organisation (WHO) Global Recommendations on Physical Activity for Health (WHO, 2011), The National Guidelines on Physical Activity for Ireland recommend that all children should be active at a moderate to vigorous level for at least 60 minutes every day (Department of Health and Children & Health Service Executive (HSE), 2009). Both sets of guidelines outline that this physical activity can include anything from sports and planned exercise to active play and games. Based on these findings it seems that children in middle childhood in Ireland are meeting this recommendation. This finding was consistent for children who experienced good health and for those with an ongoing chronic illness or disability. Consistent with previous findings (Piccininni et al., 2018), boys tended to engage in slightly higher levels of physical activity and outdoor play than girls did, however both boys and girls exceeded the recommended daily amount. However, it is worth noting that the data analysed in Study 1 was collected between August 2007 and May 2008. Therefore, it is possible that patterns and habits may have changed since this time, particularly given chrono-systemic factor such as the widespread changes in screen time and the use of digital media over the past decade.

In Study 2, for which data was collected in 2019, the category of physical activity play, exercise or sport was split into two separate categories; structured physical activity such as exercise or sport and unstructured active outdoor play. Parents provided information about the amount of time their child spent in each of these activities separately. Based on the information provided in the time-use diaries, it appears that on

a typical school day, children in Ireland spend relatively equal amounts of time in unstructured active outdoor play and in organised exercise or sport with a total of approximately 1.3 hours per day. Findings from the questionnaire used in Study 2 also suggest relatively equal amounts of time spent in both activities with the majority of children reported to be engaged in both organised exercise or sport and in active outdoor play for more than one hour on typical school days. Only a small minority were reported to not engage in organised exercise or sport on school days and even fewer were reported to not engage in active outdoor play. On weekend days, active outdoor play appeared to be a more popular activity for children than organised exercise or sport with all children reported to engage in active outdoor play for at least some period of time. However, organised exercise or sport remained a popular activity on the weekends with most of the children surveyed engaged in these kinds of activities for one hour or more.

Consistent with findings from Study 1 which reported a daily average of 1.3 hours spent in physical activity and outdoor play, the findings from Study 2 reported similar levels of physical activity and outdoor play with the majority of children reported to be spending between one and two hours per day engaged in these activities. This suggests that a substantial majority of the sample of children included in Study 2 continue to meet or exceed the nationally recommended guidelines of at least 60 minutes of physical activity per day (Department of Health and Children & Health Service Executive, 2009). However, it is worth noting that while the findings from Study 1 come from a nationally representative sample, those from Study 2 do not.

These findings are somewhat similar to those reported in research conducted as part of The Health Behaviours in School Children (HBSC) survey in Ireland in 2006. This survey found that 79% of nine year old children report being physically active for at least 60 minutes on most days of the week, with slightly higher levels of physical activity reported for boys (Nic Gabhainn, Kelly & Molcho, 2007). Yet, they are are inconsistent with previous research which used a large sample of primary school children in 5th and 6th class and found that only 19% of children of this age group met these recommended guidelines (Woods, Tannehill, Quinlan, Moyna and Walsh, 2010). Possible reasons for this inconsistency may be that the children in the study by Woods and colleagues were slightly older and research has shown that the likelihood of meeting the physical activity recommendations decreases with increasing age (Nic

Gabhainn et al., 2007; Woods et al., 2010). Furthermore these other studies focus more strongly on structured physical activities with less attention given to active play and how this might contribute to meeting the daily physical activity recommendation.

It is also interesting to compare the amount of time spent in physical activity and outdoor play across the two studies that make up the current research in light of changes in children's play that have been reported in the literature. In Study 1, where data was collected in 2007/2008, data from the time-use diaries reported that the average amount of time children spent in the pre-determined category of physical activity play, exercise or sport was 1.3 hours. In Study 2, conducted in 2019, the average amount of time spent in unstructured outdoor play and organised exercise or sport combined is 1.4 hours. This finding suggests little change in the amount of this type of play over the last decade in Ireland for children in middle childhood. This is in contrast to the decline in the amount of time children today are spending in active and outdoor play that has been reported in the literature in recent years (Frost, 2012; Mullan, 2019). It is possible that this difference exists as studies reporting on the decline in active and outdoor play have largely focused on US and UK samples. It is also possible that this inconsistency is due to the fact that other studies have looked at active outdoor play and physical activity as categories distinct from one another. Indeed, Mullan (2019) suggests that while unstructured outdoor play has declined, time spent in structured physical activities has increased. While findings from the current research suggest that there has been no decline of note in structured physical activity play and unstructured outdoor play combined, it is not possible to determine changes in unstructured outdoor play independently.

5.1.2 Physical activity and outdoor play and socio-emotional development.

The second research question examined the relationship between physical activity and outdoor play and socio-emotional development in middle childhood. It sought to establish whether children who spend more time engaged in physical activity play, exercise and sport report better socio-emotional outcomes. Findings suggest that children who spend more time in these kinds of activities at nine years old have fewer emotional difficulties and fewer difficulties in their peer relationships. However, as noted, a range of other individual, family and environmental factors, all of which were found to correlate with socio-emotional development, were controlled for when

exploring this relationship. When these factors were accounted for, only the association between physical activity play, exercise or sport and peer relationship problems remained significant. The amount of time a child spent in these activities did not impact on other areas related to socio-emotional development such as emotional problems, conduct problems, hyperactivity, inattention or pro-social behaviour.

Furthermore, it is important to note that the effect sizes observed in the relationships between this type of play and peer relationship difficulties were extremely small. This, coupled with the large sample size, suggests that the observed impact of physical activity play, exercise or sport on these aspects of social and emotional development was minimal. However, these findings are consistent with previous research using nationally representative datasets which found that outdoor time and physical activity were associated with fewer emotional and peer relationships problems both in middle childhood and early adolescence (Aggio et al., 2017; Janssen, 2016; Larouche et al., 2016; Piccininni et al., 2018). These findings are important when considered in the context of the importance of peer relationships and socio-emotional development in middle childhood. This developmental stage sees an increase in participation in peer group activities as children have made the transition to primary school. At this stage children prefer to autonomously regulate their own emotions and rely on their own resources and social skills to deal with their emotions and those of others. As such, during middle childhood peer relationships become a source of social support and a context for learning about the management of relationships. It has thus been suggested that children who are unable to make and maintain friendships in middle childhood are at increased risk of developing psychological difficulties in later years (Carr, 2017).

The third research question aimed to investigate the association between physical activity and outdoor play in middle childhood and socio-emotional development in the teenage years. It sought to establish whether children who spent more time engaged in these activities in middle childhood reported better socio-emotional outcomes in their teenage years. The findings of this longitudinal analysis are similar to those described above in relation to the second research question. Children who spent more time engaged in physical activity play, exercise or sport in middle childhood had reportedly fewer emotional problems and fewer problems in their peer relationships in early adolescence. However, as with previous findings, it is important to

note that the effect sizes observed in these relationships were small suggesting minimal impact. Again, only the association between physical activity and outdoor play and peer relationship problems remained significant after controlling for other individual child, family and environmental factors which also impact on socio-emotional development. Again, no significant impact of physical activity play, exercise or sport was noted on other specific aspects of socio-emotional development in the early teenage years.

The findings described above suggest that children who engage in more physical activity play, exercise or sport in middle childhood have fewer difficulties in their peer relationships both concurrently and later, in early adolescence. This connection between time spent in physical activity play, exercise or sport and peer relationships may be indicative of some of the benefits of physical activity and outdoor play for social development which were posited in Chapter Two. These include the opportunity this type of play provides for children to develop and practice skills for co-operative problem solving, effective communication and conflict resolution all of which are important in the development of peer relationships (Elkind, 2007; Ginsburg, 2007; Pellegrini et al., 2004; Yogman et al., 2018). These findings may also be reflective of a broader peer culture where participation and competence in physical activity and sport can often be an important avenue to peer acceptance (Daniels & Leaper, 2006). Research has found that throughout childhood being physically active and competent at sport is significantly correlated with sociometric status in the peer group, particularly for boys (Grimminger, 2013; Lindsay, 2014; Weiss & Duncan, 1992). This association between involvement in physical activity or sport and peer acceptance offers a possible explanation for the connection between physical activity play, exercise or sport and peer relationship problems in Study 1.

Finally, no association was observed between time spent in physical activity play, exercise or sport in middle childhood and socio-emotional outcomes in the later teenage years at 17 or 18 years old, nor did the covariates add significantly to the model at this stage. One possible explanation for the absence of any effect of time spent in physical activity play exercise or sport on socio-emotional outcomes in later adolescence may be due to the smaller sample size in the Wave 3 data. As noted above, the effect sizes observed in the relationships identified between physical activity play, exercise or sport and peer relationships in middle childhood (Wave 1) and early adolescence (Wave 2) were very small. The sample size declined by approximately

1000 participants from Wave 2 to Wave 3 which may account for the loss of this effect. Another possible reason for the absence of any relationship may relate to the developmental period of the study children at Wave 3 when study children were 17 or 18 years old. From a psychosocial perspective, this stage of development sees a shift from the primary concern being group membership and affiliation to a focus on establishing a clear sense of identity (Carr, 2016). It also sees the transition from school to college or work and may result in a split or change to peer groups due to these new opportunities. It is also suggested that romantic relationships increase in frequency in later adolescence (McNamara, Murphy, Murray, Smith & Watson, 2020). These possible transitions and changes to peer dynamics may have resulted in parents' perceptions of peer relationship problems altering as their child moves into this later stage of adolescence.

While the findings from Study 1 are not indicative of a strong association between physical activity and outdoor play and socio-emotional development they do highlight the importance of considering socio-emotional development from a holistic, bioecological perspective. The current research adopted a conceptual framework based on Bronfenbrenner's bioecological model of child development (Bronfenbrenner, 1979, 2005; Bronfenbrenner & Morris, 2006). As outlined, this model proposes that development is affected by many levels of influence ranging from the child's individual characteristics and experiences, to their social environments and interpersonal relationships to the broader influences of culture, community and policy. This theoretical perspective maintains that a child's growth and development occur within this set of nested social systems and that in attempting to understand development it is necessary to consider the way in which these systems interact. The findings from this research are best understood in the context of this theory and how it can be applied to socio-emotional development.

Before considering the impact of physical activity and outdoor play on socio-emotional development, a range of other individual, family and environmental factors pertaining to each of the children included in Study 1 were identified. These factors were selected based on previous research which suggests that they are associated with socio-emotional development (Carr, 2017; Dobutowitsch, 2017; Nixon, 2012). Preliminary analyses indicated that all of these factors were significantly correlated with elements of socio-emotional development. These factors were therefore accounted for in

the final regression model which sought to predict the extent to which each factor, including physical activity and outdoor play, contributed to socio-emotional development. In the final model, adjusted to account for all levels of influence, the following factors emerged as the strongest predictors of social and emotional outcomes.

Individual factors such as temperament, having an assessed learning difficulty or ongoing chronic illness or disability most strongly predicted the likelihood of experiencing emotional problems, peer relationship problems, hyperactivity and inattention and overall social and emotional difficulties. Microsystem influences at the family level, such as the nature of the parent-child relationship, were the strongest predictors of conduct problems and pro-social behaviour. Finally, while environmental level influences did not have as strong an impact as individual or family factors, they also contributed significantly to all aspects of socio-emotional development except for pro-social behaviour. In particular, a child's socio-economic status, as measured by their household's income, was an important factor, with children from lower income families presenting with more social and emotional difficulties. A consistent and worrying finding from the GUI research is this association between social disadvantage and poorer outcomes at all levels; social, emotional, behavioural and physical (Watson et al., 2014; Williams, Thornton, Morgan, Quail & Smyth, 2018).

While all of these individual and systemic factors were significant and consistent predictors of a child's socio-emotional development the extent to which a child engaged in physical activity and outdoor play was not. However, in light of Bronfenbrenner's model, coupled with the widely accepted view that active and outdoor play is an important factor in children's development, it may be worthwhile considering how factors at the various systemic levels influence a child's engagement in these activities. A major limitation of cross-sectional studies stems from the fact that all of the variables are measured at the same moment in time. Therefore, it is impossible to determine the direction of any relationship. In this case it is necessary to consider that a child's health, temperament, experiences, interpersonal relationships and possible life stresses may impact on their engagement in physical activity and outdoor play, both in terms of their capacity for play and their desire to engage in it.

It is also worth considering the findings in relation to the second and third research questions in light of existing research pertaining to the benefits of unstructured active outdoor play as distinct from structured physical activity, such as exercise or

sport. Physical activity is thought to have a range of health benefits, regardless of whether this activity is structured or unstructured (Gleave & Cole-Hamilton, 2012). However, structured physical activity lacks the spontaneity and freedom of choice involved in unstructured active outdoor play. Research suggests that choice is particularly important when it comes to play activities and that being able to choose what to play has been found to be a significant predictor of social and emotional outcomes, more so that the activities themselves (Lehrer et al., 2014).

Studies have shown that, while children are aware of the health benefits of physical activity play, their main motivation for engaging in this kind of play is for social and enjoyment reasons and because of the value they place on being free from adult control and on the unstructured nature of active outdoor play (Brockman, Jago & Fox, 2011). Furthermore, it has been suggested that organised leisure activities, such as exercise or sport, may undermine the nature of play because they reduce children's control over their free time thereby limiting play's developmental benefits (Lester & Russell, 2008). In contrast, research has also suggested that structured physical activities such as sport make a more positive contribution to socio-emotional development because of the effort, sense of competence and teamwork that comes from playing a sport (McHale et al., 2001). It is therefore possible that the combined category of structured physical activity such as exercise or sport and unstructured active outdoor play did not capture the benefits of play for socio-emotional development. As such, it was deemed pertinent to make this distinction and separate out the category of physical activity and outdoor play so as to further explore the role of both structured physical activity and unstructured active outdoor play on socio-emotional development, independent of one and other.

The fourth research question therefore sought to investigate whether there was a difference between unstructured outdoor play, which is child led and involves freely chosen activities, and structured or organised physical activities, which are typically adult led, in terms of their impact on socio-emotional development. Among play's defining characteristics is that it is a voluntary, self-directed activity which suggests a lack of adult involvement (Bruner, 1972; Bruce, 2011; Gray, 2017). While structured physical activities are also thought to be beneficial for children's health and wellbeing (Janssen & LeBlanc, 2010; Korezak et al., 2017), it was hypothesised that unstructured outdoor play may be more strongly associated with socio-emotional development given

the range of developmental benefits unstructured outdoor play is purported to have. In relation to this research question, no difference was observed between structured physical activities and unstructured outdoor play in terms of their association with socio-emotional development.

While findings in relation to this fourth research question did not reach significance, it is nonetheless interesting to observe the patterns and tendencies in these relationships particularly given the small sample size in Study 2 when compared with Study 1. Examining these non-significant tendencies suggests that active outdoor play made the largest contribution to the variance in scores relating to emotional problems and total difficulties with children who engaged in more active outdoor play reportedly experiencing fewer of these kinds of difficulties. Meanwhile, organised exercise or sport was most strongly associated with conduct problems and pro-social behaviour suggesting that children who engage more frequently in these kinds of activities report fewer conduct problems and more pro-social behaviours. These tendencies are somewhat consistent with the findings reported from the systematic review in Chapter Two where independent outdoor play was associated with having fewer emotional problems and fewer overall socio-emotional difficulties (Aggio et al., 2017; Janssen, 2016; Larouche et al., 2016).

5.1.3 Barriers and facilitators of outdoor play. The fifth and final research question sought to investigate the factors that influence engagement in physical activity and outdoor play at an individual, microsystem, mesosystem and macrosystem level. These factors were subdivided into factors that encourage children to play outdoors and those which act as a barrier to playing outdoors. Overwhelmingly, the weather was a key factor in whether or not children spent time playing outdoors with 80% of parents reporting that bad weather prevented their child from playing outside. Previous research has also highlighted the influence of the weather on levels of outdoor play (Safefood, 2017). It has been suggested that this dominant, negative perception of the weather is culturally embedded here in Ireland and that from early childhood, children become socialised to the idea that it is better to play indoors unless weather conditions are mild and dry (Kernan & Devine, 2010). Further, it is suggested that this macrosystemic factor is one which should be challenged based on the assumption that, within reason, children can and should access the outdoors, regardless of the weather.

