

Precursors and Outcomes of Sibling Bullying

Volume One out of Two

by

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Abstract

Sibling relationships have a great impact on children's social and psychological development. This thesis provides an all-encompassing examination of the precursors and outcomes of sibling bullying through three quantitative studies: the first study, a meta-analysis, provides a foundational schema of the factors associated with sibling conflicts; the second study, a short-term longitudinal study, examines the individual and proximal precursors of sibling bullying and its short-term outcomes (one and two years later); the third study, a long-term longitudinal study, examines the distal precursors of sibling bullying and its long-term outcomes (five years later). The first study assessed the strongest effect sizes associated with sibling conflicts. It examined the link between parent-child relationships, familial factors and sibling conflicts. Studies were identified through a systematic search, coded, and selected based on criteria relevant for this study resulting in 60 studies (178 effect sizes), which in total involved 43,270 participating children and adolescents. Studies were categorised as proximal and distal factors. Those involved in sibling conflicts were significantly less likely to have authoritative, and warm and affectionate parents, and less likely to come from families with affluent socioeconomic-status, positive family climate and good marital quality. Conversely, more sibling conflicts were significantly related to abusive and neglectful parents, and parent-child conflicts; and more likely to come from families with poor parental mental health, low SES, adverse family atmosphere and parental conflict. The factors were moderated by assessment methods, study design, direction and form of conflict, gender constellation, and continent. This study served as a building block for the two following studies, as it highlighted key factors to focus on in further assessing the precursors and outcomes of sibling bullying.

The second study, which was based on the Edinburgh Study of Youth Transition and Crime (ESYTC, 2014) found that parenting factors were crucial to sibling bullying. Parental involvement, parent-child conflict and parent-child leisure time were precursors and outcomes of sibling bullying, so that more parental involvement and parent-child leisure time were associated with less sibling bullying perpetration and victimisation, while parent-child conflict was associated with more sibling bullying perpetration and victimisation. Further, sibling bullying perpetration and sibling victimisation were precursors of peer bullying perpetration and victimisation one and two years later. However, the strength of the association declined over the course of two years. Impulsive behaviour and social alienation seem to be fundamental influencing factors in the development of sibling bullying and sibling victimisation, respectively. Additionally, children who were involved in peer bullying were more likely to have been involved in sibling bullying, compared to peer neutrals one and two years later.

The third study, which was based on the Avon Longitudinal Study of Parents and Children (ALSPAC; Boyd et al., 2012) found that maternal somaticism was the strongest predictor of sibling bullying. Further, the strongest predictor of sibling victimisation was partner-to-mother verbal violence. Symptoms of depression at 16.5 years of age was the strongest outcome of sibling bullying perpetration and victimisation at 12.5 years of age. Children who were peer bully-victims when they were 17.5 years old were more likely to have been sibling pure bullies and sibling bully-victims, compared to children who were peer neutrals.

The results suggest that familial factors significantly influence the quality of sibling relationships. Additionally, the findings show that sibling bullying is related to peer bullying, so that children mirror bullying behaviours across social contexts (i.e.

family environment and school environment). The findings of this thesis are important for clinical practitioners, social workers, parents and schools. Based on these findings practitioners could tailor family and parenting intervention programs that prevent siblings from establishing conflictual relationships with one another. Particularly, it is suggested that bullying intervention programs should integrate three aspects: family members should play an integrated and active role in their plans to reduce bullying and victimisation; bullying intervention and prevention studies should commence at preschool ages; positive family climate should actively be nurtured, in addition to lowering hostility.

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1. Chapter 1 –Introduction and Literature Review

1.1. Introduction

Most children's first social interactions are with family members, particularly with parents and siblings. The relationship one has with siblings is unique in that it commences at a very early age and lasts a lifetime (Noller, 2005). The quality of sibling relationships can have life-long repercussions on an individual's well-being (Feinberg, Sakuma, McHostetler, & McHale, 2013) and the development of their social skills (Buist, Dekovic, & Prinzie, 2013; Dunn, 1983). The number of children per family varies across the world in most countries it is common to have at least one sibling (CIA, 2015). Only in Macau and Singapore the birth per woman (BPW) rate is below 1 (CIA, 2015). There are further exceptions, such as the One Child Policy in China, which was implemented in 1980 for 34 years, in order to control the country's population growth rate (Clarke, 2015). In the UK eighty five per cent of adolescents have at least one sibling (Tippett & Wolke, 2014). Estimates for the year 2015 show that in Europe, USA and Canada the BPW rate ranges between 1.42 and 2.08. Further, in Latin America this rate ranges between 1.47 and 2.78 (CIA, 2015). Yet in other regions such as in Sub-Saharan Africa and in the Middle East, the rate is between 2.0 and 6.0 (Scott, Bradford Wilcox, Ryberg, & DeRose, 2015). This indicates that the area of research on the relationships between siblings merits empirical research. Conducting scientific research on the causes and consequences of negative sibling relationships is important in order to prevent possibly unfavourable social and psychological developments. Sibling conflict is assumed to be the most common form of intrafamilial conflict, however, contrastingly still the least researched (Eriksen & Jensen, 2009; Khan & Cooke, 2013; Wolke & Samara, 2004). In a US sample of 1,705 children, it was found that 37.6% experienced some kind of victimisation by a sibling

in a single year. This included: 32.3% physical assault; 9.8% property victimisation (theft and/or vandalism); and 2.7% psychological victimisation (Tucker, Finkelhor, Shattuck, & Turner, 2013). Similarly, a UK population study by Tippett and Wolke (2014) with 4, 237 participants found that 46% of children had been victimised physically, verbally, by being teased and/or through theft by a sibling; furthermore, 36% of the sample perpetrated these acts of violence against a sibling. In both Tucker et al. (2013) and Tippett and Wolke (2014), the most common form of violence was physical. Further, Tippett and Wolke (2014) found that verbal violence and being teased were more prevalent than theft, both for victimisation and perpetration. In a retrospective study, 95.3% of adults reported having carried out at least one act of violence per year towards a sibling in their childhood (Mathis & Mueller, 2015). These findings indicate a high rate of violence between siblings, particularly physical violence.

This thesis developed this topic further by examining what the key precursors and outcomes of sibling conflicts and sibling bullying are. The following literature review will first give an account of the importance of conducting research on sibling relationships, and then it will outline several developmental theories that are relevant in discussing factors that shape social interactions. This will be followed by a consideration of how sibling bullying might be defined. This definition is adapted from the definition of peer bullying, therefore a comparison of peer and sibling relationships follows. Subsequently, research findings on the factors associated with sibling bullying are discussed. Lastly, the rationale underlying the thesis studies will be outlined.

1.2. Literature Review

1.2.1. Sibling Relationships

Sibling relationships are important for the social development of children (Yucel, 2014). Several studies have compared the psychological and social development of singletons and children with siblings. Singletons are more likely to be victimised at school and show more aggressive behaviour overall, compared to children that have siblings (Kitzman, Cohen, & Lockwood, 2002). Due to learning perspective-taking skills from an early age, children with siblings are more likely to resolve conflicts and come to agreements with peers (Perner, Ruffman, & Leekam, 1994) and therefore tend to have better relationships with peers (Baydar, Greek, & Brooks-Gunn, 1997). Further, positive sibling relationships have been shown to be protective for a variety of adverse events, including accidents, illnesses, marital problems, family disputes, deaths, permanent separation, disasters and issues at school (Gass, Jenkins, & Dunn, 2007). However, due to the variability in sibling relationship qualities, not all sibling relationships provide these favourable features. For example, in a self-report study, Ernst and Angst (1983) found no significant differences in terms of personality traits between children with and without siblings. Yet, it was found that singletons scored significantly higher on the extraversion scale, compared to children with siblings. It is difficult to compare the development of singletons with that of children who grow up with siblings, as sibling relationships are very diverse and complex. For example it depends on whether a singleton is compared to a child that grew up with one same sex-sibling or with a gender mix of more siblings. This is important because the relationship between the number of siblings that a child has and their positive social development is nonlinear. The more siblings one has, parental resources become scarcer, which leads to less child supervision and more competition between siblings (Downey, 2001; Dunn, 2007; Milevsky, Schlechter, & Machlev, 2011; Yucel, 2014).

Research shows that having more than four siblings significantly increases the chances of developing internalizing behaviour problems, having worse understanding of one's locus of control and a worse sense of personal identity (Yucel, 2014). This indicates that there is a threshold for how many siblings provide favourable social and psychological developments (Downey & Condrón, 2004). Further, it has been found that sibling groups that have at least one girl are more likely to openly communicate, which fosters coping skills (Wright & Cassidy, 2009). In contrast, brother relationships increase the likelihood for victimisation (Menesini, Camodeca, & Nocentini, 2010; Tucker et al., 2013) and even for severe acts of violence to occur (Eriksen & Jenson, 2009). Further, smaller age gaps between siblings caused more competition between siblings to seek attention from their parents (Powell & Steelman, 1993). Contrastingly, small age gaps between siblings could also increase communication, compared to bigger age gaps, allowing for the fostering of social skills (Downey & Condrón, 2004). These opposing findings give an indication of the convoluted factors that influence the quality of relationships between siblings. This is what makes this a relatively intricate topic to research. Further, interactions between siblings are more likely to be positive if they are initiated by the older sibling (Hinde Tamplin, & Barrett, 1992). Thus, the development of children who grow up with siblings varies, depending on the gender constellation, the age gap between siblings, the position of the child in the sibling order, the number of siblings, the surrounding environment they live in and the extent of parental involvement and support. Irrespective of the mixed findings comparing the development of singletons and children with siblings, the research findings on the impact of siblings on an individual's life cannot be ignored. Sibling relationships are unique not only because they are lifelong, but also because they are often emotionally strong relationships. Teicher and Vitaliano (2011) compared the effects of witnessing domestic violence against a parent with witnessing domestic violence against a sibling.

Children who witnessed domestic violence against a sibling, scored higher on depression, anxiety, anger-hostility, limbic irritability and dissociation, compared to having witnessed domestic violence against the mother (Teicher & Vitaliano, 2011). The strong emotional ties one can have with siblings may explain why the quality of this kind of relationship has such a great impact on a person's development. Sibling support compensates for low parental support. Further, sibling support has also been correlated with less loneliness, higher self-esteem and life satisfaction (Milevsky, 2005). Siblings also serve as buffers for children with stressful and adverse family environments. Children with siblings showed less aggressive behaviour, compared to children without siblings (Lockwood, Gaylord, Kitzmann, & Cohen, 2002) and sibling affection protected against internalizing problems, regardless of the quality of relationship with the mother (Gass et al., 2007). A recently published meta-analysis on the psychological outcomes of sibling relationships by Buist et al. (2013) showed that conflictual sibling relationships yielded more externalizing problems (delinquency, substance abuse and aggressive behaviour) and internalizing behaviour problems (withdrawn comportment, anxiety and depression), than children in non-conflictual sibling relationships. Further, sibling aggression (threatening, verbal aggression, kicking, pushing, punching, slapping) is a unique predictor of externalizing behaviours (aggression, delinquency and substance abuse) (Button & Gealt, 2010) and significantly contributes to the development of emotional difficulties and aggressive behaviour in adulthood even when adjusting for other forms of family violence (Mathis & Mueller, 2015). Regardless of negative or positive effects, these studies underline the great impact that relationships with brothers and/or sister can have. Based on the above, it can be stated that sibling relationships are complex and potentially have great impact on the social and psychological development of children. It is important to consider that the realm of influence of the factors that affect the quality of sibling relationships goes

beyond the characteristics that make up a sibling group (i.e. age gap, gender constellation, birth order). These could include socioeconomic status (SES) of the family, parental relationship quality etc. (Dunn, 1983). Given the great impact of sibling relationships, this investigation will focus on negative sibling relationships, particularly sibling conflicts and sibling bullying. The various factors that influence the quality of a sibling relationship will be discussed next through the examination of developmental models and theories.

1.2.2. Theoretical Background

1.2.2.1. Bronfenbrenner's Ecological Systems Theory

The Bronfenbrenner's Ecological Systems Theory is based on the assumption that the interplay of factors external to one's person have an effect on the individual's internal makeup of characteristics and vice-versa (Figure 1.1). This reciprocal influence is then reflected in each individual's behaviour. These influences are all fluid and can change over time. As a result the behaviour displayed is subject to change based on the progression of a sequence of events (Bronfenbrenner, 1986). Further, as every individual differs, the constant flow of the products of interactions between factors, affect everyone differently and therefore each individual develops differently (Bronfenbrenner, 1994). Bronfenbrenner (1994) suggested six layers of domains that affect each other, the factors within each layer also influence each other, which then again affect the individual's behaviour and development. The six layers are: (1) the individual characteristics; (2) the microsystem; (3) the mesosystem; (4) the exosystem; (5) the macrosystem; (6) the chronosystem.

(1) The individual characteristics include factors such as age, gender, ethnicity, sexual orientation, intelligence, health, sibship size, age gap between siblings and

gender combinations between siblings (Bronfenbrenner, 1994; Hong & Espelage, 2012) and attitude (Lee, 2011); (2) *the microsystem* represent factors that the individual has an immediate influence on and vice-versa, such as relationships with the immediate family (e.g., sibling relationship quality, parent-child relationship quality), neighbourhood, peer groups and school (Bronfenbrenner, 1994; Hong & Espelage, 2012; Lee, 2011; Scarr, 1992); (3) *the mesosystem*, includes how the changes within the microsystem affect changes within the individual and vice-versa (Bronfenbrenner, 1994). An example of the *mesosystem* would be that changes in the individual attitudes influence sibling relationships that has an influence on peer relationships affecting school climate (Lee, 2011); (4) *the exosystem*, involves elements that the individual has no direct influence on, however products of the interactions between these elements can have a direct influence on the individual, such as parents' social networks, parents' employment, parental relationship quality and socioeconomic status (Bronfenbrenner, 1994; Hong & Espelage, 2012; Lee, 2011). Eventually the changes in the exosystem will have an effect on the other layers (microsystem and mesosystem) as changes within the individual, affect the other layers, as mentioned above. So alterations in, for example parents' employment (exosystem), will also have an effect on sibling relationship quality (microsystem); (5) *the macrosystem*, are the features that characterise a society of a community, such as norms, life-styles, cultural values, resources etc. (Bronfenbrenner, 1994; Hong & Espelage, 2012); (6) *the chronosystem*, characterises the transition of time in relation to an individual's development (Bronfenbrenner, 1994; Hong & Espelage, 2012). This could include political events, such as uprisings and how these experiences affect an individual depending on how old they are when these events occurred. Another example would be how the death of a relative affects a three year old child differently to a fifteen year old adolescent. These six layers are further categorised into proximal and distal factors. Proximal factors are

an amalgamation of the individual and the mesosystem. Not all factors in the mesosystem are automatically proximal factors. These are only the factors that affect the individual directly, for example how parenting styles affect a child would be a proximal factor, whereas parental mental health would be a distal factor. Distal factors comprise any other factors further away in the chain of causality that have indirect effects on the child.