At the mesosystem level, another finding that emerged in response to this research question was the impact of homework on outdoor play. 38% of parents either agreed or strongly agreed that homework acted as a barrier to their child playing outdoors. In a UK review of children's perception of the impact of homework on the time they have to play, Gill (2011) reported that this figure was even higher, with 55% of children reporting that they felt their time for play was restricted by homework. It is possible, therefore, that from the perspective of the child, this percentage may also be higher in the Irish context. The literature regarding the impact of homework is mixed with both positive and negative effects noted in terms of its impact on achievement and family life. There is little evidence of the benefits of homework for younger children and significant gaps have been noted with regard to the efficacy of homework in Irish primary schools (O'Toole, Kiely, McGillacuddy, O'Brien & O'Keeffe, 2019). This is an area warranting further investigation, particularly as it may be detracting from the time children spend in outdoor play.

The main factors that encouraged children to play outdoors also emerged at the various systemic levels highlighting the importance of targeting the various layers of influence that impact on outdoor play. At the microsystem level, the importance of peers and having other children to play with was a key factor. At the mesosystem level, a family's perception of their neighbourhood as being safe for children to play outside in was important. In this sample, almost all parents agreed that it was safe for their child to play outside during the day which is an encouraging finding. However, previous research has indicated that neighbourhood safety can act as a barrier to outdoor play, particularly for those living in neighbourhoods that they perceive to be unsafe (Egan & Pope, 2018; Kimbro, Brooks-Gunn & McLanahan, 2011). In addition, in a mid-term review of the national policy framework for children and young people 2012-2020, 'Better Outcomes, Brighter Futures' children as young as ten noted the effects of antisocial behaviour in their communities which lends further support to the importance of neighbourhood safety in promoting outdoor play. Finally, having access to green spaces, playgrounds, and outdoor play equipment also emerged as important in encouraging outdoor play. These findings are consistent with UK based research on the barriers and facilitators of active outdoor play where children self-reported that their engagement in outdoor play is restricted by poor weather conditions and a lack of suitable play spaces (Brockman et al., 2011).

5.2 Methodological Considerations

Having reviewed the key findings from this research in light of previous literature and theory, the strengths and limitations of this research will now be discussed in terms of the methods used under the headings of design, measures and sample.

5.2.1 Design. A strength of the design of this research lies in its ability to investigate naturally occurring variables which would be unethical or impractical to test experimentally (Mertens, 2015). For example, in this area of study, experimental designs which manipulate the level of involvement in physical activity and outdoor play would have ethical implications, as would randomising children to conditions. The approach also allowed for the inclusion of several covariates in the analysis which were included based on previous theory and research highlighting their potential impact on the outcome variables (Mertens, 2015). The use of hierarchical linear regression as a method of analysis allowed for these co-variates to be controlled for in the final analysis, grouped according to the theoretical framework on which this study was based (Bronfenbrenner & Morris, 2006) and then added to the regression model in steps.

A strength of the current research is its use of a national longitudinal dataset, in Study 1, which comprised a nationally representative sample of children in Ireland. It has been recommended in previous research that the use of national datasets in this area of study could add substantially to the existing body of literature (Hinkley et al., 2008). The families who participated in this longitudinal study provided information on a wide range of variables at various different time points in the study child's life. This data provided rich and varied information about the study child's individual characteristics and experiences, family factors and environmental variables which could then be controlled for in the final analysis. For the purposes of the current research, information provided when the study child was nine years old, 13 years old and 17 years old was accessed and analysed.

In addition, previous research has recommended the inclusion of a longitudinal component in studies exploring the relationship between play and developmental outcomes as this would allow for temporal associations to be made, thereby addressing a limitation of cross-sectional designs which measure both the exposure and the outcome at the same timepoint (Hinkley et al., 2018). The use of this dataset allowed for an exploration of the long-term impact of time spent in physical activity play, exercise

and sport in middle childhood on socio-emotional development outcomes which addressed a limitation of previous research carried out in this area (Aggio et al., 2017; Janssen, 2016; Larouche et al., 2016; Lehrer et al., 2014; McHale et al., 2001; Piccininni et al., 2018; Reid et al., 2015). Finally, the use of this dataset allowed for exploration of the link that has been suggested between the changes in children's play activities and the increase in the number of children presenting with social, emotional and behavioural difficulties (Gray, 2011a; Whitebread, 2017).

5.2.2 Measures. A limitation of the use of an existing national dataset arises from the researcher's lack of control over the methods of data collection and the measures used. In the case of the current research, this was relevant in relation to the time-use diaries which were used to gather details on the activities of the study children over the course of a typical day. These time-use diaries contained pre-coded categories of activity and respondents ticked a box to indicate which activity the study child was engaged in during each interval. As previously discussed, one of these pre-coded activities, 'physical activity play, exercise or sport' was used as the predictor variable in Study 1. A limitation of Study 1 therefore arose from the lack of distinction between structured and unstructured physical activity play, each of which have different characteristics and potential benefits. However, the current research aimed to address this limitation by separating out this category into two distinct categories; organised exercise or sport and active outdoor play, in Study 2. Thus, a strength of Study 2 was the way in which it addressed this limitation of Study 1.

A further area warranting consideration which arises from the use of the GUI time-use diaries again relates to the categorisation of play. A number of pre-coded categories in these diaries related to play and leisure activities. In addition to 'physical activity play, exercise or sport' other categories included; 'general play', 'hobbies and other leisure activities', 'playing board games or cards' and screen-based activities such as watching television, playing videogames, using a computer or messaging friends. As outlined in Chapter Two, among the key features of play is that it is a voluntary activity which is intrinsically motivated, creative and spontaneous (Gray, 2017; Pellegrini & Smith, 1998). The freedom of choice which children are allowed during play is fundamental. Studies have found that the extent to which a child views an activity as play or not play has implications for its potential benefits (Lehrer et al., 2016; Howard

et al., 2017). According to Gray (2017), for play to truly be play, the player gets to decide whether or not they engage in the activity, as well as the extent to which they involve themselves. It is therefore worth considering whether physical activity and outdoor play, despite all its posited benefits, loses its value when it is not the preferred or chosen activity of the player. Some children may prefer to engage in different forms of play, such as those included in the other categories of play in the time-use diaries, and it may be this element of choice that contributes to the developmental benefits of play. As such, it is possible that combining the amount of time each child spent in the various categories of play and leisure provided in the time-use diaries and evaluating the impact of this variable on the various aspects of social and emotional development may have yielded different results. This could potentially identify a stronger relationship between play in its various forms and socio-emotional development.

Previous research into physical activity and outdoor play has highlighted issues with the reliability and validity of outdoor play measures (Larouche et al., 2016; Reid et al., 2015). It is difficult to measure these activities objectively and so data collected tends to be either parent-reported or self-reported. As such, this data is subject to the biases that are common in self-report procedures such as positive presentation or social desirability and recall bias (Adamo, Prince, Tricco, Connor-Gorber & Tremblay, 2009). In Study 2 in particular the possibility of a Hawthorne effect warrants consideration. The Hawthorne effect refers to the idea that an awareness that a certain behaviour is receiving attention or being researched leads to a motivation on the part of the participants to change or modify that behaviour in line with what they perceive to be researcher expectations (Mertens, 2015). In Study 2, participating families were aware from the information they received that the study was investigating physical activity and outdoor play and how this relates to social and emotional development. As such it is possible, due to conformity and social desirability, that families may have over reported these activities or that the study child's engagement in these activities may have increased on the day of time-use diary completion.

Further limitations are noted in relation to the measurement of physical activity and outdoor play in the time-use diaries in both Study 1 and Study 2 where levels of play were based on parent report. While parents were asked to complete this measure with their child's input where possible, it is not known to what extent this took place. The time-use diaries asked parents to record the amount of time their child spent in

these activities on a 'typical day'. However it is possible that the day on which the time-use diary was completed was not an accurate representation of the amount of time the child usually spends in these activities. To address this concern a second measure of physical activity and outdoor play was used in Study 2 to supplement the time-use diary and provide the opportunity for participants to give a broader picture of their child's levels of engagement in these activities. While both measures, the time-use diary and the questionnaire, suggested that children spent reasonably equal amounts of time in structured physical activities and unstructured outdoor play, the average amounts of time spent in these activities were not consistent across the two measures. In general, the questionnaire recorded higher amounts of time spent engaged in these activities than the time-use diaries did. Possible reasons for the discrepancy between the two measures may include such factors as the time of the year or the weather on the day the time-use diary was completed suggesting that the questionnaire gives a more accurate representation of a typical day. However, it is also possible that the parent overestimated the amount of time their child spent in these activities when they were asked to give a rough total rather than record it in 15 minute segments. Research has shown that in measuring physical activity in children, 72% of the indirect measures overestimated the directly measured values (Adamo et al., 2009).

The use of the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997) as the outcome measure in the current research also warrants some consideration. The SDQ is one of the most widely used brief questionnaires for assessing children's behaviours, emotions and relationships and it is frequently used both for research purposes and in clinical practice (Goodman, 1997; Goodman, Lamping & Ploubidis, 2010). The SDQ has been found to be a psychometrically sound measure with the age group sampled in the current research (Stone, Otten, Engels, Vermulst & Janssens, 2010). Parental ratings on the SDQ were used as the main outcome measure in the current research for consistency purposes as parental ratings were available for all three waves of data used in Study 1. While the study child's teacher provided SDQ ratings during the first wave of GUI data collection, when the study child was nine years old, teacher ratings on the SDQ were not provided during subsequent waves of data collection. Nonetheless it is worth considering the reliability of parental ratings of their own children using the SDQ. In their large scale review of the psychometric properties of the SDQ, Stone and colleagues (2010) found that teacher ratings showed higher

internal consistencies than parent ratings. While internal consistency was acceptable for the total difficulties score for both parent and teacher ratings, internal consistency at a subscale level was adequate for teacher ratings and only moderate for parental ratings (Stone et al., 2010). A similar pattern is seen in the parent and teacher ratings provided in the GUI study. Reliability analyses of the GUI data indicated acceptable internal consistency for each subscale and the total difficulties scores based on teacher report. However, internal consistency was lower and only moderate based on parent report (Nixon, 2012).

Despite this observed difference in reliability of parent and teacher ratings on the SDQ, previous research has concluded that both parent and teachers ratings provide information of roughly equal predictive value, with information from parents more useful for detecting emotional disorders and information from teachers more useful for detecting conduct and hyperactivity problems (Goodman, Ford, Simmons, Gatward & Meltzer, 2000). A previous investigation into social and emotional outcomes of children in Ireland using the GUI data with the SDQ as an outcome measure found that a similar picture emerges based on both parent and teacher report. Nixon (2012) found that the majority of children are reported to be doing well by both parents and teacher with less than one fifth of children displaying poorer outcomes in the borderline or problematic range. However, on all scales, parent ratings were higher than teacher ratings indicating more difficulties and more pro-social behaviour. In all cases the difference in mean scores was small or negligible, as indicated by Cohen's d effect size (Nixon, 2010). While it was not possible to compare parent and teacher ratings on the SDQ across all three waves of analysis in Study 1, it is acknowledged that teachers provide reliable and useful predictive information on the SDQ and that a multi-informant approach is optimal when using this measure (Goodman et al., 2000; Stone et al., 2010).

A further consideration regarding the use of the SDQ as an outcome measure pertains to the sensitivity of this measure and the extent to which it is able to capture subtle differences between children in the normal range. In both Study 1 and Study 2 descriptive statistics indicate that there is limited variability in SDQ scale scores. As noted in the information provided about the SDQ in Chapter 3, respondents are asked to what extent they agree with the given statements on a three point scale. Such a narrow scale means that more subtle differences in a child's presentation cannot be accounted for. A wider response scale, such as a five or seven point scale, would have allowed for

more variability in response which may have captured more of these subtle differences and in turn yielded stronger effects in both Study 1 and Study 2.

Finally, it is also possible that the SDQ did not capture the kinds of social and emotional skills that physical activity and outdoor play are thought to promote. Goodman and colleagues (2010) note that the SDQ items and subscales were developed with reference to the main categories used in the classification systems of childhood mental disorders such as those used in the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV; American Psychiatric Association, 1994). Given this, the SDQ is commonly used as a screener for childhood mental health difficulties. As such, it could be argued that this measure tends to be more deficit focused and emphasises difficulties more so than strengths. As per the previous literature review, physical activity and outdoor play is often described in terms of its developmental benefits and the skills that this kind of play can help to develop. Such benefits include increased self-control, better self-regulation and enhanced wellbeing (Kemple et al., 2016; Lester & Russell, 2008; Louv, 2005). This type of play is also thought to promote creativity, problem-solving and group skills (Ginsburg, 2007; Yogman et al., 2018). In addition, research has found that physical activity is a better predictor of emotional wellbeing than it is of emotional problems (Reid et al., 2015). It is possible, therefore, that physical activity and outdoor play may be helping to develop a range of socio-emotional strengths and skills that are not captured by the SDQ.

5.2.3 Sample. Probability sampling is recommended as the sampling strategy of choice in post-positivist research (Mertens, 2015). This was the method of sampling used in the Growing Up in Ireland (GUI) study from which data for Study 1 of the current research was drawn. The sample design used in the GUI study was a two stage process with the school as the primary sampling unit and the children within the school being the secondary units (Murray et al., 2010). The GUI sample included in Study 1 was large and aimed to be nationally representative which makes the findings from this study highly generalisable. However, there are some limitations worth noting with regard to the GUI sample. Firstly, while all primary level schools were included in the population, home-educated children were not. It is estimated that approximately 150 nine-year-olds were being educated outside of the school setting in 2006 at the time of recruitment for the GUI study and these children are not represented in the sample (Murray et al., 2010).

In Study 2, however, decisions about sampling had to be made within the constraints of feasibility. As such, a sample was drawn from the target population, children aged eight to ten years old, who attended primary schools accessible to the researcher. While every effort was made to access a representative sample of this population, schools had to agree to participate in the study before families could be approached and consent to participate could be sought. Ultimately, two schools, agreed to allow the researcher to approach the relevant classes. One of these schools was located in a satellite urban town while the other was located in an independent urban town. This meant that children who lived in large cities or in rural locations were not represented in this sample. This may pose a threat to the external validity of the findings from Study 2.

A further limitation exists in relation to the response rate in Study 2 and the factors that may have influenced this. The response rate from the families of children in third and fourth class who received the information about the study was approximately 40%. Factors that have been found to influence response to survey-based research include having the time to participate, interest in the topic and the perceived benefit of the study either on a personal or societal level (Kolar & Kolar, 2008). It is therefore possible that parents who valued physical activity and outdoor play were more likely to respond, which could in turn lead to a positive bias in findings. Furthermore, a review of possible biases associated with differential rates of parental consent to participate in school-based surveys found that in a study of obesity in school age children, parents of children who were overweight or at risk of being overweight were less likely to participate (Mellor, Rapoport & Maliniak, 2008). Drawing on this finding, it is worth considering that, in the current research, parents of children who do not often engage in physical activity and outdoor play may have been less likely to participate.

Finally, while the measures used in Study 2 did not record demographic information about participants other than their age or gender, a final point for consideration with regard to the sample arises from the characteristics of the families who returned time-use diaries in the GUI study which were used in Study 1 of this research. The GUI study team reported that time-use diaries were more likely to be returned in respect of children who lived in two-parent families, where the primary caregiver was somewhat older and where the family was more advantaged in terms of educational attainment and social class (Quail & Williams, 2013). If the same pattern is

true for the time-use diaries returned in Study 2, it suggests that there may be an under-representation of children from single parent families or children who are more socially disadvantaged.

5.3 Directions for Future Research

In light of the current research's strengths and limitations discussed above and in the context of the ongoing focus on the promotion of children's active physical and mental health and wellbeing, directions for future research in this area are suggested. As outlined, previous research in this area has produced some evidence of a relationship between physical activity and outdoor play and aspects of socio-emotional development and the current research adds to that evidence base, albeit in a limited way. The following directions for future research aim to address some of the limitations of this, and previous, research.

Further studies in this area should address the measurement of outdoor play in a more objective manner. This could be through direct observations of children's play or by asking children directly to record the amount of time they spent engaged in these activities. To address the limitation of play being recorded on one day only, it might be beneficial for children to record their play activities over a longer period of time such as for one full week. Furthermore, having the child record their play activities would also allow for children to voice their opinions on what they consider to be play rather than having categories and characteristics of play predetermined for them as they have been in previous research studies. Not only might this address issues pertaining to the reliability and validity of outdoor play measures, it would also incorporate the voice of the child into the research process which has been previously recommended at a policy level (DCYA, 2012). As such, future research studies could investigate the impact of physical activity and outdoor play on socio-emotional development using creative participatory research methods with children which seek to better understand their experiences and how they view the world (Horgan, 2016). Using such methods, studies could focus on the playful activities that children most value and how these activities make them feel. Furthermore, given the suggestion that physical activity and outdoor play might be a better predictor of emotional wellbeing than it is of emotional problems (Reid et al., 2015) future research could adopt a strengths, rather than deficits approach,

including measures of socio-emotional wellbeing in their exploration of the developmental benefits of physical activity and outdoor play.