This model depicts the constant interplay of genetics and the environment in a structural manner (Lee, 2011). Contemporarily, most research related to child development is constructed based on Bronfenbrenner's Ecological Model. It provides a framework that allows organizing interlinked variables in a structured manner. The Bronfenbrenner Theory illustrates the numerous factors and their varying degrees and combinations that could affect sibling relationships, this makes the investigation of conflicts between sibling particularly complex. These intricacies are reflected in the research in this field, which will be discussed later.

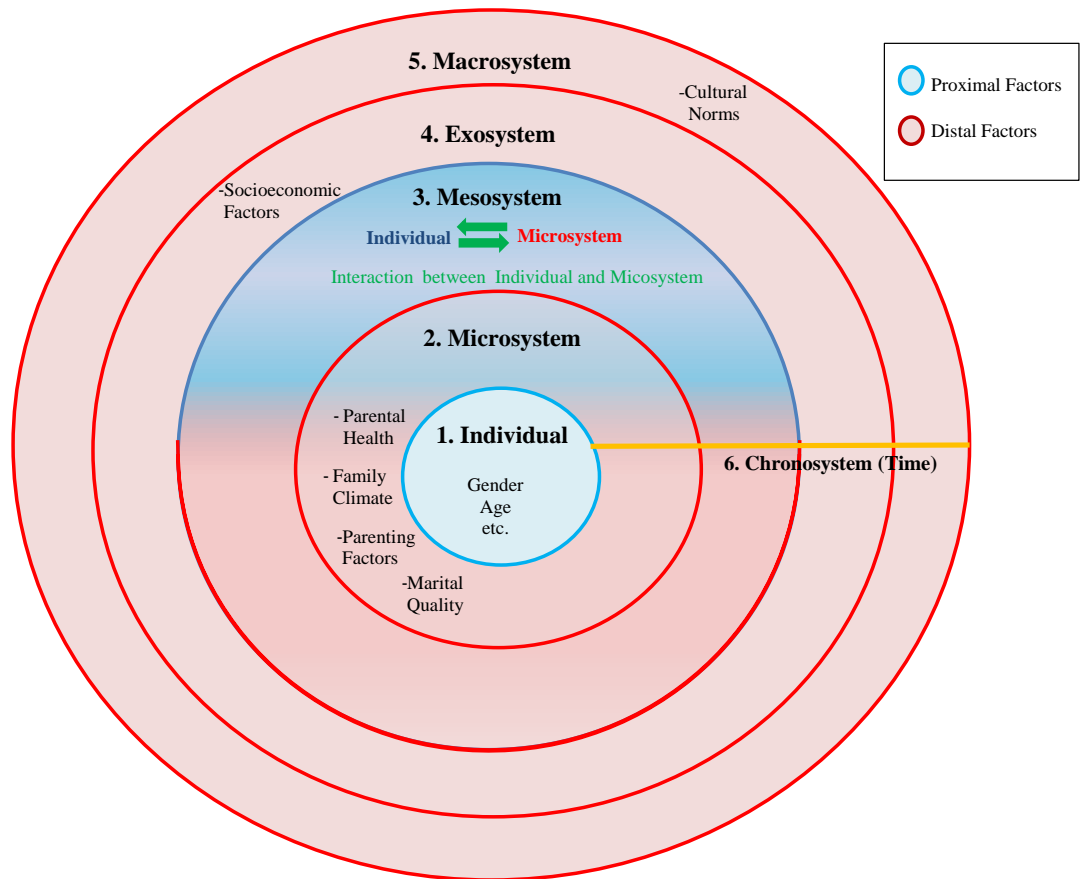


Figure 1.1. Bronfenbrenner's Ecological Model in relation to this study (Bronfenbrenner, 1986)

1.2.2.2. Social Learning Theory

Based on Social Learning Theory (Bandura, 1973) children learn from the behaviour of people who are physically and emotionally close to them through observing and modelling it. Children's observations of how social interactions are handled by these respective significant others create a foundational behavioural schema for the observant (Bandura, 1973). The theory argues that children learn not only the behaviour itself, but the concept of it. So that children can learn via observation that through the enforcement of power (perceived or real) their personal desires can be satisfied and their own goals can be reached (Kawabata, Alink, Tseng, van Ijzendoorn, & Crick, 2011). Having witnessed domestic violence has been associated with more direct conflicts between siblings (Bowes, Wolke, Joinson, Lereya, & Lewis, 2014). So

that the type of relationship witnessed between parents laid out a foundational schema as to how to interact with ones sibling. Furthermore, it has also been found that children that have witnessed family violence are also more likely to engage in aggressive behaviour outside of the family, than children who did not (Hyde-Nolan & Juliaio, 2012). This is indicated by the cross-over effects of sibling bullying to peer bullying (Duncan, 1999; Wolke & Samara, 2004). These cross-sectional studies showed that children who were involved in sibling bullying were more likely to engage in bullying amongst peers. According to the Social Learning Theory, this would be the case due to replicating behaviours that were observed and leant at home (Bandura, 1973).

1.2.2.3. Attachment Theory

The Attachment Theory by Bowlby (1971) puts forward that the first relationships one has with one's attachment figures, create an internal working model that shapes the manner in which one interacts with one's peers (Bowlby, 1971). The child's development is a reflection of a spectrum of ways in which a child is treated. This internal working model ranges from a securely-attached to an insecurely-attached working model. There is one securely attached type and three insecurely attached types (insecure-avoidant, insecure-resistant, and insecure-disorganised). The securely-attached internal working model stems from a sensitive and loving engagement with a child, which triggers a confident social development. Contrastingly, the insecurely attached working models stem from other types of parenting. Insecure-avoidant children have parents that consistently reject them in moments of stress. Though not being a favourable development, the child experiences a sense of consistent rejection by a parent within the parent-child relationships, and therefore could have learnt other ways of finding comfort in stressful situations. This is followed by the insecure-resistant children, who had parents that were inconsistent in their parenting style. Due to the inconsistency in offering comfort to the child, a lack of trust in the parent

develops, which triggers children to avoid and resist the comfort that is sometimes offered by the parent. The insecure-disorganised type is similar to the insecure-resistant type, in that the parenting style is inconsistent. However, what makes this the most detrimental type of internal working model, is that when support by a parent is offered, it is atypical and dysfunctional in style, hindering children from building up trust and comfort with a parent (Benoit, 2004). More aggression between siblings has been associated with children's insecure attachment style and more use of harsh disciplining by parents (Hoffman, Kiecolt, & Edwards, 2005; Updegraff, Thayer, Whiteman, Denning, & McHale, 2005). Further, parent-child conflict has been associated with more sibling conflicts (Wolke & Skew, 2012a). Children who have an insecure-disorganised attachment style are more likely to display aggressive behaviours, compared to children that have other attachment styles (Lyons-Ruth, 1996). A meta-analysis on this type of attachment, found that the most commonly found outcomes are externalizing behaviour problems (van Ijzendoorn, Schuengel, & Bakermans-Kranenburg, 1999). Overall, children who have an insecurely attached internal working model, lack confidence and have reduced self-efficacy (Ainsworth, Blehar, Water, & Wall, 1978; Benoit, 2004; Bretherton, 1992). This causes issues in creating friendships with peers (Kawabata et al., 2011; Sroufe, Coffino & Carlson, 2010; Sroufe, Egeland, Carlson, & Collins, 2005; Wolke & Samara, 2004). In a 30 year longitudinal study conducted by Sroufe et al. (2005) it was found that insecurely attached children were more likely to resolve conflicts in an aggressive manner, than children who were securely attached.

The Social Learning Theory and the Attachment Theory suggest that parenting styles and parent-child relationship qualities have a great impact on the development and on the perception a child ought to have on social relationships, including sibling relationships. Bronfenbrenner's Ecological Systems Theory suggests that the realm of

factors that influence how one interacts in social settings goes beyond that of parenting and the relationship between parents and children. Given the wide scope of factors that could influence the quality of sibling relationships and given the negative impact that sibling relationships can have on the social and psychological development of a person, it is important to find out what these particular factors of influence are. With the knowledge of what affects the quality of sibling relationships, it is possible to foster more positivity between siblings and create intervention programs that could improve sibling relationships. This thesis' focus is on sibling bullying behaviours, which is a particular form of aggression. In the following a definition of sibling bullying will be outlined. This will be followed by a closer examination of the literature dealing with factors that have been associated with sibling bullying.

1.2.3. Definitions

The widely accepted notion of sibling rivalry and “banter” makes it difficult for parents and educators to decide at what point the severity of sibling fighting is acceptable and when it is destructive (Eriksen & Jensen, 2009; Krienert & Walsh, 2011). Sibling aggression is assumed to be the most common form of intrafamilial violence, however, contrastingly the least researched (Eriksen & Jensen, 2009; Khan & Cooke, 2013). However, not all sibling conflict is necessarily detrimental, as it can foster adaptive conflict resolution skills within children (Dreikurs, 1964). The terminological discrepancies in defining what exactly constitutes sibling violence, is a predicament, which hinders researchers from making grand leaps forward in this field (Eriksen & Jensen, 2009; Krienert & Walsh, 2011; Wolke, Tippet, & Slava, 2015). The main underlying issue, which contributes to the variations of definitions, is the lack of a concrete measurement of the levels of severity that sibling violence can have

(Khan & Cooke, 2013). A variety of terms, such as ‘violence’, ‘aggression’, ‘conflict’, ‘abuse’, are used interchangeably to describe a particular degree of sibling violence, although these may imply different degrees of severity (Krienert & Walsh, 2011). More standardised ways of measuring specific types of conflicts between siblings would allow for research findings to contribute more effectively in a variety of other fields, such as education (Khan & Cooke, 2013), mental health (Khan & Cooke, 2013) and possibly the criminal justice system (Krienert & Walsh, 2011). This stresses the need for a clear cut definition of what entails sibling conflicts and whether there are different degrees of it.

Several researchers have contributed by attempting the rather difficult task of conceptualizing sibling violence into systematic categories. Caffaro and Conn-Caffaro (1998) categorised sibling violence into ‘*sibling rivalry*’ and ‘*sibling assault*’. The authors labelled ‘*sibling assault*’, as the more severe type of provocation, involving recursive actions of direct intimidation and indirect relational harassment, where the roles of victim and bully become more entrenched due to its repetitive nature (Caffaro & Conn-Caffaro, 1998). Contrastingly, ‘*sibling rivalry*’ was referred to as conflicts potentially being caused by jealousy and enviousness between the siblings (Caffaro & Conn-Caffaro, 1998). What makes this definition imprecise is that a conflict strained by sibling rivalry does not exclude the characteristics utilised to describe sibling assault (i.e. direct and indirect harassment). Sibling rivalry could be a form of motivation to possibly harass another sibling. Eriksen and Jensen (2009) also proposed a dichotomous categorisation, putting sibling violence into ‘*less severe*’ and ‘*severe*’ acts of aggression. ‘*Severe*’ violence included beating up a sibling and/or using a weapon and/or threatening thereof. Further, ‘*less severe*’ violence included “threatened to hit or throw something at the other one; kicked, bit, or hit with a fist; hit or tried to hit with something” (p.191) (Eriksen & Jensen, 2009). This approach originates from the idea

that the *'less severe'* acts of violence are part of social development, which do not imply a problematic trajectory for the child, whereas the *'severe'* acts of violence might (Eriksen & Jensen, 2009; Gelles & Cornell, 1985). The authors explored the aetiological differences of the terms *'severe'* and *'less severe'* violence to systematically demarcate the differences between the two proposed categories. It is found that *'less severe'* forms of violence were better explained by family environment factors, such as parental physical violence, parents getting drunk and parents easily losing their temper. *'Severe'* acts of violence were not as well explained by these factors. The authors concluded that the causes for it might stem from individual processes of how the family environments are experienced and interpreted (Eriksen & Jensen, 2009). Further, it was concluded that *'less severe'* acts of violence should be referred to as *'sibling aggression'*, whereas *'severe'* acts of violence should be called *'sibling violence'*. This approach does conceptualise negative sibling relationships further, however, it does not take into consideration more subtle types of aggression, for example acute forms of verbal victimisation that might also cause substantial harm to someone. Further this definition also does not consider longevity and consistency of aggression.

It is important to elaborate on different levels of violence and ways to express it, in order to formulate an all-encompassing definition. Wolke and Skew (2012) and Wolke et al. (2015) adapted the definition of peer bullying for sibling bullying. This thesis is based on this definition as well. However, although the well-established definition of peer bullying does provide a conceptual framework that allows for a more systematic discussion of the issue of sibling conflicts, as it includes an element of longevity, severity and imbalance of power (Skinner & Kowalski, 2013; Wolke & Samara, 2004; Wolke & Skew, 2012; Wolke et al., 2015), it is important to be cautious of adapting this definition as there are some inherent differences between sibling and

peer relationships. These will be discussed after outlining the definition of sibling bullying that this thesis is based on.

Bullying is a pattern of negative behaviours that has been defined as having three main components **a)** repeated exposure to **b)** aggressive behaviour that causes intentional harm, where there is **c)** an imbalance of power (perceived or real) between the bully and the victim¹ (Olweus, 1994). Researchers have categorised bullying into five forms: physical, verbal, relational and damage to property (Eisenberg & Aalsma, 2005; Williams & Guerra, 2007). Cyber bullying has recently been added as a new form of bullying, which is carried out through the use of technological devices, particularly through the use of social media applications (Monks & Coyne, 2011) (Figure 1.2). Bullying can be expressed in two different ways: indirectly and directly. *Direct bullying* refers to harming the victim in a physical, verbal, relational and/or through the means of cyber functions in a direct aggressive manner (Card & Hodges, 2008; Eisenberg & Aalsma, 2005). *Indirect bullying* involves inflicting harm onto someone by indirect means. This usually excludes physical bullying. However, for example relational bullying can be expressed directly by overtly excluding someone from a group activity or indirectly by purposefully manipulating social relationships, in order to cause the exclusion of someone from a group activity. Bullying is considered to be a specific type of aggressive behaviour (Monks, Smith, Barter, Ireland, & Coyne, 2009).

¹ In line with the literature on bullying, in the following the aggressor is described as the bully or perpetrator interchangeably; the recipient of bullying is referred to as the victim; and a child that is both a perpetrator and a recipient of bullying is referred to as bully-victim.

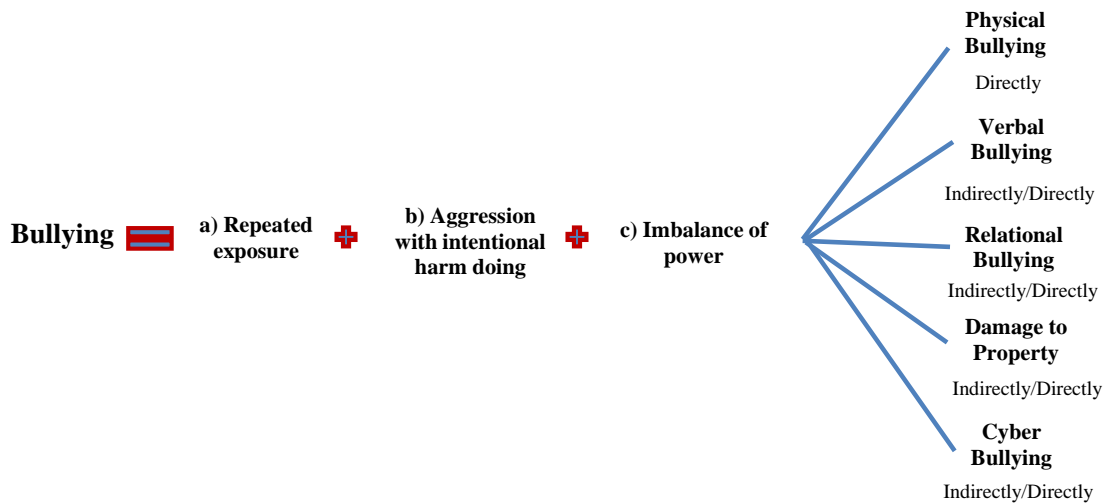


Figure 1.2. Depiction of the definition of bullying

Putting this definition (Figure 1.2) in relation to siblings dynamics **a)** repeated exposure, could occur very easily, as siblings live in the same household; **b)** aggressive behaviour that causes intentional harm, is the aggressive act; **c)** imbalance of power between the bully and the victim, imbalances of power are always present in sibling relationships (Pepler, Craig, Connolly, Yulie, McMaster, & Jiag, 2006). Older siblings have physically more power over their younger siblings, particularly younger female siblings (Wolke et al., 2015). Contrastingly, younger siblings might prevail in subtle relational power, as parents are more likely to defend younger siblings compared to older siblings (Menesni et al., 2010). In case of parental intervention in a conflict between siblings, parents are more likely to discipline the older, compared to the younger (Hoffman et al., 2005; Volling, 1997). Younger siblings might exploit such a position and are therefore more likely to retaliate or initiate conflicts with their older counterparts (Felson & Russo, 1988; Volling, 1997). Further types of power imbalances are present in sibling relationships, reflective of the different gender constellations there could be between siblings. Accordingly, the likelihood of a power imbalance between siblings is very high. Further, sibling bullying can also be expressed in five different manners: physical and verbal, which includes pushing, hitting,

punching, insulting (Button & Gealt, 2010; Duncan, 1999; Skinner, & Kowalski, 2013; Tippett & Wolke, 2015; Tucker et al., 2013; Wolke & Samara, 2004; Wolke & Skew, 2011), relational, which includes ignoring, excluding from games or activities, spreading rumours (i.e. to parents or other siblings), making the child look bad in front of others (Skinner, & Kowalski, 2013; Tippett & Wolke, 2015; Tucker et al., 2013; Wolke & Skew, 2011), damage to property and cyber, which includes saying or posting mean things about the person via social media/ phone texts or the person's social media profile (Tanrikulu & Cambell, 2015).

Bullying is a particular and identifiable pattern of aggression, which excludes extreme forms of violence, ones of sexual nature and sporadic or singular instances of aggression (Wolke et al., 2015). Monks et al. (2009) included acts of a sexual nature against a sibling in their definition of bullying. The definition of bullying that this thesis is based on (Wolke et al., 2015), excludes sexual acts of violence, as these are criminal in nature and considered fundamentally different in their motivations and consequences (Krienert & Walsh, 2011). This thesis will discuss the literature on sibling bullying including articles that might refer to sibling bullying with a different term (e.g. sibling violence, aggression, negative sibling relationships etc.), however, that define it the same way as it is described in Figure 1.2. As this definition originates from peer relationships, it is important to discuss the similarities and differences between sibling and peer relationships in relation to the definition of bullying. This will be discussed in the following section.

1.2.4. Sibling Relationships and Peer Relationships: A Comparison

The nature of a sibling relationship and a peer relationship can be very similar in that both relationships can contain dynamics such as support, trust, and reciprocation

(Dunn & Kendrick, 1981), however, they can also be strained with conflicts and disputes (Stauffer & DeHart, 2006). Although, there are similarities in these two types of relationships, the underlying elements that evoke the feeling of attachment differ, which as a result may cause the motivations to bully the counterpart to differ as well. Tisak and Tisak (1996) found that a bystander was more likely to intervene in a bullying situation when the bully was a sibling, rather than when the bully was a friend. The justification for this behaviour was the sense of family responsibility and obligation to invigilate on one's sibling (Shantz & Hobart, 1989). However, overall, peer relationships are reported as experienced more positively, compared to sibling relationships (Tippett & Wolke, 2015; Volling, Youngblade, & Belsky, 1997). Children can choose the peers they prefer to spend time with, whereas one cannot choose their siblings. Although some claim that children also cannot choose the peers they are in a specific class and school with (Wolke et al., 2015), the variability in choice is much bigger in the confines of a school, rather than a family. This is an interesting and important factor to keep in mind, when assessing what sibling relationships (no choice) can tell us about peer relationships (choice). Depending on whether one fosters a relationship by choice or whether it is fostered by obligation, different social norms will govern these relationships (Volling et al., 1997; Wolke & Skew, 2012). Despite possibly being a source of social support and positivity, sibling relationships are often interwoven with competition, jealousy, and the desire to gain parental attention (Felson, 1983). However, peer relationships are often more egalitarian and diplomatic. This is due to having the need to foster peer relationships, as one chooses the peers one wants to spend time with, whereas sibling relationships are naturally present due to the family tie that holds them together (Volling et al., 1997). The choice/no choice aspect is a key differentiating factor between peer and sibling relationships, which could determine the motivations children have to bully either a sibling or a peer. Despite these differences

the factors that define peer bullying can be applied to a sibling dynamic and can therefore be adapted. However, due to the difference in the nature of a sibling and peer relationships, the motivation to bully a counterpart might differ. In spite of the difference in motivation to bully there seems to be a carry-over effect of aggression between sibling relationships and peer relationships (Stauffer & DeHart, 2006; Tippett & Wolke, 2015; Wolke & Samara, 2004). In a cross-sectional Israeli population study with 921 participants 50.7% of participants who were victims of bullying at home, were also victims of bullying at school. Contrastingly, only 12.4% of children who were not victims at home were bullied at school (Wolke & Samara, 2004). Even after controlling for family factors, such as ordinal position of the child, number of siblings, blended family status, it was found that sibling bully-victims were twice more likely to be victims of bullying at school, compared to children not involved in sibling bullying. Victims of sibling bullying were one and a half times more likely to be victims at school, compared to children not involved in sibling bullying (Wolke & Skew, 2012a). This finding was confirmed by Tucker, Finkelhor, Turner and Shattuck (2014) who found that children who were victims of sibling aggression were also victims of peer victimisation. It should be noted though that Tucker et al., (2014) purposefully chose to not solely focus on sibling and peer bullying, rather on sibling and peer victimisation more broadly. Nevertheless, they also found carry-over effects. Menesini et al., (2010) found that victims of bullying at home were also more likely to be victims at school and when children were a bully at home, they were also more likely to be a bully at school. Duncan (1999) found that children that were victims of peer bullying, were most likely peer bully-victims, followed by victims and then bullies. While children that were sibling bullies were most likely to be peer bully-victims, followed by bullies and then victims. It was not reported how sibling bully-victims might behave in peer relations, nevertheless, the trajectory of peers mirroring

their behaviour within sibling relationships in their relationships with other peers was confirmed. Tippett and Wolke (2015) also found that children that were victims of sibling bullying were most likely to be victims of peer bullying. Further, sibling bullies were more likely to be peer bullies and peer bully-victims (Tippett & Wolke, 2015). These findings support the adaptability of the definition of peer bullying to sibling dynamics. Furthermore, the carry-over effects also suggest that an individual might have a tendency to always adopt the same role within a social group, regardless of the context of the group i.e. sibling or peer. The consistency of being involved in bullying can lead to a polarizing imbalance in a relationship, so that the roles of the bully and the victim always become further entrenched (Pepler et al., 2006). The reinforced superiority of the bully and the submissiveness of the victim pose the threat of bullying habits to translate onto other social contexts (Pepler et al., 2006), which confirms the carry-over effects from sibling to peer bullying. Pepler et al. (2006) conducted their study on adolescents, examining the carry-over effects of peer bullying onto relationships that occur from adolescence onwards (romantic relationships). The studies that confirm the carry-over effects from sibling relationships to peer relationships as, suggest that sibling dynamics might indeed create a foundational schema as to how to behave in social settings and what an individual's role in such settings is.

Should sibling bullying be a consistently significant precursor of peer bullying, it is important to explore the precursors of sibling bullying. This is important, not only due to the recursive role one might adopt (i.e., the victim is always submissive and the bully is always superior), but also because the consequences of peer bullying are alarming and include depression, anxieties (Austin & Joseph, 1996; Smokowski & Holland Kopasz, 2005), conduct problems (Wolke, Woods, Bloomfield, & Karstadt, 2000; Wolke & Samara, 2004), emotional problems (Wolke & Sapouna, 2008), and low self-esteem (Olweus, 1994). In some cases peer bullying can even lead to suicide

(Kaminski & Fang, 2009). This underlines the importance of researching the precursors of sibling bullying. Cross-sectional research on the factors associated with sibling bullying has already contributed greatly to the field, however, sufficient longitudinal research is still lacking (Wolke et al., 2015). The findings that have been uncovered so far will be discussed next.

1.2.5. Correlates of Sibling Bullying

Exclusively considering studies that examine bullying between siblings, based on the same definition that is described above (section 1.2.3.), several factors (parenting, behavioural etc.) have been found to be associated with sibling bullying. These factors, however, have mainly been found through the use of cross-sectional studies (14 studies)² and only one longitudinal study (Bowes et al., 2014). (In the following discussion of the literature, four studies³ are included that only marginally comply with the definition of sibling bullying, but they are relevant in other respects. The methodologies and descriptions of sibling conflicts in these four studies are specifically referred to in order to be distinguished from the other studies that do fit closely with the description of sibling bullying). Findings from cross-sectional studies give an insight into the factors that correlate with sibling bullying, however, cause-and-effect cannot be derived from these. Nevertheless, the findings will be discussed next by breaking the factors down into proximal and distal factors (Figure 1.1). Again, the

² (Button & Gealt, 2010; Campione-Barr, Lindell, Bassett Greer, & Rose, 2014; Duncan, 1999; Hardy, 2001; McHale, Whiteman, Kim, & Crouter, 2007; Miller, Grabell, Thomas, Bermann & Graham-Bermann, 2012; Tippett & Wolke, 2015; Tucker, Finkelhor, Shattuck, & Turner, 2013; Updegraff, Thayer, Whiteman, Denning & McHale, 2005; Wolke & Samara, 2004; Wolke & Skew, 2012a; Yabko, Hokoda, & Ulloa, 2008; Yu & Gamble, 2008; Yu & Gamble, 2009)

³ (Ensor, Marks, Jacobs, & Hughes, 2010; Jenkins, Rashbash, Leckie, Gass, & Dunn, 2012; Tucker, Finkelhor, Turner, & Shattuck, 2014; Williams, Conger, & Blozis, 2007)

literature on sibling bullying will be discussed, including articles that might refer to sibling bullying with a different term (e.g. sibling violence, aggression, negative sibling relationships etc.), but which defined it in the same or a very similar way as above (section 1.2.3.).

1.2.5.1. Proximal Factors

1.2.5.1.1. Parenting Factors and Sibling Bullying

Campione-Barr, Lindell, Bassett Greer and Rose (2014) found that maternal psychological control was significantly associated with sibling relational aggression and sibling psychological control. Relational aggression was inquired about through the use of the Revised Social Experience Questionnaire (Crick & Grotpeter, 1996), which included questions about siblings manipulating social relations and using blackmail. Sibling psychological control was assessed through the Psychological Control Scale-Youth Self-Report (Barber, 1996), which included questions about love withdrawal, invalidating feelings, personal attacks, and constraining verbal expression. Consistent with these findings were the outcomes of the cross-sectional study of Yu and Gamble (2008) who found that maternal psychological control was associated with relational aggression for younger and older siblings. They also found that overt aggression correlated with maternal psychological control; this was the case for younger siblings, but not older siblings. Relational aggression was described as purposefully leaving a person out of activities, blackmail, rumour spreading; overt aggression was described as kicking, pushing, name calling. For overt aggression children were asked with what frequency they perpetuated and were victims of name calling; picking on; and pushing around. In a later study by Yu and Gamble (2009) it was explained that a power assertive parenting style by the mother, correlated with child self-criticism may have led to increased aggression against a sibling. Being more self-critical could cause children to be more defensive and sensitive towards a provocation by a sibling and

therefore they might retaliate more impulsively. These findings however need to be considered with caution, due to being conducted cross-sectionally, as such cause-and-effect cannot be inferred. Further, more extreme types of negative parenting, such as child maltreatment (inclusive of parent-to-child verbal and physical abuse) increased the likelihood for direct bullying between siblings (Button & Gealt, 2010). In this study, sibling violence mirrors the definition of direct sibling bullying exactly.

Contrastingly, parental warmth has been associated with lower relational aggression between siblings; this was the case for mothers and fathers (Updegraff et al., 2005). Overall parental involvement seems to be an important factor in decreasing the likelihood of children engaging in sibling bullying (Wolke & Skew, 2012a). However, differences in how maternal and paternal involvement affects children have also been found. A father's involvement in his children's lives correlated significantly with lower relational aggression between siblings (Updegraff et al., 2005). For maternal involvement, no significance was found. It was suggested that mothers are more commonly perceived to be the more involved their children's lives, compared to fathers, therefore variations in a father's behaviour may affect children more strongly (Crouter, Helms-Erikson, Updegraff, & McHale, 1999). Yet, overall, the more that children perceived themselves to be treated similarly by their parents, the less relational aggression there was (Updegraff et al., 2005). The items used to investigate relational aggression included frequency of being excluded and being emotionally blackmailed. This is in line with the population study by Tippett and Wolke (2015) who found that positive parenting decreased bullying between siblings. Contrastingly, a negative relationship between children and parents and harsh parenting was associated with increased sibling bullying victimisation (Tippett & Wolke, 2015).

The findings of a longitudinal study in which the description of sibling bullying is only marginally similar to the definition used in this thesis (section 1.2.3.), is considered relevant to discuss here, because it is a population study of approximately 14,000 participants (Jenkins, Rasbash, Leckie, Gass, & Dunn, 2012). The authors found that maternal differential negative treatment of siblings led to increased hostility between siblings. They investigated sibling hostility through inquiring about the frequency of conflicts, which included how often the target child was angry at his/her siblings (Jenkins et al., 2012). Despite the fact that research has shown that parenting has a strong effect on sibling relationship qualities and child wellbeing overall, relatively little is known about how parenting affects sibling bullying. The studies cited above create a good foundation for further studies, particularly longitudinal studies.