The use of a nationally representative data set which facilitated longitudinal analysis of the relationship between play activities and socio-emotional development had been recommended by previous research (Hinkley et al., 2018). The use of the GUI data in the current research allowed for this kind of analysis whilst also providing rich information on a range of other variables that might also influence socio-emotional development. However, the GUI data offers further scope to explore this relationship. As previously outlined, the time-use diaries used in the GUI study collected information about time spent in a number of different categories of play. Only one of these categories of play, 'physical activity play, exercise and sport', was used in the current research. As play in general is thought to have a range of developmental benefits it is possible that combining the total time spent in all categories of play might yield different or stronger results. Future studies could address this as well as looking at the relationship between other categories of play and socio-emotional development.

In addition, the findings of the current research highlighted the importance of considering socio-emotional development from a bioecological perspective (Bronfenbrenner & Morris, 2006). Data from the GUI study identified a number of factors at the individual, microsystem and mesosystem levels which were found to impact on socio-emotional development while new data collected identified further mesosystem and macrosystem factors that impact on engagement in physical activity and outdoor play in a smaller, non-representative sample. Further investigation using the GUI data might explore how some of these systemic factors are impacting on levels of outdoor play on a larger scale and how this in turn might be related to socio-emotional outcomes.

Findings from the current research provide valuable information about current patterns of physical activity and outdoor play in middle childhood in Ireland as well as information about the barriers and facilitators of engagement in these activities. However, as noted these findings may be limited in terms of their generalisability. Further research might expand on these findings using a larger and more diverse sample. Moreover, it was parents and guardians, rather than children who reported on the barriers and facilitators of outdoor play. Future studies might address children's opinions on what stops them from or encourages them to play outdoors as these factors

may be different. This may have particular relevance in relation to homework. Almost 40% of parents reported that homework acts as a barrier to outdoor play. However, previous research with children has suggested that homework may be an even bigger barrier to outdoor play than the current research suggests (Gill, 2011).

Finally, the current research explored physical activity and outdoor play for all children. Where possible, individual factors such as gender, cognitive ability, health and illness were controlled for in the analysis of the association between physical activity and outdoor play and socio-emotional development. However, this research did not examine patterns of physical activity and outdoor play or the relationship between these activities and socio-emotional development in specific populations such as those with special educational needs or those with long-term illness or disability. Further research in this area is warranted to specifically explore the play experiences of children with diverse needs and abilities.

5.4 Implications for Policy, Schools and Curriculum

The promotion of the active and healthy physical and mental wellbeing of children and young people is at the fore of Irish policy. Ireland's most recent national policy framework for children and young people, 'Better Outcomes, Brighter Futures' acknowledges the importance of play, sport and recreation in promoting positive mental health and achieving these outcomes (Department of Children and Youth Affairs, 2014). Given the findings of the current research in relation to the factors that support and hinder physical activity and outdoor play, national policy should continue to focus on the provision of quality outdoor play and recreation spaces in safe environments for children and young people.

In line with national policy developments, educational policy in recent years has increasingly focused its attention on the role that schools have to play in promoting the mental health and wellbeing of children and young people (NCCA, 2009; DES, 2015; DES, 2018; NCCA, 2020). In the early years, the importance of play in supporting the learning and holistic development of the child has also been acknowledged and incorporated into curriculum developments (NCCA, 2009). The newly published Draft Primary Curriculum Framework for Consultation (NCCA, 2020) draws attention to the importance of providing opportunities for active and playful learning and includes a strong focus on wellbeing as a curriculum area that, "provides structured opportunities

for children to be as physically and emotionally well and healthy as they can be" (NCCA, 2020, p. 13) through building motivation and commitment to physical activity and healthy lifestyle choices.

However, in the review and consultation process involved in preparing this new draft curriculum, a sense of 'curriculum overload' was acknowledged, with teachers often feeling there was too much to do and too little time to do it. In addition, the demand placed on schools to respond to national priorities and societal problems was also highlighted, particularly in the area of wellbeing (NCCA, 2020). Recent research in the Irish context supports this idea and has highlighted a disconnect between policy and daily practice in Irish schools with teachers looking beyond the existing curriculum for opportunities to support wellbeing (Nohilly & Tynan, 2019). Thus it is important for schools and teachers to be aware of and avail of existing opportunities within the school day to support the mental health and wellbeing of their pupils through promoting and encouraging physical activity and outdoor play, not only through subject areas such as Physical Education (PE) and Social, Personal and Health Education (SPHE) but also at unstructured times during the school day.

As documented, research tells us that children are physically active during unstructured outdoor play and that engaging in unstructured play promotes positive feelings and emotions (Howard et al., 2017). Given these benefits of unstructured outdoor play, coupled with the suggestion of a decline in the opportunities to engage in this type of play outside of school, it is important that schools promote and protect time for unstructured outdoor play during the school day such as at breaktimes. In the past, teachers and schools have been inclined to separate outdoor, unstructured playground activities from what goes on inside the school (Baines & Blatchford, 2011). It is therefore possible that teachers and schools may be undervaluing the opportunities that breaktimes provide for supporting health and wellbeing. Given the increasing demands on teachers and schools and the literature that highlights the importance of unstructured outdoor play for healthy social and emotional development, it is recommended that schools make full use of this existing opportunity within the school day to support the wellbeing of their pupils.

5.5 Implications for Educational Psychology Practice

The findings of this research have a number of implications for the practice of educational psychologists (EPs). As outlined in Chapter One, evidence based practice is critically important in the work of EPs. Thus, in working with children, families and schools one of the EP's functions is to use their knowledge of the research evidence in a given area to inform best practice and promote best outcomes for children and young people. The findings of the current research add to the evidence base regarding physical activity and outdoor play and socio-emotional development. While only a small association between these activities and aspects of socio-emotional development was found, this association replicated previous findings in this area which were reported on in Chapter Two. Furthermore, as outlined, a substantial body of literature exists highlighting the benefits of this type of play for socio-emotional development and, when asked, children support this perspective drawing attention to the importance of play in their daily lives (Horgan et al., 2018). As such, the value of physical activity and outdoor play for children's health, development and wellbeing is acknowledged in these implications.

A number of factors are thought to contribute to children's health and wellbeing and the literature would suggest that physical activity and outdoor play may be one of these factors. In light of this it is important for EPs to be cognisant of and promote the idea that this particular influence on socio-emotional development is one which is not only effective but also easily modifiable. For children and young people, spending time engaged in active outdoor play may constitute an affordable and accessible way to promote healthy social and emotional development and positive mental health. Furthermore, while today's approach to helping children and young people with developmental and mental health difficulties is often focused on formal therapy or direct intervention from adult therapists, Gray (2017) suggests that a more preventative and early intervention approach would involve increased promotion and focus on the importance and prominence of active outdoor play for healthy socio-emotional development throughout the childhood years.

In their practice, EPs are in a unique position to work at the various eco-systemic levels around a child (Beaver, 2011). At the microsystem level, in their direct work with schools, EPs can use this position to bring focus to the role that unstructured play and time in the outdoors may have in supporting children's wellbeing. In Ireland,

the National Educational Psychological Service (NEPS), adopt a 'continuum of support' framework in supporting schools to meet the learning, social, emotional and behavioural needs of their pupils (NEPS, 2007). This framework consists of three levels of support; school support for all, school support for some and school support plus (for a few). The 'school support for all' level provides the foundation of this framework and it consists of whole school preventative and proactive approaches. It is at this level that the EP can advise schools on policy and daily practices aimed at developing school cultures that value physical activity and outdoor play as means of promoting healthy socio-emotional development and wellbeing. Furthermore, in light of the findings of the current research, the EP may also have a role to play in drawing schools' attention to the factors that may be impacting on children's levels of engagement in these activities which may in turn be impacting on their wellbeing. An important mesosystemic factor in this regard is homework which emerged as the second strongest barrier to outdoor play. As such, it is important that schools strike a balance between the academic demands of curriculum and protecting time for children to engage in other activities such as outdoor play.

Finally, the findings of this research lend support to the commitment of EPs to adopting a holistic, bioecological approach in their practice. As noted in the introduction to this research EPs have moved beyond the view that learning, socio-emotional and behavioural difficulties are within child and are committed to situating difficulties in their systemic contexts (Birch et al., 2015). The current research supports this view highlighting the complexity of socio-emotional development and the many factors that influence it at the individual, microsystem and exosystem levels. Indeed, in considering the distinctive contribution of educational psychology Cameron (2006, p301), stated that part of the power of psychology lies in the fact that it "seeks to understand the complexity of human experience and eschews simple answers to complex questions." As the findings of the current research suggest there are no simple answers when it comes to understanding the many and various factors that contribute to socio-emotional development and wellbeing. Thus it is incumbent upon EPs to promote an awareness and understanding among stakeholders that social, emotional and behavioural difficulties can best be understood and addressed in their systemic contexts.

5.6 Summary and Conclusion

The current research is situated in the context of an increased awareness and focus on the importance of physical activity and outdoor play in the lives of children (Kemple et al., 2016; Kilkelly et al., 2016; Tremblay et al., 2015) and in light of the increasing number of children and young people experiencing socio-emotional and mental health difficulties (Dooley et al., 2019). Given the reported changes in children's levels of engagement in outdoor play over recent decades and the coinciding increase in children presenting with mental health problems, this research sought to explore physical activity and outdoor play in the lives of children in Ireland in terms of its impact on socio-emotional development as well as the factors which influence it. The developmental benefits of physical activity and outdoor play have been written about extensively in the relevant literature. As such, it was hypothesised that children who engaged in higher levels of physical activity and outdoor play would report better socio-emotional outcomes both concurrently and longitudinally. Furthermore this research sought to investigate whether there was a difference between structured physical activity and unstructured outdoor play in terms of their impact on socio-emotional development. Finally, given the proposed benefits of this type of play, the research also sought to establish what factors influence engagement in physical activity and outdoor play for children in Ireland.

This research was carried out with a view to providing empirical evidence of the role that these particular types of play have in the socio-emotional development of children in Ireland which would in turn support the promotion of these activities both at a practice and a policy level. Findings indicated a small but statistically significant association between physical activity and outdoor play and peer relationships while no difference was found between structured physical activity and unstructured outdoor play in terms of their impact on socio-emotional development. However, the findings from this research provide valuable information about current patterns of physical activity and outdoor play in middle childhood in Ireland and the factors that support or hinder children's engagement in it. While the current research had many strengths including the use of a nationally representative data set which facilitated longitudinal analysis and a second follow up study which in part addressed some of the methodological concerns raised during the first study, some limitations are also evident and these have been

discussed earlier in this chapter. When interpreting the findings of this research it is necessary to be mindful of these limitations.

This thesis adds to the evidence base regarding physical activity and outdoor play and socio-emotional development. However, it also highlights the importance of considering the many and varying factors that interact to influence on a child's socio-emotional development and reinforces the importance of considering this development and any subsequent difficulties from a bioecological perspective (Bronfenbrenner & Morris, 2006). It is hoped that the expertise, knowledge and insight gathered during the preparation of this thesis will be shared in wider domains through the dissemination of this research in a relevant academic journal (See Appendix M for sample article for publication), through availing of opportunities to present it to fellow stakeholders at relevant conferences and especially through the ongoing professional practice of the author.

Among the core professional competencies of an educational psychologist are the ability to challenge views and actions that may be harmful to a child, to act as an advocate for the children and young people one works with and to contribute to the analysis, development and maintenance of effective and supportive learning environments of all children (British Psychological Society, 2019). It is the intention of the author to include a strong focus on the promotion of physical activity and outdoor play in ongoing practice. This thesis opened with an acknowledgment of the position of play within the UN Convention on the Rights of the Child. It concludes with the acknowledgement that "… in the end, a playful childhood is the most basic right of children" (Elkind, 2007) and it is the role of those who work with, support and care for children to ensure that this most basic right is protected.

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Appendices

Appendix A - Articles Excluded from Systematic Review

Excluded Article	Reason for Exclusion
Acton, J., & Carter, B. (2016). The impact of immersive outdoor activities in local woodlands on young carers emotional literacy and well-being. *Comprehensive child and adolescent nursing*, *39*(2), 94-106.	5 (measures/outcomes)
McCree, M., Cutting, R., & Sherwin, D. (2018). The hare and the tortoise go to forest school: taking the scenic route to academic attainment via emotional wellbeing outdoors. *Early Child Development and Care*, *188*(7), 980-996.	5 (measures/outcomes)
McArdle, K., Harrison, T., & Harrison, D. (2013). Does a nurturing approach that uses an outdoor play environment build resilience in children from a challenging background?. *Journal of Adventure Education & Outdoor Learning*, *13*(3), 238-254.	3 (participants)
Waite, S., Rogers, S., & Evans, J. (2013). Freedom, flow and fairness: exploring how children develop socially at school through outdoor play. *Journal of Adventure Education & Outdoor Learning*, *13*(3), 255-276.	3,5 (participants, measures/outcomes)
Dealey, R. P., & Stone, M. H. (2018). Exploring out-of-school play and educational readiness. *Early Childhood Education Journal*, *46*(2), 201-208.	3 (participants)
Macgregor, A. P., Borghese, M. M., & Janssen, I. (2019). Is replacing time spent in 1 type of physical activity with another associated with health in children?. *Applied Physiology, Nutrition, and Metabolism*, *44*(9), 937-943.	4 (analysis)
Ergler, C. R., Kearns, R. A., & Witten, K. (2013). Seasonal and locational variations in children's play: Implications for wellbeing. *Social Science & Medicine*, *91*, 178-185.	5 (measures/outcomes)
Farmer, V. L., Fitzgerald, R. P., Williams, S. M., Mann, J. I., Schofield, G., McPhee, J. C., & Taylor, R. W. (2017). What	5 (measures/outcomes)

did schools experience from participating in a randomised controlled study (PLAY) that prioritised risk and challenge in active play for children while at school?. *Journal of Adventure Education and Outdoor Learning*, *17*(3), 239-257.	
Sekhri, A. (2019). Participation in Extracurricular Activities: A Boon for Children with Special Needs. *i-Manager's Journal on Educational Psychology*, *12*(4), 42.	2 (unavailable)
Feldman, E. (2018). Does outdoor play 'keep the doctor away?'. *Integrative Medicine Alert*, *21*(11).	4 (type of study)
Street, H., Hoppe, D., Kingsbury, D., & Ma, T. (2004). The Game Factory: Using cooperative games to promote pro-social behaviour among children. *Australian journal of educational & developmental Psychology*, *4*, 97-109.	5 (measures/outcomes)
Orr, E., & Caspi, R. (2018). The impact of residential area and family size on children's play habits. *Early Child Development and Care*, 1-10.	5 (measures/outcomes)
Lehrer, J. S., & Petrakos, H. H. (2011). Parent and child perceptions of grade one children's out of school play. *Exceptionality Education International*, *21*(2), 74-92.	5 (measures/outcomes)
Hartle, L. (1994). Outdoor play: A window on social-cognitive development. *Dimensions of early childhood*, *23*(1), 27-31.	3 (participants)
Lindsey, E. W., & Mize, J. (2000). Parent-child physical and pretense play: Links to children's social competence. *Merrill-Palmer Quarterly (1982-)*, 565-591.	3 (participants)

Appendix B - Weight of Evidence A Study Quality Criteria Checklist

Weight of Evidence A – Methodological Quality	Piccininni et al. (2018)	Janssen (2016)	Lehrer et al. (2014)	Aggio et al. (2017)	Reid et al. (2015)	Larouche et al. (2016)	McHale et al. (2001)
1. Was the research question or objective in this paper clearly stated?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2. Was the study population clearly specified and defined?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3. Were all the subjects selected or recruited from the same or similar populations (including the same time period)?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4. Was a sample size justification, power description, or variance and effect estimates provided?	Yes	No	No	No	Yes	Yes	No
5. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?	No	No	No	Yes	No	No	No
6. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)?	Yes	Yes	Yes	No	Yes	Yes	Yes
7. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

8. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?	Yes	Yes	No	No	Yes	Yes	No
Quality score /9	8/9	8/9	6/9	6/9	8/9	8/9	6/9

Appendix C - Study 1 Preliminary Analyses of Covariates

The covariates for which independent samples t-tests were conducted included the study child's gender, health status, whether or not the study child has a learning difficulty, their experience of bullying and the health status of the primary caregiver. In an independent samples t-tests conducted to compare SDQ total difficulties scores for boys and girls there was a significant difference in scores for boys (M = 7.52, SD = 5.10) and girls (M = 6.84, SD = 4.77); $t(6199) = 5.41$, $p \leq .001$, with boys receiving higher SDQ total difficulties scores than girls. A further independent samples tests found that children reported to have a learning difficulty had higher SDQ total difficulties scores (M = 12.20, SD = 6.23) than those who did not have a learning difficulty (M = 6.42, SD = 4.45); $t(6199) = 25.32$, $p \leq .001$.

An independent samples t-test conducted to compare SDQ total difficulties scores for children who had experienced bullying over the previous twelve months and those who had no experience of bullying found that children who had been bullied received higher SDQ total difficulties scores (M = 10.08, SD = 5.66) than those who had not been bullied, (M = 6.42, SD = 4.45); $t(6195) = 24.67$, $p \leq .001$. Children who were reported to experience ongoing chronic illness or disability were found to have significantly higher SDQ total difficulties scores (M = 10.05, SD = 6.45) than children who were reported to be in good health (M = 6.87, SD = 4.66); $t(6199) = 15.188$, $p \leq .001$. Finally, children whose primary caregiver had ongoing chronic physical or mental health problems also had significantly higher SDQ total difficulties scores (M = 8.49, SD = 5.56) than children whose primary caregiver did not have such a condition (M = 6.99, SD = 4.83); $t(6198) = 7.997$, $p \leq .001$,

To evaluate the relationship between SDQ scores and the remaining covariates, correlational analyses were conducted between all scores on the SDQ and the following variables; temperament of the study child (as measured by the EAS Temperament Survey for Children), his or her experience of adverse life events, the parent-child relationship (as measured by the Pianta CPR-S), the primary caregiver's experience of depression (CES-D score) and household income (recorded in deciles). The results from these analyses showed significant correlation between all of these variables and SDQ total difficulties scores ($p < .05$). Table 9 below outlines the Pearson product-moment correlation coefficients computed to examine the relationship between these variables and SDQ scores. As these variables were found to be significantly associated with total

difficulties scores on the SDQ they were included as co-variates within the final analysis.

Correlations matrix of covariates and SDQ scores

	SDQ subscales					
	Emotional symptoms	Conduct problems	Hyper/ inattention	Peer problems	Total difficulties	Pro-social
EAS Shyness	.35**	.08**	-.03**	.22**	.21**	-.23**
EAS Emotionality	.54**	.39**	.28**	.28**	.54*	-.14**
EAS Activity	-.22**	-.01	.09**	-.24**	-.12**	.15**
EAS Sociability	-.11**	-.04**	.01	-.31**	-.14**	.19**
Adverse life events	.13**	.09**	.10**	.13**	.16**	-.01
PCG CES-D score	.21**	.15**	.13**	.14**	.23**	-.05**
Pianta conflict	.35**	.61**	.38**	.27**	.57**	-.33**
Pianta positive	-.12**	-.26**	-.20**	-.17**	-.26**	.36**
Pianta dependence	.29**	.12**	.10**	.16**	.24**	-.03**
Income (deciles)	-.09**	-.09**	-.09**	-.12**	-.14**	-.03**

Appendix D - Study 1 Regression Tables

Variables	SDQ Emotional symptoms score – Wave 1 (Age 9)			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Predictor variable;				
- Time spent in play	-.04*	.01	.01	.01
Individual factors;				
- Gender		.04*	.04*	.04*
- Health		-.06***	-.05***	-.05***
- SEN		-.07***	-.06***	-.06***
- Bully		-.10***	-.09***	-.08***
- Temperament;				
o Shyness		.23***	.21***	.21***
o Emotionality		.44***	.37***	.37***
o Activity		-.09***	-.09***	-.09***
o Sociability		.02	.02	.02
Family factors;				
- PCG Health			.05***	.05***
- PCG Depression			.07***	.07***
- Parent-child relationship;				
o Conflict			.05***	.05***
o Closeness			-.02	-.02
o Dependence			.12***	.12***
Environmental factors;				
- Adverse life events				.02*
- Income (deciles)				-.05***
F	8.01	277.84	200.16	177.17
R^2	.002**	.379***	.406***	.409***
Adjusted R^2	.002	.377	.404	.407
ΔR^2	.002	.377	.027	.003

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

Variables	SDQ Peer relationship problems score – Wave 1 (Age 9)			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Predictor variable;				
- Time spent in play	-.07***	-.03*	-.03*	-.03*
Individual factors;				
- Gender		-.01	-.01	-.01
- Health		-.05***	-.04**	-.04**
- SEN		-.11***	-.09***	-.09***
- Bully		-.33***	-.32***	-.31***
- Temperament;				
o Shyness		.08***	.06***	.07***
o Emotionality		.18***	.11***	.11***
o Activity		-.07***	-.06***	-.07***
o Sociability		-.22***	-.22***	-.22***
Family factors;				
- PCG Health			.03*	.02
- PCG Depression			.03*	.02
- Parent-child relationship;				
o Conflict			.09***	.09***
o Closeness			-.04**	-.04**
o Dependence			.07**	.07**
Environmental factors;				
- Adverse life events				.04**
- Income (deciles)				-.09***
F	19.72	208.72	145.20	132.13
R^2	.005***	.314***	.332***	.341***
Adjusted R^2	.005	.313	.329	.338
ΔR^2	.005	.309	.018	.009

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

Variables	SDQ Conduct problems score – Wave 1 (Age 9)			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Predictor variable;				
- Time spent in play	.02	.02	.01	.02
Individual factors;				
- Gender		-.07***	-.05***	-.05***
- Health		-.03	-.01	-.01
- SEN		-.10***	-.05***	-.05***
- Bully		-.05**	-.02	-.02
- Temperament;				
o Shyness		.002	-.01	-.01
o Emotionality		.38***	.14***	.14***
o Activity		.07***	.08***	.07***
o Sociability		-.05**	-.03*	-.03*
Family factors;				
- PCG Health			.05***	.04**
- PCG Depression			.000	-.01
- Parent-child relationship;				
o Conflict			.52***	.52***
o Closeness			-.09***	-.09***
o Dependence			-.03*	-.02
Environmental factors;				
- Adverse life events				-.004
- Income (deciles)				-.06***
F	1.36	103.13	211.97	188.30
R^2	.000	.185***	.420***	.424***
Adjusted R^2	.000	.183	.418	.422
ΔR^2	.000	.184	.236	.004

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

Variables	SDQ Hyperactivity/inattention score – Wave 1 (Age 9)			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Predictor variable;				
- Time spent in play	.03	.01	.004	.01
Individual factors;				
- Gender		-.11***	-.09***	-.10***
- Health		-.06***	-.05**	-.04**
- SEN		-.24***	-.21***	-.21***
- Bully		-.10***	-.08***	-.08***
- Temperament;				
o Shyness		-.05**	-.07***	-.07***
o Emotionality		.25***	.11***	.11***
o Activity		.12***	.14***	.13***
o Sociability		-.03*	-.01	-.01
Family factors;				
- PCG Health			.05***	.42**
- PCG Depression			.02	.01
- Parent-child relationship;				
o Conflict			.25***	.25***
o Closeness			-.11***	-.11***
o Dependence			.03	.03
Environmental factors;				
- Adverse life events				.02
- Income (deciles)				-.06***
F	3.22	107.72	107.56	96.05
R^2	.001	.191***	.269***	.273***
Adjusted R^2	.001	.189	.266	.270
ΔR^2	.001	.190	.078	.004

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

Variables	SDQ Total difficulties score – Wave 1 (Age 9)			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Predictor variable;				
- Time spent in play	-.02	.004	.002	.01
Individual factors;				
- Gender		-.06***	-.05***	-.05***
- Health		-.07***	-.06***	-.05***
- SEN		-.20***	-.17***	-.16***
- Bully		-.20***	-.17***	-.16***
- Temperament;				
o Shyness		.09***	.06***	.07***
o Emotionality		.45***	.27***	.27***
o Activity		.03	.04*	.03*
o Sociability		-.09***	-.07	-.07***
Family factors;				
- PCG Health			.07***	.05***
- PCG Depression			.05***	.03**
- Parent-child relationship;				
o Conflict			.31***	.32***
o Closeness			-.10***	-.10***
o Dependence			.07***	.07***
Environmental factors;				
- Adverse life events				.03*
- Income (deciles)				-.09***
F	1.34	323.00	332.26	301.17
R^2	.000	.415	.532	.541
Adjusted R^2	.000	.414	.530	.539
ΔR^2	.000	.415	.117	.009

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

Variables	SDQ Pro-social score – Wave 1 (Age 9)			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Predictor variable;				
- Time spent in play	-.02	-.03	-.02	-.02
Individual factors;				
- Gender		.15***	.11***	.11***
- Health		.04*	.03	.03
- SEN		.05*	.01	.01
- Bully		-.02	-.04*	-.03*
- Temperament;				
o Shyness		-.16***	-.13***	-.13***
o Emotionality		-.11***	.03	.03
o Activity		.06**	.04*	.04*
o Sociability		.10***	.07***	.07***
Family factors;				
- PCG Health			.01	.01
- PCG Depression			.02	.02
- Parent-child relationship;				
o Conflict			-.28***	-.28***
o Closeness			.23***	.23***
o Dependence			.02	.02
Environmental factors;				
- Adverse life events				.02
- Income (deciles)				-.02
F	2.38	54.72	93.89	82.53
R^2	.001	.107***	.243***	.244
Adjusted R^2	.000	.105	.240	.241
ΔR^2	.001	.107	.136	.001

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

Variables	SDQ Emotional symptoms score – Wave 2 (Age 13)			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Predictor variable;				
- Time spent in play	-.03*	.01	.01	.01
Individual factors;				
- Gender		.06***	.05***	.05**
- Health		-.07***	-.06***	-.06***
- SEN		-.09***	-.08***	-.08***
- Bully		-.08***	-.06***	-.06***
- Temperament;				
o Shyness		.13***	.12***	.12***
o Emotionality		.31***	.23***	.23***
o Activity		-.03	-.03	-.03*
o Sociability		-.01	-.01	-.01
Family factors;				
- PCG Health			-.05**	-.05**
- PCG Depression			.08***	.07***
- Parent-child relationship;				
o Conflict			.12***	.12***
o Closeness			.02	.02
o Dependence			.06***	.06***
Environmental factors;				
- Adverse life events				.01
- Income (deciles)				-.06***
F	4.12	96.63	72.63	65.01
R^2	.001*	.188***	.213***	.217***
Adjusted R^2	.001	.186	.210	.214
ΔR^2	.001	.187	.025	.004

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

Variables	SDQ Peer relationship problems score – Wave 2 (Age 13)			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Predictor variable;				
- Time spent in play	-.06***	-.04**	-.04**	-.04**
Individual factors;				
- Gender		-.07***	-.06***	-.07***
- Health		-.06***	-.05***	-.05***
- SEN		-.08***	-.06***	-.06***
- Bully		-.15***	-.14***	-.14***
- Temperament;				
o Shyness		.02	.01	.01
o Emotionality		.15***	.09***	.08***
o Activity		-.09***	-.08***	-.09***
o Sociability		-.16***	-.16***	-.16***
Family factors;				
- PCG Health			-.03*	-.03*
- PCG Depression			.02	.01
- Parent-child relationship;				
o Conflict			.09***	.09***
o Closeness			-.02	-.02
o Dependence			.05**	.05**
Environmental factors;				
- Adverse life events				.04*
- Income (deciles)				-.06***
F	14.17	68.65	48.88	44.48
R^2	.004***	.141***	.154***	.159***
Adjusted R^2	.004	.139	.151	.156
ΔR^2	.004	.137	.013	.005

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

Variables	SDQ Conduct problems score – Wave 2 (Age 13)			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Predictor variable;				
- Time spent in play	.003	.01	-.001	.002
Individual factors;				
- Gender		-.04*	-.03	-.03*
- Health		-.03*	-.02	-.02
- SEN		-.07***	-.04**	-.04*
- Bully		-.07***	-.05**	-.04**
- Temperament;				
o Shyness		.01	-.003	-.001
o Emotionality		.26***	.09***	.09***
o Activity		.05**	.05**	.05**
o Sociability		-.06**	-.04**	-.04*
Family factors;				
- PCG Health			-.01	-.01
- PCG Depression			.003	-.01
- Parent-child relationship;				
o Conflict			.38***	.38***
o Closeness			-.05**	-.05**
o Dependence			-.01	-.01
Environmental factors;				
- Adverse life events				.03
- Income (deciles)				-.07***
F	.03	46.04	75.47	68.35
R^2	.000	.099***	.220***	.226***
Adjusted R^2	.000	.097	.217	.222
ΔR^2	.000	.099	.120	.006

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

Variables	SDQ Hyperactivity/inattention score – Wave 2 (Age 13)			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Predictor variable;				
- Time spent in play	.03	-.001	-.01	-.003
Individual factors;				
- Gender		-.14***	-.13***	-.13***
- Health		-.07***	-.06***	-.06***
- SEN		.22***	-.20***	-.20***
- Bully		-.09***	-.08***	-.07***
- Temperament;				
o Shyness		-.03	-.04**	-.04**
o Emotionality		.20***	.08***	.08***
o Activity		.14***	.14***	.14***
o Sociability		-.04*	-.03	-.02
Family factors;				
- PCG Health			-.01	-.002
- PCG Depression			.04**	.03
- Parent-child relationship;				
o Conflict			.23***	.23***
o Closeness			-.07***	-.07***
o Dependence			.04**	.05**
Environmental factors;				
- Adverse life events				.03*
- Income (deciles)				-.07***
F	2.83	86.93	79.90	72.14
R^2	.001	.172***	.230***	.235***
Adjusted R^2	.000	.170	.227	.232
ΔR^2	.001	.172	.057	.006

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

Variables	SDQ Total difficulties score – Wave 2 (Age 13)			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Predictor variable;				
- Time spent in play	-.02	-.01	-.02	-.01
Individual factors;				
- Gender		-.08***	-.07***	-.07***
- Health		-.09***	-.07***	-.07***
- SEN		-.18***	-.15***	-.15***
- Bully		-.14***	-.12***	-.12***
- Temperament;				
o Shyness		.04***	.03	.03
o Emotionality		.33***	.17***	.17***
o Activity		.04*	.04**	.04
o Sociability		-.09***	-.08***	-.07***
Family factors;				
- PCG Health			-.03*	-.03*
- PCG Depression			.06***	.04*
- Parent-child relationship;				
o Conflict			.23***	.28***
o Closeness			-.05***	-.05*
o Dependence			.06***	.06***
Environmental factors;				
- Adverse life events				.04*
- Income (deciles)				-.09***
F	1.34	134.08	128.22	117.48
R^2	.000	.243	.323	.334
Adjusted R^2	.000	.241	.321	.331
ΔR^2	.000	.243	.080	.010

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

Variables	SDQ Pro-social score – Wave 2 (Age 13)			
	Block 1 (β)	Block 2 (β)	Block 3 (β)	Block 4 (β)
Predictor variable;				
- Time spent in play	-.02	-.02	-.01	-.01
Individual factors;				
- Gender		.14***	.12***	.12***
- Health		.03	.02	.02
- SEN		.03	.004	.004
- Bully		-.02	-.04*	-.04*
- Temperament;				
o Shyness		-.12***	-.11***	-.11***
o Emotionality		-.11***	-.001	-.001
o Activity		.04*	.03	.03
o Sociability		.08***	.06**	.06**
Family factors;				
- PCG Health			-.03	-.03
- PCG Depression			-.003	-.004
- Parent-child relationship;				
o Conflict			-.25***	-.25***
o Closeness			.12***	.12***
o Dependence			.03	.03
Environmental factors;				
- Adverse life events				-.01
- Income (deciles)				-.02
F	1.05	33.79	46.71	40.96
R^2	.000	.075***	.148***	.149
Adjusted R^2	.000	.073	.145	.145
ΔR^2	.000	.075	.074	.000

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

Appendix E - Information Letter for School Principal

The Role of Physical Activity and Outdoor Play in the Socio-Emotional Development of Children in Ireland

INFORMATION SHEET FOR SCHOOL PRINCIPAL

What is this project about?

The purpose of this study is to examine the relationship between physically active play and socio-emotional wellbeing in children in Ireland, with a view to identifying the factors that contribute to healthy social and emotional development.