1.2.5.1.2. Emotional Factors and Sibling Bullying

The longitudinal study by Bowes et al. (2014) examined sibling bullying based on the same definition as in this thesis. They looked at victims of sibling bullying at the age of 12 years and outcomes at 18 years. A positive linear trend was detected between having been victimised and later likelihood of having symptoms of depression, anxiety and self-harming. Similar trends have been found by several cross-sectional studies. A study that looked at unhappiness of children involved in sibling bullying as a pure bully, pure victim and bully-victim in relation to neutrals (children not involved in sibling bullying) found that pure bullies were two and half times more likely to be unhappy. This was closely followed by bully-victims and then victims (Wolke & Skew, 2012a). All relations between these types of bullying and neutrals were statistically significant. Unhappiness was constructed through a variety of questions about family environment, friends, and the participant's life as a whole. Similarly, Duncan (1999) found a significant positive association between depression and loneliness scores and children involved in direct sibling bullying. Children who were involved in both sibling

and peer bullying scored highest on psychopathology and children who were not involved in sibling nor in peer bullying, scored lowest (Duncan, 1999). Also, McHale, Whiteman, Kim and Crouter (2007) found that children who had negative sibling relationships, showed more depressive symptoms, compared to children who were in positive or distant sibling relationships. The authors inquired about negative sibling relationships with five items on a five-point scale about negativity (e.g., “sibling gets angry or mad”) and five items on a five-point scale about control (e.g., who has more power in the relationship) (Stocker & McHale, 1992). Depression mediates the relationship between sibling bullying and being a victim of peer bullying (Yabko, Hokoda, & Ulloa, 2008). This suggests that children learn to be a victim through sibling bullying and might develop depression, which in turn makes them more likely to become a victim of peer bullying (Yabko et al., 2008). This study investigated sibling bullying based on the Peer Relations Questionnaire (Rigby & Slee, 1992), which was adapted to suit the assessment of sibling relationships by Duncan (1999). It includes questions inquiring about the frequency of direct and indirect bullying, including questions about power imbalances. Internalizing problems have also been associated with sibling bullying (Yu & Gamble, 2008). Being a perpetrator of relational aggression led to more internalizing problems for older siblings compared to younger siblings (description of how the authors described sibling relational aggression found in section 1.2.5.1.1.). However, being a victim of relational aggression was more likely to lead to internalizing problems for younger siblings, compared to older siblings. This relationship remained significant even after controlling for family climate factors. This indicates that being a victim of relational aggression by an older sibling could be a unique predictor of internalizing behaviour problems in younger siblings. Internalizing problems may be more prevalent for older siblings if they were a perpetrator and for younger siblings if they were a victims, as older siblings might feel guilty for having

bullied a younger (perceived to be physically weaker) sibling. Younger siblings might suffer more if they are victims as their self-esteem is consistently broken down by a role model (i.e., older sibling). Campione-Barr et al. (2014) found a significant association between sibling relational aggression and increased depression and anxiety. Further, they found that siblings' relational aggression significantly mediated the relationship between maternal psychological control and later depression and anxiety (description of how the authors described sibling relational aggression found under section 1.2.5.1.1.). This indicates that maternal factors might buffer against depression and anxiety caused through sibling bullying. This shows the intricacy of factors that affect sibling bullying and its outcomes and underlines the need to conduct longitudinal studies on such factors, in order to understand their direction of causality.

1.2.5.1.3. Behavioural Factors and Sibling Bullying

Through a cluster analysis, McHale et al. (2007) compared different types of sibling dynamics: negative, distant and positive dynamics. Older siblings were more likely to show risky behaviour when they were in the negative sibling relationship type, compared to the distant and positive relationship type. Risky behaviour was comprised of delinquent behaviours and substance abuse (for a description of how negative sibling relationships were assessed, see under section 1.2.5.1.2.). In line with the literature on bullying between peers, bully-victims have been associated with the most severe behaviour outcomes compared to bullies and victims (Wolke & Lereya, 2014). Wolke and Skew (2012a) found that sibling bully-victims had three times the odds of having severe behaviour problems (above the 90th percentile), compared to neutrals. This was followed by pure bullies and pure victims. However, there was no significant difference between neutrals and pure victims in terms of their behaviour problems (Wolke & Skew, 2012a). This was assessed with the Strengths and Difficulties Questionnaire, which includes hyperactivity, conduct, peer relationship problems and emotional

problems (Goodman, 1997). Comparing behavioural correlates between being a victim of physical bullying and verbal bullying, victims of physical bullying were more likely to consume alcohol, marijuana and smoke cigarettes (Button & Gealt, 2010). However, both types of aggression (verbal and physical) by a sibling increased the odds of engaging in delinquent behaviour and overall aggressive behaviour. Button and Gealt's (2010) description of sibling violence is analogous to the one of sibling bullying. The age range of participants that took part in the study was from 12 to 18 years. In order to prevent the substance abuse and delinquent behaviours from developing more severely, it is necessary to find out through a longitudinal study at what age these behaviours commence and when they peak during adolescence. Similarly though, Wolke and Samara (2004) found that victims of physical and verbal bullying scored highest on the total difficulties scale, compared to children that were victimised either verbally or physically and children who were not victimised at all. This was the case for victimisation by siblings and for victimisation by peers. This study also looked at the accumulative correlates caused by carry-over effects, similar to Duncan (1999), who did this on emotional correlates (see section 1.2.5.1.2.). Wolke and Samara (2004) found that children who were involved in sibling and in peer bullying scored highest on the total difficulties scale, whereas in contrast children that were involved in neither scored lowest. Another analysis that specifically focused on hyperactivity and conduct problems found the same accumulative effects, so that the high risk group, were the children that were involved in sibling and in peer bullying (Wolke & Samara, 2004). Given these severe accumulative effects, it is important to find out what factors cause sibling bullying, in order to prevent involvement in peer bullying and the development of emotional and behavioural problems. This stresses the need for longitudinal studies focusing on the precursors and outcomes of sibling bullying.

1.2.5.2. Distal Factors

1.2.5.2.1. Family Environment Factors and Sibling Bullying

The cross-sectional study by Yu and Gamble (2008) found that negative family climate factors and lack of family cohesion correlated with overt and relational aggression for younger and older siblings. Family factors had a particularly strong association with relational aggression (for a description of how the authors described overt and relational aggression, see section 1.2.5.1.1.). Similarly, stressful family changes (changes within the family structure, e.g. marital changes, abortion, child birth, death of family member; legal stressors; and financial stressors) also seemed to affect sibling relationships negatively, as they were associated with reports of higher rates of sibling physical assaults (Hardy, 2001). This was the case for victims and perpetrators, compared to children who did not experience stressful family changes. This cross-sectional study researched sibling physical aggression, through asking participants to select the most aggressive sibling, then with what frequency and intensity different kinds of physical aggression were perpetuated (Hardy, 2001). This being a retrospective study, one could imply direction of causality, so that these family climates predicted sibling physical aggression, though this should be done with caution due to the retrospective methods. More extreme forms of family adversity, such as a child witnessing domestic violence, also increase the likelihood for siblings to bully one another directly (Bowes et al., 2014; Button & Gealt, 2010).

Maternal depression increased the likelihood of sibling bullying (Bowes et al., 2014). This was also found in the population study by Jenkins et al. (2012) whose definition of sibling bullying only marginally overlapped with the one used in this thesis. This was due to it assessing general sibling conflicts with questions that inquired about the frequency of a sibling getting angry at a participant. Nevertheless, these two studies being both longitudinal (Bowes et al., 2014; Jenkins et al., 2012) maternal

depression seems to be a consistent predictor of sibling bullying. This finding is supported by Miller et al. (2012) who, through a hierarchical regression, found that maternal depression had the strongest association to sibling aggression, compared to a variety of domestic violence factors, witnessing community violence, child gender, family income and hours spent watching TV. The authors assessed sibling violence through the Sibling Social Behavior Scales (SSBS) (Graham-Bermann, 2000), using its subscale 'aggressive sibling behavior', which includes 19 items inquiring about verbal conflicts, mild and severe physical conflicts and physical or psychological injuries that resulted from these violent acts. These findings indicate that maternal mental health might be a key factor in predicting sibling bullying.

Low socioeconomic status has also been associated with sibling victimisation (Bowes et al., 2014; Tucker et al., 2013). The longitudinal population study by Bowes et al., (2014) showed that having parents from a low socioeconomic status was a marginally significant ($p=.05$) predictor of experiencing sibling bullying. In support, Tucker et al. (2013) found that children whose parents had a college degree were less likely to be victims of any type of sibling bullying, compared to children whose parents did not have a college degree (Tucker et al., 2013). This study consisted of 1,705 participants and any type of victimisation included psychological, physical victimisation or theft. In contrast to that, Tippet & Wolke (2015) found no difference in parents having a university degree or not in relation to its effects on sibling bullying. Yet, children who live in families where there is financial stress were more likely to bully siblings or be bullied by their siblings, compared to children of families with no financial stress. Children of parents with a higher education degree being more likely to have conflicts, compared to children of parents without a degree, was also found by Tucker et al. (2014). It should be noted that they purposefully chose not to solely focus on bullying, rather on victimisation. Nevertheless, together these findings could suggest

that not all socioeconomic factors have the same effect on children's relationship quality with their siblings. As seen above (section 1.2.5.1.1.) negative parent-child relationship qualities and harsh parenting are associated with sibling bullying (Tippett & Wolke, 2015). Family financial stress could therefore be a more decisive factor, compared to parental education, as parents who experience financial stress might not be able to spend as much time with their children. Spending leisure time with children has been associated with a lower likelihood of children being involved in sibling bullying, particularly as a bully and bully-victim (Wolke & Skew, 2012a). Parents of families that experience financial stress might not be able to spend a lot of leisure time with their children, which might foster more competition between siblings to get their parent's attention, which in turn leads to more bullying between siblings. Further, lack of sleep in parents due to financial stress might also cause more impatience, which may result in harsh parenting, which also correlates with sibling negativity. Despite not exactly coinciding with the description of sibling bullying used in this thesis, Williams, Conger and Blozis (2007) found that familial economic pressure correlated with sibling aggression. This relationship was moderated by parental hostility, so that more severe familial economic pressures yielded higher rates of parental hostility, which in turn caused more aggression between siblings (Williams et al., 2007). It should be investigated what layers of socioeconomic status affect sibling relationships most and what the causes of that might be. This also shows the convoluted nature of the influences of a variety of proximal and distal factors that are closely related to sibling bullying.

1.2.5.2.2. Peer Bullying and Sibling Bullying

That sibling bullying is associated with peer bullying has been established thus far (see section 1.2.4.). However, it should be noted that longitudinal studies are lacking. The above discussed studies are all cross-sectional except one study. Bullying

might involve a bidirectional relationship, so that children who are bullied at school might be more likely to bully their siblings at home and vice-versa. Therefore, it is important to conduct longitudinal research on the outcomes of sibling bullying. One longitudinal study by Ensor, Marks, Jacobs and Hughes (2010) examined children's general antisocial interactions, which included bullying (refusal to share, snatch away, bully and hurt); they observed children at age three with a sibling and later on at age six where the children were put in a room with two unfamiliar peers. They found that antisocial behaviour between siblings predicted antisocial behaviour between peers. Ensor et al. (2010) suggested that the prediction might be moderated through social and emotional maturity, as when sibling antisocial behaviour declined, children also become less likely to perpetuate antisocial behaviour towards their peers. This further underlines the importance of conducting longitudinal studies on the relationship between sibling and peer bullying, controlling for proximal and distal factors, in order to find out whether sibling bullying might be a unique predictor of peer bullying.

1.2.6. Conclusions

Sibling relationships create opportunities for important building blocks to be formed that influence later psychological and social development. Sibling bullying is a relatively understudied area of research, mainly due to inconsistencies in the ways that researchers and lay people refer to and perceive sibling bullying. In their review on sibling bullying, Wolke et al. (2015) have suggested adapting the definition of peer bullying to create an integrated, structured definition of sibling bullying. This definition allows distinguishing sibling bullying from other forms of aggression that may be more common, more extreme or very rare. Fourteen cross-sectional studies and one longitudinal study have examined factors that correlate with sibling bullying. These

studies may have referred to sibling bullying with a different term, however ultimately they examined sibling bullying based on the definition proposed by Wolke et al. (2015). The bigger part of research on sibling bullying has linked it with internalizing problems, namely depression and anxieties. Parenting styles also affect sibling relationships, however, research is still lacking here. Nevertheless, the general picture indicates that negative mother-child relationships and harsh parenting increase the likelihood of sibling bullying. Further, externalizing behaviour problems, such as aggressive behaviour, delinquent and risky behaviour have been associated more with being a sibling bully-victim and being a bully, rather than with being a victim. A number of family environment factors have been associated with sibling bullying, particularly negative family climate, maternal depression and financial stress. Six studies have indicated that specifically sibling bullying is associated with peer bullying. In most studies children mirrored the role within the peer dynamic of the one in the sibling dynamic. These carry-over findings suggest that children learn to adopt a particular social role, which is exhibited in any social setting they are in. These studies greatly contribute to the research field. However, the next step is to infer cause and effect so that, for example, it can be established whether externalizing behaviour problems are a cause or a consequence of being a sibling bully. This calls for longitudinal studies to be conducted. Finding out what factors influence sibling bullying and what the exact outcomes are, would help for specific intervention programs to be designed that will help to prevent sibling bullying. This is vital to improve the social and psychological wellbeing and development of children.

1.3. Study Rationale

This thesis aimed to identify the most significant precursors and outcomes of sibling bullying. The first study is a meta-analysis looking at proximal and distal factors associated with sibling conflicts. This is done in order to find out what fundamentally the most relevant factors associated with negative sibling relationships are. Sibling conflicts, rather than sibling bullying, was purposefully chosen as the focus in the meta-analysis. This was due to the different ways in which sibling bullying has been referred to in research thus far. As a result, the findings of the meta-analysis indicate the factors that are to be focused on in the following longitudinal studies, which focus on sibling bullying. The second study is a four-year-long longitudinal population study (Edinburgh, Scotland) that assessed the precursors and outcomes of sibling bullying at the beginning of adolescence (McAra & McVie, 2010). The data used were first collected when participants were 11.5 years old and data were then collected each successive year up until participants were 14.5-15.5 years old. Sibling bullying was assessed at the age of 12.5 years (second data collection point). Hence the precursors and the immediate outcomes of sibling bullying were examined. This second study focused on the proximal precursors of sibling bullying. The third and final study was another longitudinal study based on the Avon Longitudinal Study of Parents and Children (ALSPAC). This study tracks child development from birth until 17.5 years (the actual study goes beyond this age, however, this thesis focuses on child development until the end of adolescence). In the ALSPAC data, sibling bullying was also assessed at 12 years of age. This study investigated how distal factors, particularly parental mental health and parental marital quality, affected sibling bullying. Further, the long-term consequences of sibling bullying were assessed (i.e., until the end of adolescence). This thesis therefore offers an all-encompassing examination of the precursors and consequences of sibling bullying: the first study provides a foundational

schema of the factors associated with sibling conflicts, the second study constitutes a relatively short-term longitudinal study, examining the proximal factors that are associated with sibling bullying (based on the findings of the previous meta-analysis) and its short-term outcomes (i.e., one and two years later). Finally, the third study explores the distal factors associated with sibling bullying (based on the findings of the previous meta-analysis) and its long-term outcomes (i.e., the end of adolescence). Thus, the research questions are:

- 1) What are the proximal and distal factors most strongly related to sibling conflicts based on research findings thus far?
- 2) What are the child characteristics and proximal predictors and short-term outcomes of being a victim of sibling bullying and of being a perpetrator of sibling bullying?
- 3) What are the distal predictors and long-term outcomes of being a victim of sibling bullying and of being a perpetrator of sibling bullying?
- 4) What are the cross-over effects of sibling bullying to peer bullying?