Who is undertaking it?

My name is Emma Hilliard. I am presently completing a Doctorate in Educational and Child Psychology at Mary Immaculate College, Limerick. This research is being carried out under the supervision of Dr. Suzanne Egan and Dr. Jennifer Pope and will form part of my doctoral thesis.

What are the benefits of this research?

This research is concerned with identifying factors that contribute to social and emotional development. The promotion of children's mental health and wellbeing is at the fore of Irish policy. This study aims to contribute to the evidence base concerning the relationship between play and socio-emotional wellbeing in children in Ireland.

What is involved?

This research involves families with children in 3rd & 4th class. Should your school wish to participate in the study, children in these classes will be given an information pack to take home to their parent/guardian. This pack will contain information about the project for both the parent/guardian and the child. It will also contain consent forms, the questionnaires and a time use diary. Having read the information, families who wish to proceed should complete the enclosed documents and return them to the school in a sealed envelope. Families who do not wish to participate can return the information pack to the school. After an agreed period of time, the researcher will collect the documents.

Ethical considerations:

Informed consent from all participating families will be secured as well as the assent of the children whom this research concerns. All data collected will remain confidential and will be stored anonymously. Families are under no obligation to participate and

those who do will be informed of their right to withdraw from the project at any stage during the research process.

If you are happy for families in your school to be approached in relation to this research, the information packs will be delivered to the school and passed on to the relevant class teachers to be distributed. Should you have any questions in relation to the project please do not hesitate to contact me on [redacted]

This study has received ethical approval from the Mary Immaculate College Research Ethics Committee (MIREC). If you have any concerns about this study and wish to contact an independent authority, you may contact: *Mary Collins, MIREC Administrator, Research and Graduate School, Mary Immaculate College, South Circular Road, Limerick. Telephone: 061-204980/Email: mirec@mic.ul.ie*

Appendix F - Letter and Information Sheet for Parent/Guardian

The Role of Physical Activity and Outdoor Play in the Socio-Emotional Development of Children in Ireland

Dear parent/guardian,

My name is Emma Hilliard. I am presently completing a Doctorate in Educational and Child Psychology at Mary Immaculate College, Limerick. As part of my studies I am carrying out research in the area of children's play behavior and how this relates to their social and emotional wellbeing. This research is being supervised by Dr. Suzanne Egan and Dr. Jennifer Pope and will form part of my doctoral thesis. Details of my research project and what is involved for participants are outlined in the information sheet overleaf.

If you wish to participate in this study please read the Information Sheet for Parents/Guardians to find out more about it and sign the Informed Consent Form. I would also ask that you discuss the project with your child using the enclosed Child Information Letter and Assent Form before completing the questionnaires and diary. Full details and instructions as to how to complete these documents are provided and should be read in advance of your participation.

You are under no obligation to participate in this study. Should you choose not to participate please return this information pack to your child's class teacher.

If you have any further queries with regard to this research, please do not hesitate to contact me or my supervisors on [redacted] or email me at [redacted]

Thank you for taking the time to read this information.

Yours sincerely,

_____

Emma Hilliard

Trainee Educational and Child Psychologist

The Role of Physical Activity and Outdoor Play in the Socio-Emotional Development of Children in Ireland

INFORMATION SHEET FOR PARENTS/GUARDIANS

What is this project about?

The purpose of this research is to explore the relationship between physically active play and social and emotional wellbeing in children in Ireland.

What are the benefits of this research?

This research is concerned with identifying the factors that contribute to social and emotional development in children in Ireland. The promotion of children's physical, social and emotional wellbeing is at the fore of Irish policy. This study aims to contribute to the evidence base concerning the relationship between play and socio-emotional wellbeing in children.

What is involved?

Should you wish to take part in this research you will need to complete two short questionnaires about your child; one concerning their physically active play and one relating to their social and emotional wellbeing. I am also hoping to gather more detailed information about how your child spends their time during a typical day using a time use diary. Detailed instructions as to how to complete this diary are provided on the front of this document. If time permits you would need to fill in this diary on a typical day for your child. However, if this is not possible you can still participate in the study by completing and returning the other two questionnaires. Once the documents are complete you should seal them in the envelope provided and return them to your child's class teacher for the researcher to collect.

How will the information be used / disseminated?

The data you provide will be combined with that of the other participants in this study and used to form the results section of my thesis. Summary data only will appear in the thesis, individual participant data will not be shown.

How will confidentiality be kept?

All information gathered as part of this research will remain confidential to protect your privacy. A random ID number will be generated for each participating family and it is this number rather than your name which will be held with the data to maintain

anonymity. You are under no obligation to participate in this research. Should you choose to participate you are also free to withdraw participation without giving a reason and without consequence.

If you have any further queries with regard to this research, please do not hesitate to contact me or my supervisors on [redacted] or email me at [redacted]

This study has received ethical approval from the Mary Immaculate College Research Ethics Committee (MIREC). If you have any concerns about this study and wish to contact an independent authority, you may contact: *Mary Collins, MIREC Administrator Research and Graduate School, Mary Immaculate College, South Circular Road, Limerick. Telephone: 061-204980/Email: mirec@mic.ul.ie*

Appendix G - Informed Consent Form for Parents/Guardians

The Role of Physical Activity and Outdoor Play in the Socio-Emotional Development of Children in Ireland

INFORMED CONSENT FORM

Dear Participant,

As outlined in the information letter the current study aims to explore the relationship between physically active play and socio-emotional wellbeing in Irish children. Details of what the study involves are contained in the information letter. The letter should be read carefully before consenting to take part in the study.

All information gathered as part of this study will remain confidential and will not be shared with any third party. The data you provide will be stored anonymously. You are free to withdraw from the study at any time. In accordance with the MIC Record Retention Schedule anonymised research data may be held indefinitely.

Please read and tick the following statements before signing this consent form:

- ☐ I have read and understood the participant information letter.
- ☐ I understand what the project is about, and what the results will be used for.
- ☐ I know that my participation is voluntary and that I can withdraw participation without giving any reason.
- ☐ I am aware that every effort will be made to protect my anonymity and keep the data confidential.

Name (PRINTED): _____

Name (Signature): _____

Date: _____

Appendix H - Information Sheet for Children

INFORMATION SHEET FOR CHILDREN

Who am I?

My name is Emma. I go to college in Limerick. I am training to be an Educational and Child Psychologist. A psychologist is somebody who works with children, their families and their school to help with lots of different things. I am doing a big project for college and I am hoping that you and your family will take part in it.

What is my project about?

I am interested in the kinds of things you like to do every day. I really want to know about the games you play and how often you get to play them. I also want to know what you do the rest of the time.

Why am I doing this project?

I am doing this project because I want to find out about how much time children in Ireland spend playing. I also want to see how this makes them feel. I hope that other people will read my project and learn more about the kinds of things that children do every day.

What next?

If you and your parents decide that you want to take part in my project your parents will need to answer some questions about you and how you spend your time. They might also fill in a diary for a full day that tells me the kinds of things that you did that day. You can help your parents to fill this in if you like. When people see the information that your parents give it won't have your name on it, so nobody will know who you are. If you don't want to take part in the project you don't have to. Just tell your parents and that's ok too.

If you have any questions about my project you can ask your parents, your teacher or your principal and they will tell me so that I can answer them for you.

Thank you for reading about my project!

Appendix I - Child Assent Form

CHILD ASSENT FORM

Please tick the boxes and sign your name if you are happy to be part of my project

- ☐ I have read about the project with my parents.
- ☐ I am happy for my parents to fill in the forms about the kinds of things I do every day.
- ☐ I know that the information about me won't have my name on it so the people who read the project won't know who I am.
- ☐ I know that I don't have to be part of the project if I don't want to.

Signed: _____

Appendix J - Time-use Diary

Time-Use Diary

To complete this time use diary, simply mark the booklet to indicate what your child was doing for each quarter hour in the day from 7am until 10pm. To do this draw a line through the relevant box that corresponds to the time of day and the activity that your child was engaged in at that time. See example below:

Activity	7am				8am				9am				10am				11am			
	15	30	45		15	30	45		15	30	45		15	30	45		15	30	45	
1. Sleeping	\	\																		
2. Resting/Relaxing (doing nothing)																				
3. Personal care (washing, dressing, toilet)			\	\																
4. Eating/drinking/having a meal					\	\														

This example shows that the child was sleeping from 7am to 7.30am, washing and dressing between 7.30am and 8am, eating and drinking from 8am to 8.30am. The diary would continue to be completed in the same way throughout the day.

If your child is engaged in more than one activity at a given time, for example eating and watching television please record their main activity. If you consider their main activity to be watching TV then record this in row 14 'watching TV' rather than row 4 'eating/drinking/having a meal'

Where possible this diary should be completed with your child's input and on a day that you would consider to be 'typical'. Once again, please be assured that the information you provide will be treated in the strictest of confidence and the data collected will be stored and analysed anonymously.

Should you require further guidance on completing the diary please contact me via the details provided in the information letter.

Day on which this diary was completed: **DAY** _____ **DATE** _____

Activity	7am				8am				9am				10am				11am			
	15	30	45		15	30	45		15	30	45		15	30	45		15	30	45	
1. Sleeping																				
2. Resting/Relaxing (doing nothing)																				
3. Personal care (washing, dressing, toilet)																				
4. Eating/drinking/having a meal																				
5. Travelling (to and from school, leisure activities, relative's houses etc)																				
6. At school																				
7. Homework																				
8. Physical exercise or sport (e.g. football training/match, swimming lessons, dance class etc)																				
9. Active outdoor play (e.g. chasing, trampoline, outdoor games, riding a bike, playing ball etc)																				
10. Other play (e.g. board games, playing with toys, imaginary/make-believe indoor play)																				
11. Hobbies/other leisure activities (e.g. arts & crafts, music, drama, scouts etc)																				
12. Computer/Video gaming (e.g. PlayStation, Xbox, etc)																				
13. Using a mobile device (tablet, phone etc)																				
14. Watching TV																				
15. Reading books, comics, magazines etc																				
16. Household chores																				
17. Visiting relatives or friends for purposes other than play																				
18. On a shopping trip (shopping for clothes or groceries)																				
19. On a family outing																				
20. Religious activity (attending a religious service, prayer etc)																				
21. Other																				

Activity	5pm				6pm				7pm				8pm				9pm			
	15	30	45		15	30	45		15	30	45		15	30	45		15	30	45	
1. Sleeping																				
2. Resting/Relaxing (doing nothing)																				
3. Personal care (washing, dressing, toilet)																				
4. Eating/drinking/having a meal																				
5. Travelling (to and from school, leisure activities, relative's houses etc)																				
6. At school																				
7. Homework																				
8. Physical exercise or sport (e.g. football training/match, swimming lessons, dance class etc)																				
9. Active outdoor play (e.g. chasing, trampoline, outdoor games, riding a bike, playing ball etc)																				
10. Other play (e.g. board games, playing with toys, imaginary/make-believe indoor play)																				
11. Hobbies/other leisure activities (e.g. arts & crafts, music, drama, scouts etc)																				
12. Computer/Video gaming (e.g. PlayStation, Xbox, etc)																				
13. Using a mobile device (tablet, phone etc)																				
14. Watching TV																				
15. Reading books, comics, magazines etc																				
16. Household chores																				
17. Visiting relatives or friends for purposes other than play																				
18. On a shopping trip (shopping for clothes or groceries)																				
19. On a family outing																				
20. Religious activity (attending a religious service, prayer etc)																				
21. Other																				

Activity	12 noon				1pm				2pm				3pm				4pm			
	15	30	45		15	30	45		15	30	45		15	30	45		15	30	45	
1. Sleeping																				
2. Resting/Relaxing (doing nothing)																				
3. Personal care (washing, dressing, toilet)																				
4. Eating/drinking/having a meal																				
5. Travelling (to and from school, leisure activities, relative's houses etc)																				
6. At school																				
7. Homework																				
8. Physical exercise or sport (e.g. football training/match, swimming lessons, dance class etc)																				
9. Active outdoor play (e.g. chasing, trampoline, outdoor games, riding a bike, playing ball etc)																				
10. Other play (e.g. board games, playing with toys, imaginary/make-believe indoor play)																				
11. Hobbies/other leisure activities (e.g. arts & crafts, music, drama, scouts etc)																				
12. Computer/Video gaming (e.g. PlayStation, Xbox, etc)																				
13. Using a mobile device (tablet, phone etc)																				
14. Watching TV																				
15. Reading books, comics, magazines etc																				
16. Household chores																				
17. Visiting relatives or friends for purposes other than play																				
18. On a shopping trip (shopping for clothes or groceries)																				
19. On a family outing																				
20. Religious activity (attending a religious service, prayer etc)																				
21. Other																				

Appendix K - Physical Activity and Outdoor Play Questionnaire

Part 1: Short Questionnaire on Physical Activity and Outdoor Play

My child is: male ☐ female ☐ Child's age: _____

Please tick the box that best fits with the amount of time your child spends in the following kinds of activities:

1. On a typical **school day**, how long does your child spend playing outdoors (e.g. chasing, trampolining, outdoor games, riding a bike, playing ball etc.)

Not at all	0 – 30 mins	30min -I hour	1 - 1.5 hours	1.5 - 2 hours	2 - 2.5 hours	2.5 - 3 hours	3 - 3.5 hours	3.5 - 4 hours	4+ hours

2. On a typical **weekend day**, how long does your child spend playing outdoors (e.g. chasing, trampolining, outdoor games, riding a bike, playing ball etc.)

Not at all	0 – 30 mins	30min -I hour	1 - 1.5 hours	1.5 - 2 hours	2 - 2.5 hours	2.5 - 3 hours	3 - 3.5 hours	3.5 - 4 hours	4+ hours

3. On a typical **school day**, how long does your child spend in organised physical exercise or sport (e.g. football training/match, swimming lessons, dance class etc.)

Not at all	0 – 30 mins	30min -I hour	1 - 1.5 hours	1.5 - 2 hours	2 - 2.5 hours	2.5 - 3 hours	3 - 3.5 hours	3.5 - 4 hours	4+ hours

4. On a typical **weekend day**, how long does your child spend in organised physical exercise or sport (e.g. football training/match, swimming lessons, dance class etc.)

Not at all	0 – 30 mins	30min -I hour	1 - 1.5 hours	1.5 - 2 hours	2 - 2.5 hours	2.5 - 3 hours	3 - 3.5 hours	3.5 - 4 hours	4+ hours

Please answer the following questions about your child and outdoor play:

Is there anything that stops your child from playing outdoors? Please tick all that apply:

- ☐ No available spaces for play
- ☐ Neighbourhood is unsafe to play in
- ☐ Nobody to play with
- ☐ Bad weather
- ☐ Too much traffic
- ☐ Too busy with other activities/clubs
- ☐ Homework
- ☐ My child prefers to play indoors

Other; Please specify:
_____

Is there anything that encourages your child to play outdoors? Please tick all that apply:

- ☐ Safe neighbourhood
- ☐ Good weather
- ☐ Other children to play with
- ☐ Not having homework
- ☐ Availability of green areas, playgrounds and play spaces
- ☐ Access to outdoor play equipment (e.g. trampoline, bike, skates, etc.)

Other; Please specify: _____

To what extent do you agree or disagree with the following statements:

	Strongly Agree	**Agree**	**Disagree**	**Strongly Disagree**
It is safe for children to play outside in my area during the day	○	○	○	○
There is heavy traffic on my street	○	○	○	○
There is good access to green areas, playgrounds and play spaces nearby	○	○	○	○
There are other children outside to play with	○	○	○	○
Organised sports activities and clubs encourage my child outdoors	○	○	○	○

Homework acts as a barrier to my child playing outdoors	○	○	○	○
My child has access to outdoor play equipment (e.g., trampoline, bike, skates, etc.)	○	○	○	○
My child prefers to play indoors	○	○	○	○
My child is too busy with other activities and clubs to play outside	○	○	○	○

Appendix L - Ethical Approval for Study 2

Mary Immaculate College Research Ethics Committee

MIREC-4: MIREC Chair Decision Form

APPLICATION NO. A19-017

1. PROJECT TITLE

The Role of Physically Active Play in the Socio-Emotional Wellbeing of Irish Children

2. APPLICANT

Name:	Emma Hilliard
Department / Centre / Other:	Dept of Educational Psychology, Inclusive & Special Education
Position:	Postgraduate Researcher

3. DECISION OF MIREC CHAIR

☐	Ethical clearance through MIREC is required.
☐	Ethical clearance through MIREC is not required and therefore the researcher need take no further action in this regard.
✓	Ethical clearance is required and granted. Referral to MIREC is not necessary.
☐	Ethical clearance is required but the full MIREC process is not. Ethical clearance is therefore granted if required for external funding applications and the researcher need take no further action in this regard.
☐	Insufficient information provided by applicant / Amendments required.