2. Chapter 2 –The Effects of Parenting Styles and Familial Factors on Sibling Conflicts: A Meta-Analysis

2.1. Introduction

Sibling conflict is assumed to be the most common form of intrafamilial conflicts, however, contrastingly the least researched (Eriksen & Jensen, 2009; Khan & Cooke, 2013; Wolke & Samara, 2004). Most children's first social interactions are with family members, primarily with parents and siblings. These dynamics, particularly between siblings, are long-lasting and can be unique bonds, which can have lifelong repercussions on an individual's well-being (Feinberg, Sakuma, McHostetler, & McHale, 2013) and the development of social skills (Buist, Dekovic, & Prinzie, 2013; Dunn, 1983).

2.1.1. Prevalence and Psychological Wellbeing

As discussed in the literature review, research has shown associations between conflictual sibling relationships and externalizing, and internalizing problems, and conflictual peer relationships. A recently published meta-analysis on the psychological factors associated with sibling relationships by Buist et al. (2013) showed that conflictual sibling relationships yielded more externalizing problems (delinquency, substance abuse and aggressive behaviour) and internalizing problems (withdrawn comportment, anxiety and depression), than children in non-conflictual sibling relationships. However, sibling warmth was associated with fewer externalizing behaviour problems. This indicates the potency of the effect of sibling relationships on the psychological well-being of children. Further, sibling aggression (threatening, verbal aggression, kicking, pushing, punching, slapping) is a unique predictor of externalizing behaviours (aggression, delinquency and substance abuse) (Button &

Gealt, 2010) and significantly contributes to the development of emotional difficulties and aggressive behaviour in adulthood, even when adjusting for other forms of family violence (Mathis & Mueller, 2015). In addition, children in conflictual sibling relationships were more likely to engage with coercive peers, which further nurtured confrontational behaviour patterns (Criss & Shaw, 2005) and predicted peer victimisation when there was a perceived dominance imbalance within the sibling relationship (Faith, Elledge, Newgent, & Cavell, 2015). However, when there was dominance symmetry in the sibling relationship (despite the power imbalance caused by the age difference between siblings) it was found that children learnt adaptive conflict resolution strategies, thereby making them less prone to being involved in any type of peer conflict. The power imbalance that is not caused by age seems to be a learnt behaviour, caused by parental non-intervention during sibling conflicts (Perlman, Garfinkel, & Turrell, 2007). This shows that there are factors external to the sibling relationship that may influence conflict within this relationship. The importance of exploring what these factors are, in order to be able to reduce conflict between siblings is underlined, particularly due to the strong impact of sibling relationships on the psychological well-being of children and peer relationship quality. This is a research area which has not been explored as extensively and systematically as the exploration of psychological wellbeing factors associated with sibling conflicts. Therefore, this meta-analysis will systematically map out which specific family, parenting and environmental factors may influence conflicts between siblings, creating a basis on which forthcoming research can be anchored.

2.1.2. Factors Associated with Sibling Conflicts: The Theoretical Framework

There are numerous interlinked factors that could affect negative sibling relationships. This is illustrated very well with the Bronfenbrenner's Ecological Systems Theory (Bronfenbrenner, 1986). The vast number of possible combinations of proximal factors leads to widespread variability in a sibling relationship quality. Distal factors comprise any other factors further away in the chain of causality. The distal factors that are relevant for the study of exploring what factors have the strongest association with sibling conflicts are elements, such as parental mental health, parental marital quality, family climate and socioeconomic status factors. The various degrees and combinations of distal factors that can affect sibling relationship qualities make the investigation of what affects sibling conflicts particularly complex. Additionally, combinations of proximal and distal factors further complicate the possibility of untangling the specific elements associated with sibling conflicts. These intricacies are reflected in the existing research in this field.

Parents (or guardians) play a key role in determining their children's relationships with their siblings (Tucker & Kazura, 2013) and peers (Lereya, Samara, & Wolke, 2013). Based on Social Learning Theory it is often argued that children learn from the behaviour of people who are physically and emotionally close to them through observing and modelling it (Bandura, 1973). According to this, the child could learn and develop its behaviour through direct (proximal) or indirect (distal) relationships with the surrounding environment that they live in. Further, Bowlby's Attachment Theory puts forward that the type of attachment style one has with ones' primary attachment figures (guardians), creates an internal working model that shapes the manner in which one interacts with peers (Bowlby, 1971). This internal working model ranges from a securely-attached to an insecurely-attached working model. The securely-attached internal working model stems from a sensitive engagement with a

child, which triggers a confident social development, whereas the insecurely attached internal working model stems from neglecting a child, which contrastingly triggers a lack of confidence and reduced self-efficacy in the child (Ainsworth, Blehar, Water, & Wall, 1978; Bretherton, 1992). Therefore, children's development is affected by the direct relationship with their parents (proximal relationship), which in turn could influence their relationship with others (e.g., siblings, peers).

In terms of proximal factors, McHale, Updegraff, Tucker and Crouter (2000) found that punitive and authoritarian parenting styles are correlated with negative sibling relationship qualities. This is in line with the population study by Tippet and Wolke (2014) who found that harsh parenting was associated with sibling victimisation and violence perpetration. Additionally, they found that positive parenting decreased negativity between siblings (Tippet & Wolke, 2014). Further, maternal hostile behaviour has also been associated with hostility among siblings (Piotrowski, Taylor, & Cormier, 2014). Other proximal factors associated with sibling conflicts include maternal psychological control (Campion-Barr, Lindell, Bassett Greer, & Rose, 2014; Yu & Gamble, 2008), extreme violence between parents and children (Button & Gealt, 2010) and parental differential treatment of their children (Updegraff et al., 2005). Distal factors, such as familial economic pressures also correlate with sibling aggression (Bowes, Wolke, Joinson, Lereya, & Lewis, 2014; Williams, Conger, & Blozis, 2007). This relationship was moderated by parental hostility, so that more severe familial economic pressures were related to more aggression between siblings in families with higher rates of parental hostility (Williams et al., 2007). Further, Tucker et al. (2013) found that children of parents without a college degree completion were more likely to experience any type of victimisation by a sibling, than were children of parents with a completed college degree. This indicates that a lower SES contributes to a more negative sibling relationship. Other distal factors associated with sibling

conflicts include maternal depression (Jenkins, Rashbash, Leckie, Gass, & Dunn, 2012; Miller, Grabell, Thomas, Bermann, & Graham-Bermann, 2012), lack of family cohesion (Yu & Gamble, 2008), stressful family changes (Hardy, 2001) and extreme domestic violence between parents (Bowes et al., 2014; Button & Gealt, 2010). These findings indicate that there is a variety of factors that can influence the quality of relationship between siblings. Qualitative reviews, such as the most recent one by Wolke, Tippet and Slava (2015) have discussed and summarised these factors (however this one was on sibling bullying, rather than sibling conflicts). On the other hand, a quantitative review allows for a thorough statistical analysis that will show which of these factors have the strongest effects sizes associated with sibling conflicts. This particular finding is crucial for the creation of intervention programs that decrease the likelihood for conflicts between siblings to occur, by specifically focusing on the factors that have the strongest effects sizes associated with sibling conflicts. In light of the negative effects of sibling conflicts on children's psychological wellbeing, such intervention programs are essential (Buist et al., 2013). Hence, that is why this quantitative review covers an important gap in research. Considering the variety of factors that have been found to be connected to sibling conflicts, this meta-analysis will systematically categorise the factors into proximal and distal ones according to the Bronfenbrenner Ecological Systems Theory (Bronfenbrenner, 1986). As a result, the aim of the study is to dissect what parenting aspects (proximal factors) and what family environment aspects (distal factors) have the strongest effect size in connection to sibling conflicts.

Studies exploring the relationship between proximal and distal factors and sibling conflicts differ extensively in their methods. This includes methodological factors such as, the origin of the study, gender constellation of the sibling sample used for study, type of design, type of sibling conflict (direct conflict or indirect conflict),

and assessment methods of the relevant variables. Therefore, an analysis exploring how these differences affect the effect sizes of proximal and distal factors in relation to sibling conflicts needs to be done. As a result, moderation analyses that explore these effects will be carried out.

2.1.3. Aims of the Study

The aim of this meta-analysis is to give a clear overview of the proximal and distal factors that have the strongest effect sizes associated with sibling conflicts, with an exploration of factors that moderate these effect sizes. Specifically, the exploration of distal factors (except for SES factors) in combination with proximal factors in relation to sibling conflicts has not been researched extensively (Dawson, Pike, & Bird, 2015; Wolke et al., 2015). It will give researchers and practitioners a systematic overview of the existing research on the factors that have the strongest associations with sibling conflicts. This is particularly crucial given the detrimental outcomes that conflictual sibling relationships can cause. The results of this meta-analysis will aid in the creation of intervention programs for family and school counsellors that aim to prevent harmful psychological and social developments, caused by sibling conflicts. Further, the number of studies that will make up the subcategories of the meta-analysis, will give an indication of possible research gaps within this field, which need to be explored, in order to advance research and practice in improving psychological and social wellbeing, particularly within developmental psychology. To our knowledge this is the first meta-analysis examining together the proximal and distal factors associated to negative sibling relationships.

2.2. Methods

The structure of this meta-analysis was based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher, Liberati, Tetzlaff, Altman, & The PRISMA Group, 2009) (Supplementary Table S1).

2.2.1. Information Sources and Database Search

A literature search of all studies on sibling conflicts was conducted. The time frame of the first search was from 1970 until February 2015. The commencement date was 1970 because research on sibling relationships began to thrive in the 1970s, after Bowlby's Attachment Theory (1973) and Bronfenbrenner's Ecological Systems Model (1979) (Milevsky, 2011). The following data bases were used to carry out the search: PsychInfo, PubMed, Social Sciences Full Text, Scopus, ERIC, Web of Science, MEDLINE and Education Research Complete. The data bases were chosen because they cover a range of related and relevant disciplines: psychology, sociology, education and other associated multidisciplinary topics. The selection of search terms was relatively broad, in order to maximise the potential to obtain wide-ranging and comprehensive indicators of the factors associated with sibling conflicts. The broad nature of the search is demonstrated by the respective search terms that were utilised; bully*, bulli*, victim*, violen*, harass*, aggress*, fight*, antisocial, delinquen* (* represents that the search includes the respective words and all possible fragments). These terms were inserted with the Boolean operator 'OR' in conjunction with sibling*, sister* and brother*. Scopus was directed to search for the relevant terms in the 'title', 'abstract' and 'key terms'; PubMed was directed to search in 'title' and 'abstract'; and Web of Science was directed to search in 'topic'. For the databases ERIC, PsychInfo, MEDLINE, Education Research Complete and Social Science Full Text it was only

possible to select either ‘title’ or ‘abstract, in which cases, the ‘abstract’ option was selected. After the search, articles were then sorted based on the previously set exclusion and inclusion criteria (see below). The studies that were included were then further grouped based on the respective variables each study examined. The results of this coding process made it apparent that the meta-analysis could be further improved by narrowing its focus. Based on the groups that had emerged from the coding, the factors associated with sibling conflicts were subdivided into four core areas: SES, Domestic Violence, Parental Mental Health and Parenting Practices. The first stage of a meta-analysis was then re-visited.

The time frame of the second search was from 1970-February 2016. The same search engines were utilised: PsychInfo, PubMed, Social Sciences Full Text, Scopus, ERIC, Web of Science, MEDLINE and Education Research Complete. New search terms were determined based on outcomes from the first search and other meta-analyses in related research areas (Kitzmann, Gaylord, Holt & Kenny, 2003; Lorant, Eaton, Robert, Philippot & Ansseau, 2003; Sirin, 2005; Davies, Evans & DiLillo, 2008; Reijntjes, Kamphuis, Prinzie & Telch, 2010; Lereya, Samara & Wolke, 2013). For each subgroup (SES, Domestic Violence, Parental Mental Health and Parenting Practices) the relevant search terms were entered in the search engines, in conjunction with ‘sibling* OR sister* OR brother*’ (Figure 2.1). As the literature on parenting practices is enormous, it was necessary to narrow this search further. This was done to maximise the chances that the search results would exclusively be related to the relationship between parenting practices and sibling conflicts. Therefore, the search terms for ‘Parenting Practices’ was additionally inserted in conjunction with ‘AND bully* OR bulli* OR victim* OR viole* OR aggress* OR harass* OR fight* OR antisocial* OR delinquen*’. Additionally, manual searches were conducted by scanning reference lists of relevant studies.

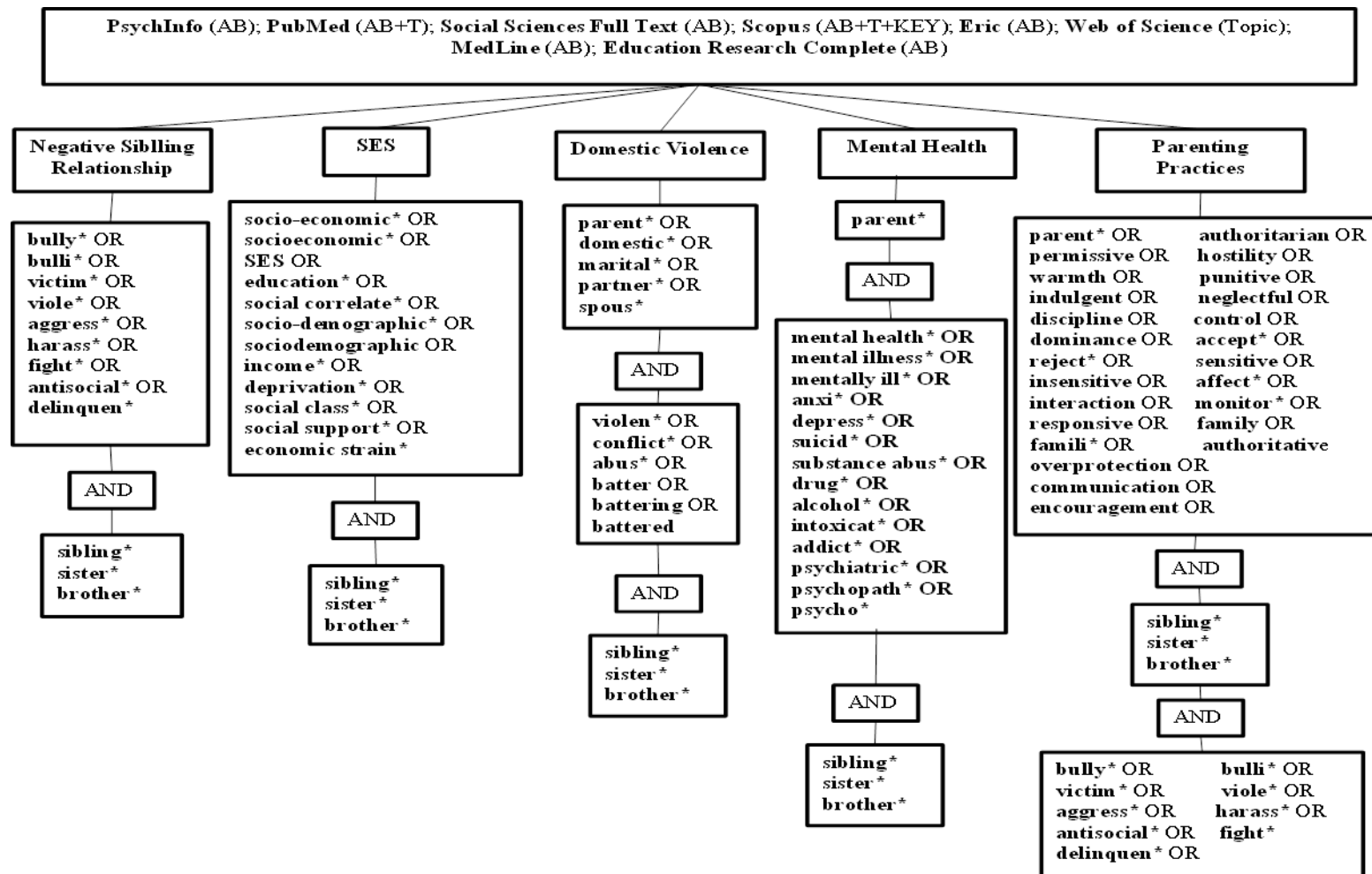


Figure 2.1. Description of search strategy for meta-analysis (AB=Abstract; T=Title; KEY=Key Words)

2.2.1.1. Eligibility Criteria and Study Selection

Inclusion criteria. For an article to be included in the analysis (Table 2.1), first it had to adopt a quantitative methodology. Second, studies on direct and/or indirect sibling conflicts were included, where direct conflicts referred to a sibling directly physically and/or verbally harming another sibling, and indirect conflicts referred to a sibling purposefully manipulating the social dynamics within a family, excluding and telling on a sibling to a parent (Wolke & Samara, 2004). Studies that referred to sibling conflicts with a distinct term, such as relational aggression were also included, due to cross-cultural differences in terminology. Third, the measures of sibling relationships should have been conducted through self-report measures (by the child and his/her sibling), parental reports of sibling relationship, and/or observational studies. The same principles were employed for the proximal and distal factors (e.g. SES, domestic violence, parental mental health and parenting). The inclusion analysis was not limited to sibling dyad relationships only; it was also possible to have a target child (TC) reporting about the sibling relationship with one or more siblings overall. Fourth, the study had to contain (or the authors needed to provide upon request) sufficient statistical information to be able to calculate an effect size (correlations, means, and standard deviations, odds ratio and standard errors, event rates and sample size). Fifth, the mean ages of TCs had to be below 18 years. Sixth, published and unpublished articles were included for analysis. Lastly, articles in English and Spanish were included.

Exclusion criteria. Qualitative, retrospective and intervention studies were excluded (Table 2.1). Retrospective studies were excluded as they tend to have low validity and high response bias, as participants may tend to confabulate their memory, due to the retrospective nature (Briere, 1992). Studies that only looked at samples from clinical populations were excluded. Further, exclusions were made for studies that only

had twin, adoptive and foster populations in their experimental conditions. Finally, meta-analyses were also excluded, although their reference lists were scanned to avoid omitting relevant studies.

Table 2.1. Inclusion and Exclusion Criteria

	Inclusion Criteria	Exclusion Criteria
Study Design	<ul style="list-style-type: none"> - Quantitative Studies - Cross-Sectional - Longitudinal 	<ul style="list-style-type: none"> - Qualitative Studies - Retrospective Studies - Intervention Studies - Meta-Analyses
Sample	<ul style="list-style-type: none"> - Children and siblings mean age had to be below the age of 18 years - Only typically developing children 	<ul style="list-style-type: none"> - Samples of solely clinical populations - Exclusively twin samples - Exclusively adoptive and/or foster samples
Measures of Outcome Variables	<ul style="list-style-type: none"> - Self-report measures of sibling relationships (child and/or siblings) - Only TCs reporting about the sibling relationship - Direct and/or indirect conflict between siblings 	
Reporting of Outcome Variables	<ul style="list-style-type: none"> - Reports of quality of relationship between sibling dyads - Reports of quality of relationship between one or more siblings overall 	
Measures of Predictor Variables	<ul style="list-style-type: none"> - Child- or parent- self-report measures of any of the possible precursors that fall in the previously set categories (parental mental health, domestic violence, SES and parenting practices) - Authors' observational reports of any of the possible precursors that fall in the previously set categories (parental mental health, domestic violence, SES and parenting practices) 	
Terminology	<ul style="list-style-type: none"> - Studies that referred to conflicts with a distinct term, such as relational aggression 	
Analysis	<ul style="list-style-type: none"> - Sufficient statistical information in order to be able to calculate an effect size (correlations, means, and standard deviations, odds ratio, <i>t</i> values, chi-squares) (either present in article, or provided by authors upon request) 	
Status of Article	<ul style="list-style-type: none"> - Published and unpublished articles (e.g. doctor theses) 	
Language	<ul style="list-style-type: none"> - Articles did not have to be exclusively in English 	

2.2.2. Coding of Studies

There were two coders and one senior reviewer. The first and second coder independently created groups and subgroups into which all variables were categorised. Any disagreements were examined, discussed and resolved; disagreements were referred to the senior reviewer. Both coders allocated very similarly, so that the variables were initially grouped into four main categories, which were based on the topical database searches (i.e. SES, Domestic Violence, Parental Mental Health and Parenting Practices). Based on the search result, it was found that the content of the category Domestic Violence was more appropriately described as Marital Quality. This was done as domestic violence research in relation to sibling conflicts, primarily referred to domestic violence between parents, hence changing the category name to Marital Quality. Additionally based on the search result, a new subgroup emerged, which was named Family Climate. Subsequently, the above-mentioned main groups (SES, Marital Quality, Parental Mental Health, Parenting Practices and Family Climate) were further, independently, subdivided by the two coders into more specific categories. This was concluded with the aim of achieving the right balance between having too few categories, which may have led to systematic patterns being hidden, and too many categories, which may have led to an insufficient number of variables in each category for analysis (Lereya et al., 2013). The number of subcategories within each main group varied substantially, reflecting the size of each category's search results (i.e. parenting practices being broken down into substantially more subcategories, compared to the other categories, due to the vast number of studies that were found through the searches). Cohen's kappas were computed for the categories to indicate the agreement between coders. Some variables (e.g., two-parent family; blended family; negative/positive life events), which neither of the coders nor the senior coder felt appropriately reflected any of the groups, had to be excluded from analysis. All kappa's

exceeded .90, except for Family Climate ($\kappa=.56$), which was extensively discussed with the senior coder, in order to reach agreements.

After dividing the variables into the main categories, they were further examined with the senior reviewer, and were further put into more appropriate and specific groups (given that there was a sufficient number of variables in each main group to subdivide accordingly). SES was subdivided into affluent SES and low SES; Marital Quality was divided into Positive Marital Quality and Parental Conflict; Parental Mental Health Problems was kept as one group, due to the small number of variables that comprised this group. Parenting Practices had a high proportion of variables and was therefore subdivided into seven subgroups. The meta-analysis on parenting practices by Lereya et al. (2013) was used as a guide to identify patterns in the variables. As a result, four positive groups emerged: Authoritative Parenting, Warmth and Affectionate Parenting, Parental Involvement and Support and Parental Supervision. Three negative groups emerged: Abusive Parenting, Neglectful Parenting and Parental Differential Treatment (PDT). Finally, Family Climate was subdivided into Positive Family Climate, Adverse Family Atmosphere and Child-Parent Conflict. Child-Parent Conflict was then added to the parenting practices group.

The final groups were then categorised into positive proximal (authoritative parenting; warm and affectionate parenting; parental involvement and support and parental supervision), positive distal (affluent SES; positive family climate and good marital quality), negative proximal (abusive parenting; neglectful parenting; parent-child conflict and PDT), and negative distal (low SES; adverse family atmosphere; parental conflict and parental mental health problems) factors. All proximal factors were exclusively ones where the child is an active entity and directly affected by respective interactions, whereas in distal factors the child is a passive entity, where he/she is indirectly affected (Table 2.2-Table 2.3).

Table 2.2. Definition of Categories and Examples of Positive Factors

	Category	Definition of Category	Descriptions and Examples of Variables
Proximal Factors	Authoritative Parenting	Parenting that served the purpose of improving the child's behaviour and wellbeing in a fair responsive and democratic manner, while encouraging communication and trust.	Authoritative parenting; democratic reasoning; good nature; problem solving by explaining emotions of other person; granting independence; trusting; connectedness; nurturance; instrumental aid
	Warm and Affectionate Parenting	It does not involve active parting (contrasting to authoritative parenting) however, involves emotional care, including physical and emotional acceptance, warmth, closeness and gentleness.	Affection; showing care; positive physical contact; acceptance; warmth
	Parental Involvement and Support	Supportive and practical involvement in their children's activities. Giving children's activities active and emotional attention.	Total amount of interactions with children; share's children's excitements; joint engagement in verbal and/or physical play
	Parental Supervision	Parental monitoring, knowledge about their children's friends, leisure time and whereabouts.	Supervision; behaviour supervision; mother knew about children's whereabouts
Distal Factors	Affluent SES	High family income, education, financial stress etc. were considered as indicators of SES level (Hollingshead, 1975). Studies looking at high SES.	How much money can be saved up; parent education (degree or higher);
	Positive Family Climate	Overall nurturing, supportive and cohesive family environment or variables of events (proximal and individual life events) that could cause a positive family environment (specifically, not solely within the parent-child dynamic, but within the family dynamic overall).	Family closeness, family cohesion, family positive expressiveness, family support
	Good Marital Quality	An affectionate, pleasant, and fair marriage.	Parents listen and talk to each other; enjoy each other's company; satisfaction with co-parenting; high marital love; dyadic adjustment; no violence between parents

Table 2.3. Definition of Categories and Examples of Negative Factors

	Category	Definition of Category	Descriptions and Examples of Variables
Proximal Factors	Abusive Parenting	These behaviours towards the children are truly malicious and serve no positive purpose (the opposite of Warmth/Affection).	Commands; threats; insults; sarcasm; quarrelling; name calling; ridicule; hostile behaviour; humiliate; angry coercion; intrusive remarks
	Neglectful Parenting	Does involve parenting, possibly for the wellbeing of the child and not necessarily with malicious intentions, however, the parenting measures are maladaptive and have negative effects on the child's wellbeing.	Non-intervention; ignoring; poor problem solving; poor supervision; irritated with child; dislike mess; anxious rearing; inconsistent/harsh parenting
	Parent-Child Conflict	Disagreements, fights and arguments between parents and children over children's chores, homework, attitude, appearance.	Mother-child negative interactions, parent-child conflict scale, father-child disagreements and arguments, fight about chores
	Parental Differential Treatment	Significant imbalance between the treatments of each sibling. Volling and Belsky (1998) found that different treatment by parents correlates with sibling jealousy and often promotes sibling conflict.	Absolute differential behaviour towards each siblings; unfair treatment compared to sibling; perceived disfavouritism; absolute difference in affections
Distal Factors	Low SES	Low family income, education, financial stress etc. were considered as indicators of SES level (Hollingshead, 1975). Studies looking at low SES.	High housing density; receipt of aid; single parenting; parent education (some college; GCSE or lower)
	Adverse Family Atmosphere	An overall family dynamic that encourages conflict and anger within the entire family or variables of events that could cause a negative family environment (specifically, not solely within the parent-child dynamic, but within the family dynamic overall).	Family coercion, family conflict, expression of anger,
	Parental Conflict	Marriage that involved hostility, provocation and anger between parents about marriage and/or about childrearing.	Conflict in presence of child; hostility to one another; blaming, complaining about each other; putting each other down; sarcastic comments about each other; tension; humiliate each other; physical violence; grabbing; pushing
	Parental Mental Health	All variables that related to parental mental health.	Anxiety; externalizing problems; internalizing problems; low self-esteem; low self-efficacy; depression

2.2.3. Coding of Study Characteristics and Moderators

Data were independently extracted from each individual study. The following study characteristics were retrieved from each study included in the meta-analysis. The data collection tool for the proximal and distal factors was extracted (questionnaire, observation, mixed methods), as well as who reported about these (mother, father, TC, only the older sibling, only the younger sibling, both siblings). The data collection tool of sibling conflicts was also extracted (questionnaire, observational or mixed methods), and who reported about it (mother, father, TC, only the older sibling, only the younger sibling, both siblings). Additionally, we extracted whether perpetration, victimisation or reciprocal conflict was assessed and whether it was direct violence, indirect violence or both, and who expressed this violence (the older sibling, the younger sibling or whether it was a dyadic relationship measure). SES factors were extracted (income and marital status) and methodological and design features (longitudinal or cross-sectional). Also the country and the continent in which the study was conducted were extracted. Several details relating to the siblings were extracted, including the mean age of each child when sibling data was recorded. The time interval between the data collection of the proximal or distal factors and sibling conflict variables was also reported. Additionally, the gender of siblings and the gender composition of the sibling dynamic were recorded.

Out of these extracted data, the following categorical moderators were constructed. The *assessment method of the respective proximal and distal factors* (child-report, parent-report, observation or mixed); *assessment method of sibling conflict* (child report, parent report, observation or mixed). Here, for both moderators 'mixed' included a mixture of reporting participants and/or a mixture of assessment methods. *Direction of conflict* (victimised, perpetration or reciprocal); *type of conflict* (direct, indirect, both); *gender constellation* (same sex, any or other); *design*

(longitudinal or cross-sectional); *continent* (Europe, North America, other) and *SES* (lower, lower-middle, middle, upper-middle and upper).

Data were extracted from the individual articles into the software program Comprehensive Meta-Analysis (CMA) (Borenstein, Hedges, Higgins & Rothstein, 2011). Authors were contacted for those articles that were eligible for analysis, but were missing some essential data in order to conduct analyses. Authors were sent a kind reminder two weeks after having sent the initial email. Unless there were explicit requests for extensions to have more time to gather the respective data, the articles by authors who did not reply to the data request within one month were excluded from analysis (Erkisen & Jensen, 2006; Erkisen & Jensen, 2009; Oh, Volling, & Gonzalez, 2015; McGuire, McHale & Updegraff, 1996).

2.3. Statistical Analysis

2.3.1. Summary Measures

Studies provided a variety of different data formats (correlations, odds ratios, event rates; means and standard deviations); therefore, the effect size format adopted was Hedges's *g*, which is a standardized effect size described as the difference between means of two compared groups (conflictual sibling relationships vs. non-conflictual sibling relationships) divided by the pooled standard deviation (Cooper & Hedges, 1994). Hedges's *g* values with 95% confidence intervals were calculated for each study's effect size compared to the overall weighted effect size across studies. Effect sizes in Hedges's *g* format can be interpreted with Cohen's conventions (Cohen, 1988). The analyses were conducted using a random effects model, as it was assumed that there would be substantial heterogeneity between studies. Under the random effects model the calculated error term takes into consideration within-study and between

study variability, results are therefore more generalizable and it is a more conservative measure, than the fixed effects model (Gini & Pozzoli, 2009; Cook, Williams, Guerra, Kim, & Sadek, 2010). Study outcomes were converted into Hedges's g utilizing the Comprehensive Meta-Analysis (CMA) software program (Borenstein et al., 2011).