4. REASON(S) FOR DECISION

Re: **A19-017 – Emma Hilliard - *The Role of Physically Active Play in the Socio-Emotional Wellbeing of Irish Children***

I have reviewed this application and I believe it satisfies MREC requirements. It is, therefore, approved in full.

Emma might like to consider the following

- **Appendix A – Information letter for school principal**
  - Perhaps the introduction could mention that Emma is following up on their telephone conversation
  - There could also be a suggestion at the end of the letter as to how the Principal should communicate consent – email? / telephone call? / Principal's Consent Form?

5. DECLARATION (MREC CHAIR)

Name (Print):	Dr Áine Lawlor
Signature:	
Date:	15th March 2019

Appendix M - Empirical Paper

The Role of Physical Activity and Outdoor Play in the Socio-Emotional Development of Children in Ireland: Insights from the Growing Up in Ireland Study.

Emma Hilliard

Abstract

Physical activity and outdoor play is thought to have a number of benefits for healthy growth and development, both physically and psychologically. Recent decades have seen changes in the way children play, with suggestions of a decline in the time children have for active outdoor play. At the same time, these decades have seen a substantial number of children presenting with social, emotional and behavioural difficulties. This research aimed to examine the relationship between physical activity and outdoor play and socio-emotional development in children in Ireland. It investigated whether children who spent more time engaged in these activities reported better socio-emotional outcomes both concurrently and longitudinally. Data from the Growing Up in Ireland (GUI) national longitudinal study of children in Ireland was used to explore if time spent in physical activity play, exercise and sport at 9 years of age was related to socio-emotional development at 9 years old, 13 years old and 17-18 years old. Regression analyses indicated that time spent in physical activity and outdoor play at nine years old was significantly associated with peer relationship problems in middle childhood and early adolescence. While individual, family and environmental factors were significant predictors of other aspects of socio-emotional development, time spent in physical activity and outdoor play was not. These findings tentatively support an association between these physical activity and outdoor play and peer relationships in middle childhood and early adolescence and further highlight the importance of adopting a holistic bioecological approach to understanding socio-emotional development.

Introduction

The view that children's play is essential for healthy growth and development is widely held and this perspective has been influential for many years (Whitebread et al., 2017). A substantial body of literature suggests that play contributes to several aspects of development in the physical, cognitive, social and emotional domains (Gleave & Cole-Hamilton, 2012). Among its many proposed benefits, play is thought to develop creativity and imagination, improve attention, promote language development, enhance social competence and peer relationships and contribute to the development of emotional competencies such as confidence, resilience and self-regulation (Ginsburg, 2007; Pellegrini & Smith, 1998a; Whitebread et al., 2017; Yogman, Garner, Hutchinson, Hirsh-Pasek & Golinkoff, 2018).

Undoubtedly, being outdoors allows for a different range of play opportunities that cannot exist in an indoor play environment. Outdoor play affords children the opportunity to experience greater freedom of movement, to engage in larger and more boisterous movements and to have contact with natural elements (Bento & Dias, 2017). However it is important to note that outdoor play can involve almost every form of play that is also seen indoors such as fantasy or pretend play, constructive play, play with language, play with objects and any kind of social play thus making the outdoors an optimal environment for play (Kilkelly et al., 2016). Being outdoors tends to encourage more active forms of play, such as running, climbing, chasing and rough and tumble play. This kind of play, also known as physical activity play, is typically highly unstructured and informal and is thought to have a number of benefits for healthy growth and development, both physically and psychologically (Pellegrini and Smith, 1998b). These benefits are reported to include the promotion of healthy weight and cardiovascular fitness as well as decreases in stress, fatigue, injury and depressive symptoms and increases in concentration and attention (Yogman et al., 2018).

There are many different play activities that children can engage in outdoors and these provide various experiences which are thought to enhance socio-emotional development. Outdoor play provides children with opportunities to engage with their peers and it is through these experiences that children learn to make friends, work in groups, share, understand the perspectives of others and self-advocate when necessary (Ginsburg, 2007). In middle childhood the complexity of games is thought to increase and as such, social play with peers often involves problem solving about what to play,

who can play, when to start and stop as well as deciding on the rules of the game to be played (Elkind, 2007; Pellegrini, Blatchford, Kato & Baines, 2004). This requires negotiation, compromise and cooperation. Burdette and Whitaker (2005) propose that the process of solving these kinds of dilemmas and conflicts during play contributes to the development of a number of social and emotional competencies including empathy, flexibility, self-awareness and self-regulation.

It is also suggested that physical activity play outdoors has the potential to improve many aspects of emotional health and wellbeing including minimising anxiety, depression, aggression, stress and sleep difficulties (Burdette & Whitaker, 2005). It is well documented that physical activity and exercise decreases symptoms of depression and anxiety and alleviates stress in adults. Moreover, studies investigating the health benefits of physical activity for school-aged children and adolescents have found small to modest associations between physical activity and symptoms of depression (Janssen & LeBlanc, 2010; Korezak, Madigan & Colasanto, 2017). Further research in this area is indicated. In addition to the potential benefits of physical activity generally, a growing body of research suggests that outdoor play in natural environments is particularly beneficial for healthy emotional development. Spending time in natural outdoor environments is thought to reduce stress and promote an overall sense of wellbeing (Louv, 2008) while exposure to natural sunlight outdoors facilitates the secretion of serotonin, the hormone related to preventing depression and to promoting a sense of wellbeing and calmness (Kemple et al., 2016).

Despite the myriad of benefits of play for healthy child development that have been discussed in the literature and the recent focus on the importance of play in national and international policy, recent years have seen a shift in the way that children spend their time. Research suggests that children today spend less time in unstructured, outdoor play than in previous generations (Chudacoff, 2011; Clements, 2004; Elkind, 2007; Frost, 2012; Gray, 2011a). A global study of children's pastimes and play in countries from North America, South America, Africa, Europe and Asia found similarities in children's play across these nations. Findings indicated that a lack of unstructured outdoor play was a consistent feature of childhood and that today, children's major free-time activity is watching television (Singer, Singer, D'Agostino & DeLong, 2009). In addition, more recent research from the UK explored how school-age children currently spend their time and how this has changed over the past thirty

years. Results of this exploration show that over this time period, children increased their time at home and spent more time in screen-based activities and doing homework. Concurrently, they spent less time in unstructured play while time spent in organised exercise or sport was also seen to increase (Mullan, 2019).

Several reasons for this decline in time for play have been suggested. Firstly, children today appear to engage less in unsupervised, outdoor play and this has been linked to concerns about risks relating to child safety, injury prevention and a lack of appropriate play spaces (Brussoni et al., 2015; Chudacoff, 2011; Clements, 2004). In addition, the traditional structure of households has changed in recent decades with a substantial increase in families where both mothers and fathers work outside the home and children spend more time in childcare or alternative adult led structured activities (Chudacoff, 2011; Ginsburg, 2007). Regardless of parents' working arrangements, structured activities such as music lessons and sports activities are a larger part of children's lives today as parents often strive to do their best for their children by building skills and aptitudes from a young age (Chudacoff, 2011; Ginsburg, 2007; Gray 2011a). Furthermore it is suggested that academic demands now start at a younger age with a focus on literacy and numeracy in schools and homework taking up increasing amounts of time outside of the school day (Gray, 2011a; McCoy, Byrne & Banks, 2012). Finally, it is difficult to ignore the passive entertainment offered by television, smart phones and other digital media as another key factor in the changing habits of children today.

In the Irish context, recent data from Growing Up in Ireland (GUI), the National Longitudinal Study of Children in Ireland offers some insight into the current play behaviour of Irish children. This data shows that the most popular forms of play for seven to eight-year-old children in Ireland are reading for pleasure, playing computer games and make-believe play. Conversely, games with physical activity, including running and riding a bicycle were amongst the least popular, particularly for girls. It is also reported that Irish children are spending a substantial amount of time on screen-based activities which would in turn imply a reduction in the amount of time spent in active outdoor play for Irish children (Economic & Social Research Institute (ESRI), 2016). Kernan (2007) also notes a change in the site of children's unstructured play over the past fifty years, reporting that the location of play has shifted from public spaces outdoors to semi-public spaces to taking place mainly indoors.

Meanwhile, recent decades have also seen substantial numbers of children presenting with social, emotional and behavioural difficulties. Estimates from recent Irish studies suggest that as many as one in four Irish children aged 11–13 years may be experiencing a mental health difficulty at any given time (Coughlan et al., 2014; Dooley, Fitzgerald & MacGiollabhui, 2015). Given the posited benefits of play for social and emotional development and the possibility that children may be missing out on opportunities to develop these skills due to changes in the way that children are spending their time, a theory linking these two situations has begun to emerge. This theory suggests that the increase in the number of children presenting with social, emotional and behavioural difficulties is strongly linked to the decline in the amount and quality of time that children have for play (Gray, 2011a; Whitebread, 2017).

While the literature describing the developmental benefits of play is abundant, the nature of much of this research is indicative, tending to hypothesise about how play might influence children's outcomes (Whitebread et al., 2017). However, empirical studies of children's physical activity and outdoor play which provide strong evidence to support the link between this type of play and social and emotional outcomes are more limited. The current research aims to address this gap. Data from the child cohort of the Growing Up in Ireland (GUI) study provided the opportunity to investigate the relationship between the amount of time children in Ireland spend in physical activity play, exercise or sport and their socio-emotional development both concurrently and longitudinally. The GUI study is a national longitudinal study of children in Ireland which was commissioned by the Irish government and is being carried out on an ongoing basis by researchers from the Economic and Social Research Institute (ESRI) and Trinity College, Dublin (TCD). For the purposes of the current study, analysis was carried out on the data collected during the first, second and third waves of the study, when the study children were nine years old, 13 years old and 17/18 years old.

The following research questions are addressed in the current study:

1. What are the reported levels of physical activity and outdoor play in middle childhood in Ireland?
2. Is there a relationship between the amount of time children spend in physical activity and outdoor play and their socio-emotional development?

3. Do children who spend more time engaged in physical activity and outdoor play in middle childhood report better socio-emotional outcomes in their teenage years?

Methodology

Sample. The sample for the child cohort of the GUI study was generated through the Irish primary school system. Using a two-stage sampling design, a nationally representative sample of 1,105 primary schools was first selected and approximately 82% of these (910 schools) consented to participate in the study. In the second stage, the sample of children and their families were then randomly generated from within those schools with a response rate at the family level of 57% (McCoy, Quail & Smyth, 2012). This yielded a total sample of 8,568 study children, their primary and secondary caregivers and their school principals and teachers who provided the data for this cohort of the GUI study.

For the purposes of the current research, the sample included for analysis was comprised of participants in the child cohort of the GUI study who completed the main surveys and subsequently returned self-completion time-use diaries. A total of 6,412 time-use diaries were returned from the 8,568 nine-year-old children who were interviewed during Wave 1 of the GUI study. 184 of these diaries were deemed to be unusable by the GUI study team due to reasons such as too much missing information or implausible information given. This left a total of 6,228 usable time-use diaries, representing an effective response rate of 72.6% of participation in the main study. For the purposes of this study, a further seven time-use diaries were deemed unusable due to implausible information such that the study child was reported to be engaged in several other activities whilst also reported to be engaged in physical activity play, exercise or sport.

Thus, the final file for analysis of data collected during Wave 1, when the study child was nine years old, contained 6221 children and their families who completed the survey and returned the time use diary. The sample for analysis of data at Wave 2 contained 5673 participants who had returned time use diaries at Wave 1 and completed the surveys at Wave 1 and Wave 2. The final sample for analysis of data at Wave 3 contained 4626 participants who had returned time use diaries at Wave 1 and

successfully completed surveys at Waves 1, 2 & 3. This information, as well as the gender breakdown of participants, is summarised in Table 1 below.

Table 1

Final Sample Sizes for Study 1 Analysis

	Wave 1		**Wave 2**		**Wave 3**	
Sample size	n = 6221		n = 5673		n = 4626	
	male	*female*	*male*	*female*	*male*	*female*
	n=3091	n=3130	n=2828	n=2847	n=2282	n=2344

Data collection procedures. Data collection in the GUI study was carried out by fieldworkers who had received specific training by the GUI study team in advance of meeting participating families. Data for the child cohort of the GUI study was collected firstly in the school setting and then in the study child's home. Having completed the school-based phase of the project, participating families were then visited in their homes by the trained interviewers. The respondents in the home included the primary caregiver, who was the main respondent to the survey, and the study child. In 98% of cases, the primary caregiver was the study child's biological mother. Where possible, the resident spouse or partner of the primary caregiver was also interviewed in the home. In cases where there was a non-resident parent of the study child, a self-completion questionnaire was sent to this non-resident parent, with the consent of the primary caregiver.

The main interview with the primary caregiver was carried out on a face to face basis using a Computer Assisted Personal Interview (CAPI). Respondents were also asked to self-complete a paper-based questionnaire which included potentially sensitive questions. At the end of the interview a paper-based self-completion time-use diary was left with the respondent who had completed the main primary caregiver questionnaire. They were asked to fill out the time-use diary with the study child on an agreed date. A worked example of the time-use diary was explained by the interviewer and left with the respondent. Participants were asked to return the time-use diary, once completed, to the study team by post in a prepaid envelope. Full details of the data collection procedures

are available in technical reports issued by the GUI study team (Murray et al., 2010; Thornton, Williams, McCrory, Murray & Quail, 2016; Murphy, Williams, Murray & Smith, 2019).

Measures. For the purposes of the current study, the main outcome measured was the study child's socio-emotional development while the predictor variable was the amount of time the study child spent in physical activity play, exercise or sport on a typical day. Details on the measures used for these variables and covariates included in the final analysis are provided below.

Socio-emotional development measure. This was measured using the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997). The SDQ is a social, emotional and behavioural screening questionnaire which is widely used in both research and clinical practice. It was selected for use in the GUI study to provide an outcome measure across behavioural and psychosocial domains. There are versions available for completion by parents or teachers of children aged 3–16 years old and a self-rated version for children aged between 11 and 16 years old. The questionnaire contains 25 items and produces scores on five subscales with a subscale score range of 0-10. The subscales measured are: Emotional symptoms (e.g. often unhappy, downhearted or tearful), Peer relationship problems (e.g. rather solitary, tends to play alone), Conduct problems (e.g. often fights with other children), Hyperactivity/inattention (e.g. thinks things out before acting), and Prosocial behaviour (e.g. considerate of other people's feelings) . Each subscale comprises five items. A 'Total Difficulties' score can be calculated by adding the scores on the Emotional symptoms, Peer relationships problems, Conduct problems and Hyperactivity/inattention subscales. These four subscales can also be grouped into internalising problems, which combines scores from Peer relationship problems and Emotional symptoms subscales and externalising problems, which combines scores from the Hyperactivity/inattention and Conduct problems.

To complete the Strengths and Difficulties Questionnaire, respondents were asked to what extent they agreed with each item on a three-point rating scale of 'Certainly true', 'Somewhat true' or 'Not true'. Item scores vary from 0 to 2, individual subscale scores range from 0 to 10 and the total difficulties score ranges from 0 to 40.

Responses given by the primary caregiver were used as the main outcome measure of socio-emotional development. Primary caregivers completed the SDQ during all three waves of data collection when the study child was aged nine, 13 and 17/18 respectively.

The SDQ has good psychometric properties and has been used previously in large scale longitudinal research studies around the world (Murray et al., 2010). With regard to validity, it has been shown to correlate highly with the Child Behaviour Checklist (Goodman & Scott, 1999). The SDQ has been shown to differentiate well between clinical and community based samples when it is used as a screener and to assess socio-emotional health and problem behaviours in children (Goodman, 1997; Goodman & Scott, 1999). In an evaluation of the internal reliability of the SDQ in a large sample of British children, aged 5-15 years, moderate to strong coefficient alphas were reported for the parent version. The mean alpha across all scales and all versions was good at .73 (Goodman, 2001). The SDQ has also been found to have stable test-retest reliability over a 12-month period (Hawes & Dadds, 2004). Reliability analyses using the current sample have reported acceptable internal consistency with alpha levels ranging from .52 to .74 for the individual subscales and an alpha level of .79 for the total difficulties score (Nixon, 2012).

Time-use diary. The independent or predictor variable used in this analysis was the amount of time that the study child spent in physical activity play, exercise or sport on a given day. This was calculated using the information provided by participants in the GUI study in the time-use diaries that were completed during the first wave of data collection at age 9 years. The purpose of the time-use diaries was to record what the study child did over a 24-hour period, from 12.00 midnight until 12.00 midnight. As such, the diary day was divided into 96 15-minute intervals or time slots. The time-use diaries contained 22 pre-coded activities, examples of which included things like sleeping, personal care, at school, physical activity play/exercise/sports, watching TV, on a family outing and so on. Respondents were asked to tick to indicate which activities the study child was involved in during each of the time slots, with the option to record up to five activities concurrently.

The GUI study team combined ‘physical activity play, exercise and sport’ into one category, and this was given as one of the pre-coded activities within the time-use diary. The examples listed as a guide for this category included playground, running, chasing, football, judo, ballet and dance. As such, this category did not

distinguish between structured activities such as football practice or dance classes and unstructured activities such as playground or chasing. For the purposes of analysis in the current study the number of time slots where respondents ticked this physical activity play/exercise/sports category was summed for each participant to give an overall total of the amount of time that participants spent engaged in this activity during their diary day. This new variable was used as the predictor variable in the analysis.

Covariate measures. As outlined in the previous chapter, the literature indicates a number of individual and systemic factors which are thought to impact on socio-emotional development. Based on this literature, these factors were included as covariates in the analysis for this study. The measures used to gather information about these covariates are described below.

Four individual child variables were included as covariates in the analysis: the study child's gender, whether the study child had a learning difficulty (yes/no), whether the study child had been the victim of bullying in the past year (yes/no) and the study child's temperament. Data for all of these variables was obtained during the interview with the primary caregiver. The temperament variable was measured using the Emotionality, Activity and Sociability (EAS) Temperament Survey for Children: Parental Ratings (Buss & Plomin, 1984). The EAS is a 20-item questionnaire which was designed to measure aspects of temperament that are related to developmental differences in personality and behaviour. It produces scores on four scales: Emotionality, Activity Level, Sociability and Shyness. Each scale consists of five items and respondents were asked to indicate their level of agreement with each item on a five-point scale which ranged from 'not characteristic' to 'very characteristic', resulting in a score ranging from 0 to 5 on each of the four scales.

Three family related variables were included as covariates in the analysis: primary caregiver's health status, parental depression and the parent-child relationship. These variables were based on primary caregiver reported data. The primary caregiver health status variable was created from a question which asked whether the respondent currently had, or had in the past, suffered from any chronic illness or disability which made it difficult for them to look after the study child. The responses available to this question were 'in the past', 'currently' and 'no'. These responses were recoded into two categories, 'yes' and 'no', for the purposes of this analysis.

Parental depression was measured using the Centre for Epidemiological Studies Depression Scale (CES-D). The CES-D is a widely used self-report measure that is used as a screening instrument for depression in the general population and the short eight-item version was used in the GUI study. This instrument was included in the sensitive supplementary section of the questionnaire for the primary caregiver to self-complete using paper and pen. Sample items include: "I felt that I could not shake off the blues even with help from my family and friends", and "I thought my life had been a failure", which were answered on a four-point Likert-scale ranging from 0 (<1 day) to 3 (5–7 days), with reference to the previous seven-day period. A composite score is calculated by summing item responses. Composite scores of 7 and above are classified as depressed with scores < 7 defined as not depressed (Murray et al., 2010).

The parent-child relationship variable described the nature of the relationship between the primary caregiver and the study child and was measured using the Pianta Child-Parent Relationship Scale (CPR-S) (Pianta, 1992). This instrument is comprised of 30 statements which form three subscales; Conflicts (12 items), Positive Aspects of the Relationship (10 items) and Dependence (4 items). The Conflicts subscale relates to the parent's perception of difficulties in their relationship with their child and the interpersonal temperament traits of their child. The Positive Aspects subscale includes items relating to getting on with their child and feelings of effectiveness in the parent. The Dependence subscale mainly relates to the parent's perception of the child's dependence on him/her. Thus, The Pianta CPR-S taps into both positive and negative aspects of the parent-child relationship. Respondents indicated the extent to which each of 30 statements applied to their current relationship with the study child, in the form on a 5-point scale: 'Definitely does not apply', 'Not really', 'Neutral', 'Not sure', 'Applies somewhat', and 'Definitely applies'. A score on each subscale can then be calculated.

Two environmental variables were included as covariates in the analysis: life events and socio-economic status (SES), as measured by household income. Information on these variables was collected during the primary caregiver interview. The life events variable was created from a question which provided the respondent with a list of potentially disturbing, unsettling or traumatic events. Items on this list included things like moving to a new house, parental separation, the death of a parent, as well as providing the respondent with the opportunity to describe a disturbing event not covered in this list. Respondents indicated which, if any of these events, the study

child had experienced. For the purposes of the analysis in the current study, the number of life events that each study child had experienced was summed to create the life events variable. The SES variable used net household income as a measure of socio-economic status. Respondents were provided with a card displaying 10 categories of net household income and asked to select which category their household fell into. These categories were coded in deciles from 1 – 'lowest' up to 10 – 'highest' and these deciles were used as the measure of SES for the purposes of this analysis.

Ethical Considerations. Ethical approval for the GUI study was granted by the Research Ethics Committee (REC) of the Health Research Board in Ireland. The parent or guardian and the study child provided written informed consent prior to beginning the data collection process. Procedures relating to child protection were informed by the Children First Guidelines (Department of Health and Children, 1999). All interviewers, as well as other staff working on the Growing Up in Ireland study, were vetted by An Garda Siochána. Further, more detailed information on the ethical considerations in the GUI study are available in technical reports issued by the research team (Murray et al., 2011). The current study involved the use of anonymised data from the GUI study which ensured that the participants could not be identified. This data is archived in the Irish Social Science Data Archive (ISSDA) in the form of an Anonymised Microdata File (AMF).

Results

Statistical analysis. Secondary analysis on the Growing Up in Ireland datasets was performed using IBM SPSS® Statistics, Version 26. *P*-values less than 0.05 were considered statistically significant. The dataset was cleaned for outliers or missing data. As previously reported, 184 time-use diaries were excluded by the GUI study team due to missing or implausible information. A further seven time-use diaries were excluded for the purposes of the current analysis due to implausible information recorded. Thus, the final sample sizes for analysis were 6221 at Wave 1, 5673 at Wave 2 and 4626 at Wave 3.

Preliminary analyses were conducted on potential covariates. These variables included the study child's gender, health status, temperament, presence of a learning

difficulty, experience of being bullied, the primary caregiver's physical and mental health, the nature of the parent-child relationship, the study child's experience of adverse life events and socioeconomic status as measured by household income. Information pertaining to these potential covariates was collected during Wave 1 when the study child was nine years old[2]. In order to determine that each of the covariates included in the final analyses were significantly impacting on SDQ scores, preliminary analyses were carried out using either independent samples t-tests or correlations. The findings of these preliminary analyses are reported in Appendix C. The variables which were found to be significantly associated with the total difficulties scores on the SDQ were included as co-variates within the final analysis which is reported below.

Hierarchical Linear Regressions were conducted as the main analyses to examine the association between time spent in physical activity play, exercise or sport at nine years old and scores on the Strengths and Difficulties Questionnaire (SDQ) at the three different time points; age 9 (Wave 1), age 13 (Wave 2) and age 17 (Wave 3). All analyses were conducted with the score on each of the individual subscales of the SDQ; emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and pro-social; and with the SDQ total difficulties score. The total difficulties score was calculated be adding scores on the emotional symptoms, peer relationship problems, conduct problems and hyperactivity/inattention subscales.

At block one of the regression model, the predictor variable, time spent in physical activity play, exercise or sport was entered. At block two individual level factors were entered; gender, health status, presence of a learning difficulty, temperament, experience of bullying. At block three family level factors were entered; primary caregiver's health status, primary caregiver's experience of depression, parent-child relationship. Finally, at block four environmental level factors were entered; adverse life events and socio-economic status. Figure 3 provides an illustration of this model. Standardised regression coefficients (β) are reported throughout.

[2] To account for variances in each of the confounding variables that may have occurred at the different time points, additional analyses were conducted to include the same or similar covariates as measured when the study child was 13 years old, when running the analysis on Wave 2 data and as measured when the study child was 17 years old when running the analysis on Wave 3 data. No notable variations in the results were observed and as such results are presented as above with covariates measured at age 9.

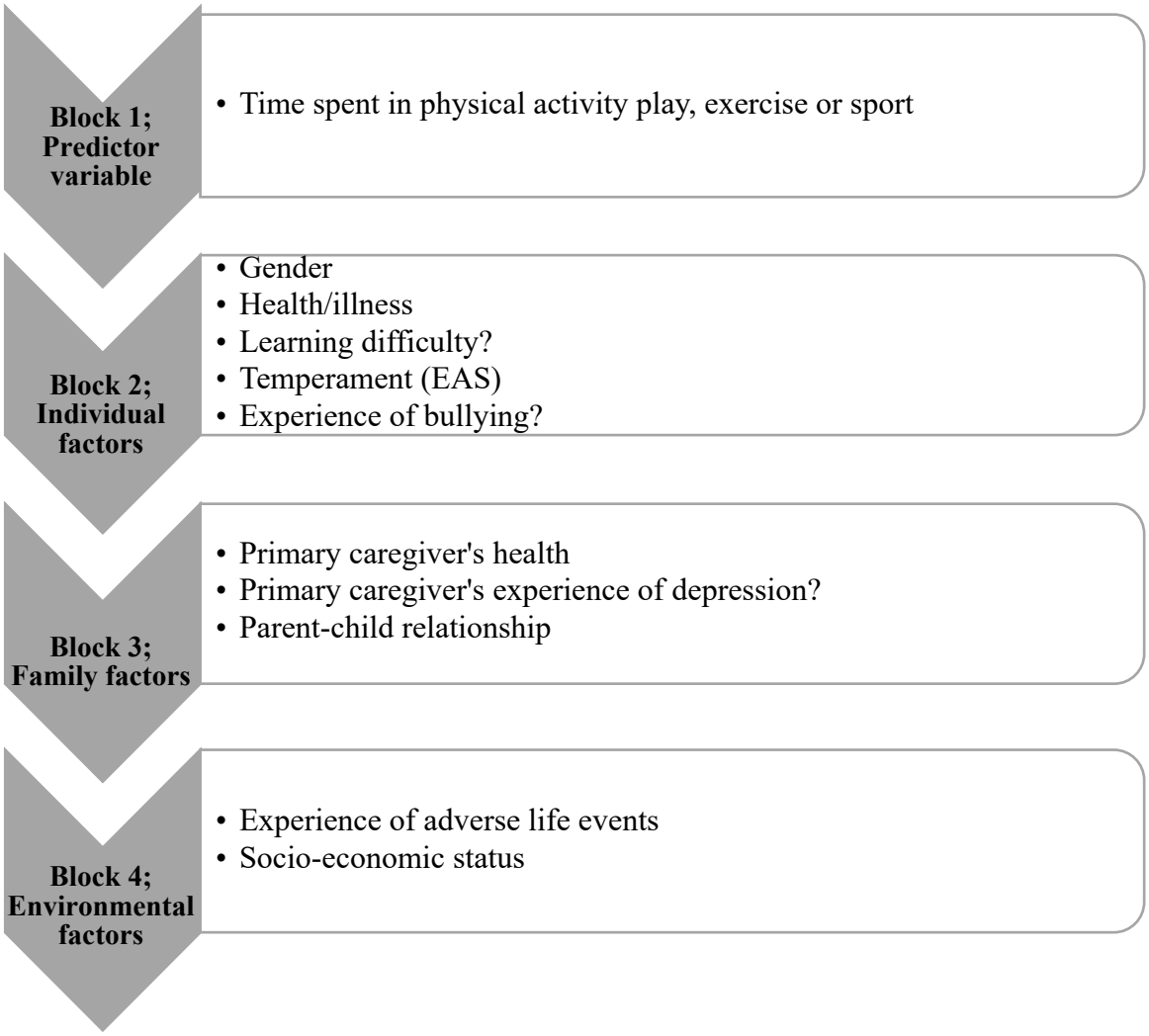

Figure 1.. Hierarchical Linear Regression Model

Descriptive statistics. The predictor variable in the regression analysis was the amount of time the study child spent in physical activity play, exercise or sport on a given day. The average amount of time reported to be spent in this activity by nine-year-old children in Ireland at the time of measurement was 1.30 hours (*SD* = 1.37). There was a significant difference between the amount of time spent engaged in these activities for boys (*M* = 1.54, *SD* = 1.47) and girls (*M* = 1.06, *SD* = 1.22); $t(6219) = 14.19$, $p \leq .001$. No difference in the time spent in these activities was noted for children who had an ongoing chronic illness or disability (*M* = 1.26, *SD* = 1.38) and those who did not (*M* = 1.30, *SD* = 1.37); $t(6219) = -.74$, $p \leq .001$. The outcome variables in the regression analyses were the scores reported by the primary caregiver on the Strengths

and Difficulties Questionnaire (SDQ). See Table 2 below for further details of SDQ scores.

Table 2

Means, Standard Deviations and Range for SDQ Scores (Wave 1, Wave 2, Wave 3)

Wave 1 (n = 6221)	**Mean**	**Std. Deviation**	**Range**
Total difficulties;	7.18	4.95	37
- Emotional symptoms	1.96	1.94	10
- Peer relationship problems	1.10	1.39	9
- Conduct problems	1.21	1.42	10
- Hyperactivity/inattention	2.92	2.40	10
Pro-social	8.87	1.42	9
Wave 2 (n = 5675)			
Total difficulties;	6.31	4.91	35
- Emotional symptoms	1.71	1.89	10
- Peer relationship problems	1.06	1.34	10
- Conduct problems	1.06	1.43	10
- Hyperactivity/inattention	2.48	2.30	10
Pro-social	8.79	1.50	10
Wave 3 (n = 4626)			
Total difficulties;	6.49	4.96	33
- Emotional symptoms	1.94	2.10	10
- Peer relationship problems	1.36	1.49	10
- Conduct problems	0.94	1.25	10
- Hyperactivity/inattention	2.24	2.17	10
Pro-social	8.68	1.64	10

Background information pertaining to the covariates controlled for in the final analysis are outlined in Table 3 and Table 4 below. Frequencies are provided for gender, health status, learning difficulty, experience of bullying and primary caregiver health status. Means and standard deviations are recorded for scores on the relevant scales; EAS Temperament Survey, Pianta CPR-S, Primary caregiver depression score (CES-D) and number of adverse life events.

Table 3

Descriptive Statistics for Categorical Covariates

	n	*Percentage %*
Gender;		
- Boys	3091	49.7
- Girls	3130	50.3
Study child health status;		
- Ongoing chronic illness/disability	599	9.6
- No chronic health problems	5622	90.4
Diagnosis of learning difficulty?		
- Study child has learning difficulty	517	8.3
- No learning difficulty	5704	91.7
Study child has been the victim of bullying?		
- Yes	1288	20.7
- No	4929	79.2
- Don't know	4	.06
Primary caregiver health status;		
- Ongoing chronic illness/disability	785	12.6
- No chronic health problems	5435	87.4

Table 4

Means and Standard Deviations for Continuous Covariates

	Mean	*Std. Deviation*
Temperament (EAS Temperament Survey);		
- Shyness	2.28	0.75
- Emotionality	2.08	0.87
- Activity level	4.05	0.78
- Sociability	3.63	0.63
Parent-child relationship (Pianta CPR-S);		
- Conflicts	21.65	8.39
- Positive aspects of the relationship	44.73	3.81
- Dependence	10.20	3.43
Primary caregiver depression score (CES-D)	1.92	3.04
Number of adverse life events	1.85	1.09

Regression analysis. ***Wave 1 Analysis.*** Hierarchical linear regressions were conducted to test the association between time spent in physical activity play, exercise or sport, as recorded at nine years old, and scores on the various scales of the SDQ at the same time point. The results of this analysis found that the predictor variable significantly predicted scores on the emotional symptoms subscale of the SDQ, R^2 = .002, $F(1, 4113) = 8.01$, $p = .005$, and the peer relationship problems subscale of the SDQ, R^2 = .005, $F(1, 4109) = 19.719$, $p < .001$, before adding the covariates to the model. No significant effects were noted on scores on each of the other individual subscales or on the SDQ total difficulties score at this stage of the analysis (Total difficulties: R^2=.00, $F(1, 4104) = 1.34$, $p = .25$; Conduct problems: R^2=.00, $F(1, 4110) = 1.36$, $p = .24$; Hyperactivity/inattention: R^2=.001, $F(1, 4108) = 3.22$, $p = .07$; Prosocial: R^2=.001, $F(1, 4113) = 2.38$, $p = .12$).