On several occasions, a number of variables from the same study were coded in the same category. For example household chaos and high housing density (Kretschmer & Pike, 2009) were both placed under low SES. In these cases, the mean effect size for the variable under the same category within the same study was calculated. This was done in order to avoid the program from considering different variables from the same study as independent studies (Borenstein et al., 2011). The same applied for effect sizes that were derived from different informants for the same variable within the same study (e.g., maternal-and paternal-reports of warm and affectionate parenting (Pike, Coldwell, & Dunn, 2005)).

2.3.2. Heterogeneity and Moderators Analysis

As a random effects model was employed, heterogeneity tests were conducted. Significant heterogeneity implied that factors other than sampling errors contributed to differences in effect sizes. Q -statistics were calculated and tested for significance. A significant Q_w shows heterogeneity between the effect sizes within a moderator category, and a significant Q_b shows heterogeneity between the effects sizes between moderator categories. In order to assess to what extent the variability of outcomes across studies can be attributed to random error, I^2 was employed (Borenstein, Hedges, Higgins, & Rothstein, 2009). Values below 25% indicate that most dispersion between results is due to random error, while values above 75% show that the variability between outcomes is real and therefore they are more likely to be explained by

moderator variables (Huedo-Medina, Sanchez-Meca, Marin-Martinez, & Botella, 2006).

2.3.3. Publication Bias

Publication bias analyses were conducted using four methods: The Rosenthal's Failsafe Number (Rosenthal, 1991), the Begg and Mazumbar Rank Correlation Test (Begg & Mazumbar, 1994), the Egger's test (Egger, Smith, Schneider, & Minder, 1997) and the Duval and Tweedie's Trim and Fill Test (Duval & Tweedie, 2000). The first method, Rosenthal's Failsafe Number, indicated how many unpublished studies would have to exist to nullify the observed significant effect size. Findings are robust when the Failsafe N exceeds the value of five times the number of studies (k), plus 10 ($5k+10$) (Rosenthal, 1995). The Begg and Mazumbar Rank Correlation Test, also known as Kendall's tau b, examines publication biases based on the size of studies. Small studies with large effect sizes would be associated with relatively large variances; therefore no significant association between variance and effect size indicates an absence of publication bias. The Kendall tau b is interpreted in a similar way as a correlation; a value of 0 indicates no correlation, while deviations from 0 show an association (Borenstein, 2005). The Egger's Test calculated a linear regression to detect asymmetry in the funnel plot. The calculated intercept indicates the publication bias, a higher deviation from zero, shows larger systematic discrepancy between larger and smaller studies; therefore publication bias being present (Egger, et al., 1997). Finally, the Duvall and Tweedie's Trim-and-Fill Test is based on the funnel plot, which indicates asymmetry in the presence of publication bias. The Trim-and-Fill method removes the asymmetric studies from one side in order to identify the unbiased effect; the studies and their imputed counterparts are then reinserted to create a symmetric funnel plot, and then an adjusted effect size is calculated for this symmetric

plot (Sutton, Duval, Tweedie, Abrams, & Jones, 2000). The deviation between effects sizes gives an indication of the severity of publication bias i.e. it creates an effect size taking the bias into account. Due to great variability in publication bias detection methods, it was decided to employ these four methods, as they vary greatly in their detection style. Should all four methods indicate a publication bias, rather than just one, the publication bias detection can be considered as relatively robust.

2.4. Results

2.4.1. Search Results

The search results from each database were loaded onto EndNote x6 (Thomson Reuters, 2012). The search result of all subgroups and data bases generated 32,472 articles (Figure 2.2). Subsequently, the duplications that the search engines produced were deleted. Articles were then sorted based on the previously set exclusion and inclusion criteria. Firstly, titles and abstracts were reviewed. Then a full text scan of each article obtained was done. The authors of articles that were eligible for analysis based on the inclusion and exclusion criteria, however, were missing data for analysis (e.g. *Ns*, *rs*) were contacted (Howe, Fiorentino, & Garipey, 2003; Oliva & Arranz, 2005; Yu & Gamble 2008; Yu & Gamble 2009; Dawson, Pike, & Bird, 2015). The articles of authors who did not reply to the data request within one month, were discarded from analysis. Further searches were conducted manually by scanning reference lists of relevant articles. The final number of articles that was included in the meta-analysis was 60 (Figure 2.2).

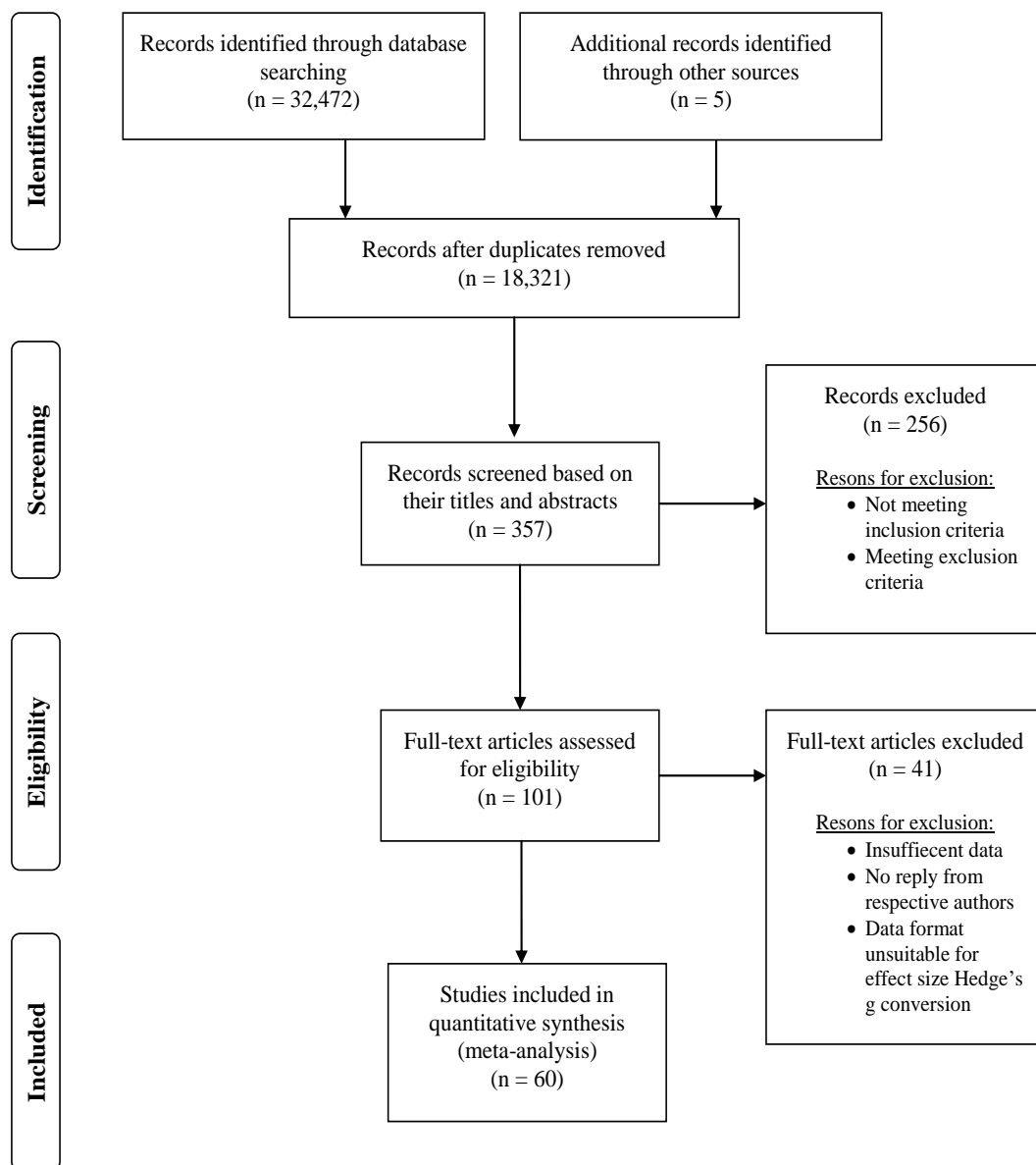


Figure 2.2. Description of search results for the meta-analysis

2.4.2. Study Characteristics

The 60 studies included 43,270 participating children (Table 2.4) (a list of the references of the studies included in the meta-analysis, that are not included in the reference list, can be found in Appendix A). Participant numbers across studies ranged from 48-7,362. There were two studies that only included reports of one gender (one study included only females and one study included only males). There were 24 studies

in which the reporting sibling was either the older or the younger and there were 36 studies in which both, the younger and older sibling reported on sibling conflicts. In terms of gender constellation, 46 studies included any gender constellation (i.e., no specification of gender interaction) and 8 only looked at same-gender dyads (e.g., girl-girl or boy-boy). The resulting number of studies either had specific constellation (e.g. only males as older siblings (Compton, Snyder, Schrepferman, Bank & Shortt, 2003)) or did not report it. Due to including longitudinal studies, it was decided to report the mean ages of children at the time point of sibling conflict data collection. There were 21 studies that only reported the mean age of TCs (rather than of all children in the household or of the children of the sibling dyad that was examined). The overall mean age of children in these studies was 9.95 years (SD=3.28 years). Further, there were 33 studies in which the mean ages of younger and older siblings were reported and two studies in which an age range was reported. The overall mean age of the younger siblings was 9.56 years (SD=4.40 years) and the overall mean age of older siblings was 12.05 years (SD=4.88 years). This excludes studies that reported an age range and longitudinal studies that collected sibling conflict data at several time points and only reported mean ages of the participating siblings over that respective time range.

It was decided to code the marital status as either two guardians (i.e. married parents, two biological parents that were not married, one biological parent and one step-parent, two adoptive parents) or one guardian (one single parent of a legally divorced relationship or separated relationship, an adoptive parent, widow/er). Forty-two studies reported marital status, out of which 64.29% of children had two guardians.

Further, it was recorded whether studies examined reciprocal conflict, being a victim of conflict or perpetration of conflict. All 60 studies reported this, most examining reciprocal violence (N=44; 73.3%). Also, studies reported whether the sibling conflict was direct (e.g. direct physical or verbal violence) (N=22; 36.67%),

indirect (e.g. relational manipulation i.e. excluding of games) (N=2; 3.33%) or both (N=36; 60.00%) (Table 2.5).

The informant of sibling conflict was also reported (children, parents or a mixture of respondents and methods). In most cases when there were multiple informants, there were also a number of methods used, such as questionnaires and observational methods. Therefore, these were grouped together as one category (mixed respondents mixed methods). The same was done for the outcome variable where 28.3% (N=17) of studies exclusively examined mothers. No studies included only the father. The rest of the studies had either a combination of both parents, were observational studies or the children reported on the parents behaviour or family climate.

Seventy-five per cent of the studies (N=45) were cross-sectional. It must be noted that this includes longitudinal studies that collected sibling conflict data and test variable data at the same time point (time interval of 0), and were therefore categorised as cross-sectional studies.

The SESs of the samples were categorised as lower, lower-middle, middle, upper-middle and upper classes. There were 12 studies that could not be categorised as they had overarching SES groups, in relation to the class categories in this study (i.e. middle and upper class). Of the studies that could be grouped into any of the five categories, half fell in the middle class (N=32; 53.3%).

Study origin was grouped by continent. Out of the 60 studies 42 (70%) were North American, 15 (25%) were European and 3 (5%) were from elsewhere (one Colombian sample (Ripoll et al., 2009); one Israeli sample (Signer, 1998) and one mixture (Yu & Gamble, 2008)).

Table 2.4. Study Characteristics: Sample, Gender, Age and Families

Study*	N**	TC Gender	Rank of TC in Sibling Constellation	% of Females	Gender Constellation of Siblings	N of same sex pairs	N of opposite sex pairs	Age of TC***	Age of Younger Sibling***	Age of Older Sibling***	Years between collection of Precursor and Outcome	% of Families with two guardians	% of Families with one guardians
Bank et al. (2004)	182	Either	Either (Older or Younger)	-	Any	-	-	10.0	-	-	0	-	-
Bowes et al. (2014)	6,928	Either	Either (Older or Younger)	-	Any	-	-	12	-	-	4	-	-
Brody et al. (1987)	80	Either	Both (Older and Younger)	50	Same sex dyads	40	-	-	4.50-6.50	7-9	0	100	0
Brody et al. (1987a)	84	Either	Both (Older and Younger)	52.38	Same sex dyads	42	-	-	5.50	8	0	100	0
Brody et al. (1994)	142	Either	Both (Older and Younger)	45.07	Same sex dyads	71	-	-	12	10; 14	0; 1; 5	100	0
Brody et al. (1992)	152	Either	Both (Older and Younger)	47.37	Same sex dyads	76	-	-	7.60	10.20	0; 1	100	0
Brody et al. (1999)	85	Either	Either (Older or Younger)	52.94	Any	-	-	10.50	-	-	0	100	0
Buist et al. (2011)	560	Either	Both (Older and Younger)	51.25	Any	139	141	-	12.40	14.50	0	100	0
Campione-Barr et al. (2014)	202	Either	Both (Older and Younger)	53.47	Any	59	42	-	13.67	16.46	0	72.30	27.7
Compton et al. (2003)	146	Either	Both (Older and Younger)	26.71	Older Male Sibling****	34	39	-	16	20	-	65	35
Criss & Shaw (2005)	416	Male	Either (Older or Younger)	23.32	Any	-	-	10	-	-	0	-	-
Dawson, Pike & Bird (2015)	246	Either	Both (Older and Younger)	50.81	Any	61	63	-	7.30	5.12	0	100	0

*Full list of authors are to found in the reference list

**Number of participants that completed questionnaire/that were observed; in case of longitudinal study, based on first wave

*** Mean age when sibling data was collected, except for Brody et al. (1987) and Wolke and Skew (2012) who reported age ranges.