After controlling for the influence of the covariates, results showed that time spent in physical activity play, exercise or sport continued to significantly predict scores

on the peer relationships subscale (β = -.03, *SE* = .01, *p* = .04 , 95% CI [-.06, -.002]). This finding suggests that children who spent more time engaged in physical activity play, exercise or sport were reported to have fewer difficulties in their peer relationships. Results showed the predictor variable did not continue to significantly predict scores on the emotional symptoms subscale after accounting for the influence of the covariates (β = .01, *p* = .25, 95% CI [-.01, .06]. Results also showed no statistically significant impact of the predictor variable on the other SDQ scores after covariates were controlled for (Total difficulties; β = .01, *p* = .59, 95% CI [-.06, .10]; Conduct problems: β = .02, *p* = .22, 95% CI [-.01, .04]; Hyperactivity/inattention: β = .01, *p* = .61, 95% CI [-.04, .06]; Prosocial: β = -.02, *p* = .24, 95% CI [-.05, .01]).

Table 5

Percentage of Variance (R^2) in the SDQ Outcome Variables at Age 9 (Wave 1) Explained at each Block of the Regression Model

	Emotional symptoms	Peer problems	Conduct problems	Hyper/ inattention	Total difficulties	Pro-social
Block 1: *(predictor variable)*	.002**	.005***	.000	.001	.000	.001
Block 2: *(Block 1 + individual factors)*	.379***	.314***	.185***	.189***	.415***	.107***
Block 3: (*Block 2 + family factors)*	.406***	.332***	.420***	.266***	.532***	.243***
Block 4: *(Block 3 + environ-mental factors)*	.409***	.341***	.424***	.270***	.541***	.244

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

While the predictor variable did not significantly predict SDQ scores after covariates were added to the regression models (with the exception of the peer relationships problems subscale), results of the regression analyses highlighted the significant impact of individual, family and environmental factors on SDQ scores on all scales. For emotional symptoms, peer relationship problems, hyperactivity/inattention and the total difficulties scores the largest contribution to the regression models were made by individual factors. For the conduct problems and pro-social subscale the largest contribution to the regression models were made by family factors. Details of the percentage of variance (R^2) explained by each block of the regression model are summarised in Table 5 above.

Wave 2 analysis. Hierarchical linear regressions were then conducted to test the association between time spent in physical activity play, exercise or sport at nine years old and SDQ scores when the study child was 13 years old. Similar to the findings of the analysis of Wave 1 data, the results of this analysis found that the predictor variable significantly predicted scores on the emotional symptoms subscale of the SDQ when the study child was 13 years old, R^2= .001, $F(1, 3767) = 4.12$, $p = .04$, and the peer relationship problems subscale of the SDQ when the study child was 13 years old, R^2 = .004, $F(1, 3767) = 14.77$, $p < .001$, before controlling for the covariates. No significant effects were noted on scores on each of the other individual subscales or on the SDQ total difficulties score at this stage of the analysis (Total difficulties: R^2=.00, $F(1, 37637) = 1.34$, $p = .25$; Conduct: R^2=.00, $F(1, 3767) = .03$, $p = .86$; Hyperactivity: R^2=.001, $F(1, 3767) = 2.33$, $p = .13$; Prosocial: R^2=.000, $F(1, 3767) = 1.05$, $p = .31$).

After controlling for the influence of the covariates, results showed that time spent in physical activity play, exercise or sport at nine years old continued to significantly predict scores on the peer relationship problems subscale of the SDQ at 13 years old (β = -.04, *SE* = .02, $p = .01$, 95% CI [-.08, -.01]). This is similar to the findings at 9 years of age and suggests that children who spent more time engaged in physical activity play, exercise or sport at nine years old were reported to have fewer difficulties in their peer relationships at 13 years old. Also similar to the findings at age nine, results showed the predictor variable did not continue to significantly predict scores on the emotional symptoms subscale at 13 years old once covariates had been accounted for (β = .01, $p = .52$, 95% CI [-.03, .05]). Results showed no statistically significant impact of the predictor variable on other SDQ scores at 13 years old after controlling for

the covariates (Total difficulties: β = -.01, *p* = .51, 95% CI [-.13, .06]; Conduct: β = .002, *p* = .90, 95% CI [-.03, .03]; Hyperactivity: β = -.003, *p* = .84, 95% CI [-.05, .04]; Prosocial: β = -.005, *p* = .74, 95% CI [-.04, .03]).

Consistent with the findings of Wave 1 analysis, the findings of regression analyses conducted with Wave 2 data also highlighted the significant impact of individual, family and environmental factors included as covariates on SDQ scores at age 13. Details of the percentage of variance (R^2) explained by each block of the regression model are summarised in Table 13 below. Full details of these regression analyses and the proportion of variance accounted for by each of the covariates are included in Appendix D.

Table 13

Percentage of Variance (R^2) in the SDQ Outcome Variables at Age 13 (Wave 2) Explained at each Block of the Regression Model

	Emotional symptoms	Peer problems	Conduct problems	Hyper/ inattention	Total difficulties	Pro-social
Block 1: *(predictor variable)*	.001*	.004***	.000	.001	.000	.000
Block 2: *(Block 1 + individual factors)*	.188***	.141***	.099***	.172***	.243***	.075***
Block 3: (*Block 2 + family factors)*	.213***	.154***	.220***	.230***	.323***	.148***
Block 4: *(Block 3 + environ-mental factors)*	.217***	.159***	.226***	.235***	.334***	.149

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

Wave 3 Analysis. Results of a hierarchical linear regression conducted to assess the impact of time spent in physical activity play, exercise or sport at nine years old on SDQ scores recorded when the study child was 17 years old showed no statistically significant findings. (Total difficulties: $R^2 = .00$, $F(1, 3068) = .33$, $p = .57$; Emotional: $R^2 = .001$, $F(1,3068) = 1.93$, $p = .16$; Peer relationship problems: $R^2 = .00$, $F(1,3068) = .46$, $p = .50$; Conduct: $R^2 = .002$, $F(1, 3068) = 4.73$, $p = .03$; Hyperactivity: $R^2 = .001$, $F(1, 3068) = 3.28$, $p = .07$; Prosocial: $R^2 = .00$, $F(1, 3068) = .003$, $p = .95$.)

After controlling for the covariates no association was found between the predictor variable and the SDQ total difficulties score (β = -.01, *p* = .69, 95% CI [-.16, .11]). No significant effects were noted on each of the other subscales (Emotional: β = .02, *p* = .20, 95% CI [-.02, .09]; Peer: β = .02, *p* = .42, 95% CI [-.02, .06]; Conduct: (β = -04, *p* = .03, 95% CI [-.07, -.01]); Hyperactivity: β = -.03, *p* = .17, 95% CI [-.10, .02]; Prosocial: β = -.01, *p* = .59, 95% CI [-.06, .03]). Furthermore, individual, family and environmental factors included as covariates did not significantly predict SDQ scores at age 17, all *p*'s > .05. Table 14 below outlines the percentage of variance (R^2) in the outcome variables (SDQ scores) at the three different time points explained by the predictor variable (the amount of time the study child spent in physical activity play, exercise or sport at nine years of age).

Table 14

Percentage of Variance (R^2) in the SDQ Outcome Variables at age 9, 13 and 17/18 Explained by the Predictor Variable (Physical Activity Play, Exercise and Sport at Age 9)

	Emotional symptoms	Peer problems	Conduct problems	Hyper/ inattention	Total difficulties	Pro-social
Wave 1 – Age 9	.002**	.005***	.000	.001	.000	.001
Wave 2 – Age 13	.001*	.004***	.000	.001	.000	.000
Wave 3 – Age 17/18	.001	.000	.002	.001	.000	.000

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

Discussion

Summary of Findings. The first research question sought to provide an estimate of levels of physical activity and outdoor play in middle childhood in Ireland. This category of physical activity and outdoor play incorporated activities such as playground, running, chasing, football, judo, and dance. Findings indicated that on average, nine-year-old children in Ireland spent approximately 1.3 hours per day engaged in these types of activities. In line with the World Health Organisation (WHO) Global Recommendations on Physical Activity for Health (WHO, 2011), The National Guidelines on Physical Activity for Ireland recommend that all children should be active at a moderate to vigorous level for at least 60 minutes every day (Department of Health and Children & Health Service Executive (HSE), 2009). Both sets of guidelines outline that this physical activity can include anything from sports and planned exercise to active play and games. Based on these findings it seems that children in middle childhood in Ireland are meeting this recommendation. This finding was consistent for children who experienced good health and for those with an ongoing chronic illness or disability. Consistent with previous findings (Piccinni et al., 2018), boys tended to engage in slightly higher levels of physical activity and outdoor play than girls did, however both boys and girls exceeded the recommended daily amount.

These findings are somewhat similar to those reported in research conducted as part of The Health Behaviours in School Children (HBSC) survey in 2006. This survey found that 79% of nine year old children report being physically active for at least 60 minutes on most days of the week, with slightly higher levels of physical activity reported for boys (Nic Gabhainn, Kelly & Molcho, 2007). Yet, they are are inconsistent with previous research which used a large sample of primary school children in 5th and 6th class and found that only 19% of children of this age group met these recommended guidelines (Woods, Tannehill, Quinlan, Moyna and Walsh, 2010). Possible reasons for this inconsistency may be that the children in the study by Woods and colleagues were slightly older and research has shown that the likelihood of meeting the physical activity recommendations decreases with increasing age (Nic Gabhainn et al., 2007; Woods et al., 2010). Furthermore these other studies focus more strongly on structured physical activities with less attention given to active play and how this might contribute to meeting the daily physical activity recommendation.

The second research question examined the relationship between physical activity and outdoor play and socio-emotional development in middle childhood. It sought to establish whether children who spend more time engaged in physical activity play, exercise and sport report better socio-emotional outcomes. Findings suggest that children who spend more time in these kinds of activities at nine years old have fewer emotional difficulties and fewer difficulties in their peer relationships. However, as noted, a range of other individual, family and environmental factors, all of which were found to correlate with socio-emotional development, were controlled for when exploring this relationship. When these factors were accounted for, only the association between physical activity play, exercise or sport and peer relationship problems remained significant. The amount of time a child spent in these activities did not impact on other areas related to socio-emotional development such as emotional problems, conduct problems, hyperactivity, inattention or pro-social behaviour.

Furthermore, it is important to note that the effect sizes observed in the relationships between this type of play and peer relationship difficulties were extremely small. This, coupled with the large sample size, suggests that the observed impact of physical activity play, exercise or sport on these aspects of social and emotional development was minimal. However, these findings are consistent with previous research using nationally representative datasets which found that outdoor time and physical activity were associated with fewer emotional and peer relationships problems both in middle childhood and early adolescence (Aggio et al., 2017; Janssen, 2016; Larouche et al., 2016; Piccininni et al., 2018). These findings are important when considered in the context of the importance of peer relationships and socio-emotional development in middle childhood. This developmental stage sees an increase in participation in peer group activities as children have made the transition to primary school. At this stage children prefer to autonomously regulate their own emotions and rely on their own resources and social skills to deal with their emotions and those of others. As such, during middle childhood peer relationships become a source of social support and a context for learning about the management of relationships. It has thus been suggested that children who are unable to make and maintain friendships in middle childhood are at increased risk of developing psychological difficulties in later years (Carr, 2017).

The third research question aimed to investigate the association between physical activity and outdoor play in middle childhood and socio-emotional development in the teenage years. It sought to establish whether children who spent more time engaged in these activities in middle childhood reported better socio-emotional outcomes in their teenage years. The findings of this longitudinal analysis are similar to those described above in relation to the second research question. Children who spent more time engaged in physical activity play, exercise or sport in middle childhood had reportedly fewer emotional problems and fewer problems in their peer relationships in early adolescence. However, as with previous findings, it is important to note that the effect sizes observed in these relationships were small suggesting minimal impact. Again, only the association between physical activity and outdoor play and peer relationship problems remained significant after controlling for other individual child, family and environmental factors which also impact on socio-emotional development. This suggests that children who engage in more physical activity play, exercise or sport in middle childhood have fewer difficulties in their peer relationships in early adolescence. Again, no significant impact of physical activity play, exercise or sport was noted on other specific aspects of socio-emotional development in the early teenage years. Furthermore, no association was observed between time spent in physical activity play, exercise or sport in middle childhood and socio-emotional outcomes in the later teenage years at 17 or 18 years old.

While these findings are not indicative of a strong association between physical activity and outdoor play and socio-emotional development they do highlight the importance of considering socio-emotional development from a holistic, bioecological perspective (Bronfenbrenner, 1979, 2005; Bronfenbrenner & Morris, 2006). This theoretical perspective maintains that development is affected by many levels of influence ranging from the child's individual characteristics and experiences, to their social environments and interpersonal relationships to the broader influences of culture, community and policy and that a child's growth and development occurs within these nested social systems. In attempting to understand development it is necessary to consider the way in which these systems interact. The findings from this research are best understood in the context of this theory and how it can be applied to socio-emotional development.

Findings indicate that individual factors such as temperament, having an assessed learning difficulty or ongoing chronic illness or disability most strongly predicted the likelihood of experiencing emotional problems, peer relationship problems, hyperactivity and inattention and overall social and emotional difficulties. Microsystem influences at the family level, such as the nature of the parent-child relationship, were the strongest predictors of conduct problems and pro-social behaviour. Finally, while environmental level influences did not have as strong an impact as individual or family factors, they also contributed significantly to all aspects of socio-emotional development except for pro-social behaviour. In particular, a child's socio-economic status, as measured by their household's income, was an important factor, with children from lower income families presenting with more social and emotional difficulties. A consistent and worrying finding from the GUI research is this association between social disadvantage and poorer outcomes at all levels; social, emotional, behavioural and physical (Williams, Thornton, Morgan, Quail & Smyth, 2018).

Strengths and Limitations. A strength of the current research is its use of a national longitudinal dataset which comprised a nationally representative sample of children in Ireland. It has been recommended in previous research that the use of national datasets in this area of study could add substantially to the existing body of literature (Hinkley et al., 2008). The families who participated in this longitudinal study provided information on a wide range of variables at various different time points in the study child's life. This data provided rich and varied information about the study child's individual characteristics and experiences, family factors and environmental variables which could then be controlled for in the final analysis. In addition, previous research has recommended the inclusion of a longitudinal component in studies exploring the relationship between play and developmental outcomes as this would allow for temporal associations to be made, thereby addressing a limitation of cross-sectional designs which measure both the exposure and the outcome at the same timepoint (Hinkley et al., 2018).

A limitation of the use of an existing national dataset arises from the researcher's lack of control over the methods of data collection and the measures used. In the case of the current research, this was relevant in relation to the time-use diaries which were used to gather details on the activities of the study children over the course

of a typical day. One area for consideration that arises from the use of this measure pertains to the type of play that this study explored and the way in which it was measured. The use of this dataset, and in particular the time-use diaries which recorded children's activities over the course of a typical day, meant that categories of play were determined by the GUI study team. The GUI study placed structured physical activity such as organised exercise or sport into the same category as unstructured outdoor play such as chasing or playground games thereby not taking into account that each of these types of activity may have benefits distinct from each other. Future research could address this limitation by separating this category of play into structured physical activities and unstructured active outdoor play with a view to investigating the impact of both of these activities separately on socio-emotional outcomes.

Conclusion

The current research is situated in the context of an increased awareness and focus on the importance of physical activity and outdoor play in the lives of children (Kemple et al., 2016; Kilkelly et al., 2016; Tremblay et al., 2015) and in light of the increasing number of children and young people experiencing socio-emotional and mental health difficulties (Dooley et al., 2019). Given the reported changes in children's levels of engagement in outdoor play over recent decades and the coinciding increase in children presenting with mental health problems, this research sought to explore physical activity and outdoor play in the lives of children in Ireland in terms of its impact on socio-emotional development. It was hypothesised that children who engaged in higher levels of physical activity and outdoor play would report better socio-emotional outcomes both concurrently and longitudinally. Findings indicated a small but statistically significant association between physical activity and outdoor play and peer relationships. This thesis adds to the evidence base regarding physical activity and outdoor play and socio-emotional development. However, it also highlights the importance of considering the many and varying factors that interact to influence on a child's socio-emotional development and reinforces the importance of considering this development and any subsequent difficulties from a bioecological perspective.

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