****In the moderator analysis grouped as 'other'.

Table 2.4. Study Characteristics: Sample, Gender, Age and Families continued

Study*	N**	TC Gender	Rank of TC in Sibling Constellation	% of Females	Gender Constellation of Siblings	N of same sex pairs	N of opposite sex pairs	Age of TC***	Age of Younger Sibling***	Age of Older Sibling***	Years between collection of Precursor and Outcome	% of Families with two guardians	% of Families with one guardians
Defoe et al. (2013)	816	Either	Either (Older or Younger)	57.84	Any	211	197	-	13.03	14.92	0	-	-
Derkman et al. (2011)	856	Either	Both (Older and Younger)	49.77	Any	214	214	-	13.4; 14; 15; 16; 17	15.2; 16; 17; 18; 19	0; 1; 2; 3; 4	100	0
Dubrow & Howe (1999)	60	Either	Both (Older and Younger)	53.30	Same sex dyads	30	-	-	4.20	6.60	0	100	0
Ducharme (2003)	178	Either	Either (Older or Younger)	-	Any	-	-	14	-	-	0	71.01	26.86
Dunn et al. (1999)	7,362	Either	Both (Older and Younger)	48.35	Any	-	-	-	4.00	7.30	4	-	-
Feinberg et al. (2003)	370	Either	Both (Older and Younger)	43.38	Any	96	89	-	-	-	-	100	0
Fosco et al. (2012)	358	Either	Either Older or Younger	45.81	Any	93	86	-	-	-	0	-	-
Garcia et al. (2000)	360	Either	Both (Older and Younger)	-	Any	-	-	5	-	-	3	58	41
Hakvoort et al. (2010)	176	Either	Either (Older or Younger)	55.11	Any	57	31	10.15	-	-	0	100	0
Howe et al. (2003)	48	Either	Both (Older and Younger)	50	Any	12	12	-	1.17; 3.50; 5.30	3.90; 6.20; 8.20	0; 2; 4	100	0
Howe & Ross (1990)	64	Either	Both (Older and Younger)	50	-	-	-	-	1.17	3.87	0	-	-
Keery et al. (2005)	372	Female	Either (Older or Younger)	100	-	-	-	12.6	-	-	0	-	-
Keeton et al. (2015)	162	Either	Either (Older or Younger)	-	Any	84	78	8.59	-	-	0	88	12

*Full list of authors are to found in the reference list

**Number of participants that completed questionnaire/that were observed; in case of longitudinal study, based on first wave

*** Mean age when sibling data was collected, except for Brody et al. (1987) and Wolke and Skew (2012) who reported age ranges.

Table 2.4. Study Characteristics: Sample, Gender, Age and Families continued

Study*	N**	TC Gender	Rank of TC in Sibling Constellation	% of Females	Gender Constellation of Siblings	N of same sex pairs	N of opposite sex pairs	Age of TC***	Age of Younger Sibling***	Age of Older Sibling***	Years between collection of Precursor and Outcome	% of Families with two guardians	% of Families with one guardians
Kim et al. (1999)	1,308	Either	Both (Older and Younger)	47.86	Same sex dyads	-	-	-	-	-	0	-	-
Kowal & Kramer (1997)	122	Either	Both (Older and Younger)	49.18	Any	31	30	-	11.01	13.52	0	100	0
Kramer & Kowal (2005)	56	Either	Both (Older and Younger)	58.93	Any	17	11	-	13.42	17.34	13	71	21
Kretschmer & Pike (2009)	118	Either	Both (Older and Younger)	-	Any	-	-	-	5.30	7.50	0	100	0
Liu (2007)	128	Either	Both (Older and Younger)	46.09	Any	29	35	-	11.30	13.90	0	100	0
McCoy et al. (1994)	140	Either	Both (Older and Younger)	44.28	Same sex dyads	70	-	7	-	-	5	100	0
McHale et al. (2007)	344	Either	Both (Older and Younger)	-	Any	-	-	-	10.34	14.04	0	100	0
Modry-Mandell et al. (2007)	126	Either	Both (Older and Younger)	47.62	Any	-	-	4.79	-	-	0	96	-
Natsuaki et al. (2009)	780	Either	Both (Older and Younger)	49.74	Same sex dyads	390	-	-	12.08	13.56	0	100	0
Oliva & Arranz (2005)	513	Either	Either (Older or Younger)	56.92	Any	-	-	15.43	-	-	-	-	-
Pike et al. (2005)	202	Either	Both (Older and Younger)	-	Any	-	-	-	5.20	7.40	0	100	0
Repinski & Shonk (1999)	76	Either	Either (Older or Younger)	46.05	Any	-	-	-	-	-	0	100	0
Richmond et al. (2005)	266	Either	Both (Older and Younger)	44.36	Any	67	66	-	7.90; 10.50; 14	10.20; 12.30; 16.10	0; 2; 4	90	10
Ripoll et al. (2009)	118	Either	Both (Older and Younger)	69.49	No younger females****	27	32	-	13.29	16	0	100	0

*Full list of authors are to found in the reference list

**Number of participants that completed questionnaire/that were observed; in case of longitudinal study, based on first wave

*** Mean age when sibling data was collected, except for Brody et al. (1987) and Wolke and Skew (2012) who reported age ranges.

****In the moderator analysis grouped as 'other'.

Table 2.4. Study Characteristics: Sample, Gender, Age and Families continued

Study*	N**	TC Gender	Rank of TC in Sibling Constellation	% of Females	Gender Constellation of Siblings	N of same sex pairs	N of opposite sex pairs	Age of TC***	Age of Younger Sibling***	Age of Older Sibling***	Years between collection of Precursor and Outcome	% of Families with two guardians	% of Families with one guardians
Sapouna & Wolke (2013)	3,136	Either	Either (Older or Younger)	51.50	Any	-	-	13	-	-	1	-	-
Schaefer & Salafia (2014)	158	Either	Either (Older or Younger)	50.63	Any	-	-	13.74	-	-	0	-	-
Seginer (1998)	294	Either	Either (Older or Younger)	51.70	Any	-	-	-	17.42	21.58	0	100	0
Senguttuvan et al. (2014)	652	Either	Both (Older and Younger)	53.37	Any	166	160	-	14.52	17.17	0	77	23
Snyder et al. (2005)	310	Either	Both (Older and Younger)	26.45	Older Male****	73	82	-	6.30; 8.30	9.50; 11.50	0	-	-
Soli (2009)	358	Either	Both (Older and Younger)	65.08	Any	88	91	-	12.58	16.22	0	88	12
Stocker (1994)	170	Either	Either (Older or Younger)	-	Any	49	36	7.11	-	-	0	100	0
Stocker et al. (1989)	192	Either	Both (Older and Younger)	46.88	Any	44	52	-	4.68	7.66	0	-	-
Stocker & Youngbalde (1999)	272	Either	Either (Older or Younger)	43.38	Any	72	66	-	7.91	10.17	0	100	0
Tippett & Wolke (2015)	4,237	Either	Either (Older or Younger)	50.70	Any	-	-	12.52	-	-	0	-	-
Ttofi & Farrington (2008)	182	Either	Either (Older or Younger)	-	Any	-	-	11.50	-	-	0	-	-
Tucker et al (2013)	1,705	Either	Either (Older or Younger)	49	Any	-	-	8.54	-	-	0	69	31
Tucker et al. (2014)	1,726	Either	Either (Older or Younger)	49	Any	-	-	5.68	-	-	0	70	20

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**Number of participants that completed questionnaire/that were observed; in case of longitudinal study, based on first wave

*** Mean age when sibling data was collected, except for Brody et al. (1987) and Wolke and Skew (2012) who reported age ranges.

****In the moderator analysis grouped as 'other'.

Table 2.4. Study Characteristics: Sample, Gender, Age and Families continued

Study*	N**	TC Gender	Rank of TC in Sibling Constellation	% of Females	Gender Constellation of Siblings	N of same sex pairs	N of opposite sex pairs	Age of TC***	Age of Younger Sibling***	Age of Older Sibling***	Years between collection of Precursor and Outcome	% of Families with two guardians	% of Families with one guardians
Tucker & Kazura (2013)	164	Either	Both (Older and Younger)	50	Any	36	46	-	7.16	9.84	0	65	35
Volling et al. (2002)	120	Either	Both (Older and Younger)	55	Any	34	26	-	1.3	4	0; 3 months; 4 months	100	0
Williams et al. (2007)	902	-	Both (Older and Younger)	-	-	-	-	-	12.11; 13; 14; 15	14.48; 15; 16; 17.37	0; 1; 2; 3	100	0
Wolke & Skew (2012)	1,746	Either	Either (Older or Younger)	49.54	Any	1269	477	-	10-12	13-15	0	-	-
Yabko et al. (2008)	242	Either	Either (Older or Younger)	61.20	Any	-	-	12.25	-	-	0	-	-
Yu & Gamble (2008)	256	Either	Either Older or Younger	48.83	Any	57	71	4.6	-	-	0	100	0
Yu & Gamble (2008a)	866	Either	Both (Older and Younger)	49.43	Any	225	208	-	11.60	14.30	0	85	15
Yu et al. (2009)	880	Either	Both (Older and Younger)	49.32	Any	228	212	-	11.60	14.30	-	84.6	15.4

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**Number of participants that competed questionnaire/that were observed; in case of longitudinal study, based on first wave

*** Mean age when sibling data was collected, except for Brody et al. (1987) and Wolke and Skew (2012) who reported age ranges.

Table 2.5. Study Moderators: Conflict Type and Direction, Informants, and Study Design and Measures

Study*	Direction of Conflict	Type of Conflict	Report of Sibling Conflict	Report of Test Variable	Guardian that reported test variable or test variable was about	Design	SES	Continent
Bank et al. (2004)	Reciprocal	Direct and Indirect	Mixed Respondent a/o Mixed Methods**	Mixed Respondent a/o Mixed Methods**	Both Guardians	Cross-Sectional	Lower	North America
Bowes et al. (2014)	Victimised	Direct and Indirect	Child-Report	Parent-Report	Mothers	Longitudinal	-	Europe
Brody et al. (1987)	Perpetration	Direct	Observation	Observation	Mother	Cross-Sectional	***	North America
Brody et al. (1987a)	Perpetration	Direct and Indirect	Observation	Parent-Report	Mother	Cross-Sectional	***	North America
Brody et al. (1994)	Reciprocal	Direct and Indirect	Child-Report	Mixed Respondent a/o Mixed Methods**	Both Guardians	Longitudinal	***	North America
Brody et al. (1992)	Reciprocal	Direct and Indirect	Mixed Respondent a/o Mixed Methods**	Parent-Report	Both Guardians	Longitudinal	***	North America
Brody et al. (1999)	Reciprocal	Direct	Child-Report	Parent-Report	Both Guardians	Cross-Sectional	Middle	North America
Buist et al. (2011)	Reciprocal	Direct and Indirect	Child-Report	Parent-Report	Both Guardians	Cross-Sectional	-	Europe
Campione-Barr et al. (2014)	Victimised	Direct and Indirect	Child-Report	Child-Report	Mother	Cross-Sectional	Upper	North America
Compton et al. (2003)	Reciprocal	Direct and Indirect	Observation	Mixed Respondent a/o Mixed Methods**	Mother	Longitudinal	Lower	North America
Criss & Shaw (2005)	Reciprocal	Direct and Indirect	Child-Report	Mixed Respondent a/o Mixed Methods**	Mother	Cross-Sectional	Lower	North America
Dawson et al. (2015)	Reciprocal	Direct and Indirect	Child-Report	Mixed Respondent a/o Mixed Methods**	Both Guardians	Cross-Sectional	***	Europe
Defoe et al. (2013)	Reciprocal	Direct	Child-Report	Mixed Respondent a/o Mixed Methods**	Both Guardians	Cross-Sectional	***	Europe
Derkman et al. (2011)	Reciprocal	Direct and Indirect	Child-Report	Child-Report	Both Guardians	Longitudinal	-	Europe

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**Mixed Respondents a/o Mixed Methods= Studies that had several respondents (i.e. mother, parents, children) and/ or several methods to collect data (i.e. questionnaires, observation, interviews)

*** These could not be grouped into any of the 5 SES categories (lower, lower-middle, middle, upper-middle and upper), as these studies had overarching SES classes that made it impossible to accurately group them into the five possible categories.

Table 2.5. Study Moderators: Conflict Type and Direction, Informants, and Study Design and Measures continued

Study*	Direction of Conflict	Type of Conflict	Report of Sibling Conflict	Report of Test Variable	Guardian that reported test variable or test variable was about	Design	SES	Continent
Dubrow & Howe (1999)	Reciprocal	Direct and Indirect	Observation	Observation	Both Guardians	Cross-Sectional	Middle	North America
Ducharme (2003)	Reciprocal	Direct and Indirect	Child-Report	Child-Report	Both Guardians	Cross-Sectional	Middle	North America
Dunn et al. (1999)	Reciprocal	Direct and Indirect	Parent-Report	Parent-Report	Both Guardians	Longitudinal	-	Europe
Feinberg et al. (2003)	Reciprocal	Direct	Child-Report	Child-Report	Both Guardians	Longitudinal	***	North America
Fosco et al. (2012)	Reciprocal	Direct	Child-Report	Mixed Respondent a/o Mixed Methods**	Both Guardians	Cross-Sectional	-	North America
Garcia et al. (2000)	Reciprocal	Direct	Observation	Mixed Respondent a/o Mixed Methods**	Mother	Longitudinal	Lower	North America
Hakvoort et al. (2010)	Reciprocal	Direct	Child-Report	Mixed Respondent a/o Mixed Methods**	Both Guardians	Cross-Sectional	Middle	Europe
Howe et al. (2003)	Reciprocal	Direct	Observation	Observation	Mother	Longitudinal	Middle	North America
Howe & Ross (1990)	Perpetration	Direct	Observation	Observation	Mother	Cross-Sectional	Middle	North America
Keery et al. (2005)	Victimisation	Indirect	Child-Report	Child-Report	Both Guardians	Cross-Sectional	-	North America
Keeton et al. (2015)	Reciprocal	Direct and Indirect	Child-Report	Parent-Report	-	Cross-Sectional	Upper	North America
Kim et al. (1999)	Reciprocal	Direct and Indirect	Mixed Respondent a/o Mixed Methods**	Mixed Respondent a/o Mixed Methods**	Both Guardians	Cross-Sectional	Lower-Middle	North America
Kowal & Kramer (1997)	Reciprocal	Direct and Indirect	Child-Report	Child-Report	Both Guardians	Cross-Sectional	Middle	North America

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Table 2.5. Study Moderators: Conflict Type and Direction, Informants, and Study Design and Measures continued

Study*	Direction of Conflict	Type of Conflict	Report of Sibling Conflict	Report of Test Variable	Guardian that reported test variable or test variable was about	Design	SES	Continent
Kramer & Kowal (2005)	Reciprocal	Direct and Indirect	Observation	Observation	Mother	Longitudinal	Middle	North America
Kretschmer & Pike (2009)	Reciprocal	Direct	Child-Report	Mixed Respondent a/o Mixed Methods**	Both Guardians	Cross-Sectional	***	Europe
Liu (2006)	Reciprocal	Direct and Indirect	Child-Report	Mixed Respondent a/o Mixed Methods**	Both Guardians	Cross-Sectional	Upper	North America
McCoy et al. (1994)	Reciprocal	Direct and Indirect	Child-Report	Mixed Respondent a/o Mixed Methods**	Both Guardians	Longitudinal	***	North America
McHale et al. (2007)	Reciprocal	Direct and Indirect	Child-Report	Parent-Report	Both Guardians	Cross-Sectional	***	North America
Modry-Mendell et al. (2007)	Reciprocal	Direct	Parent-Report	Parent-Report	Mothers	Cross-Sectional	Lower	Europe
Natsuaki et al. (2009)	Perpetration	Direct and Indirect	Mixed Respondent a/o Mixed Methods**	Child-Report	Mother	Cross-Sectional	Middle	North America
Oliva & Arranz (2005)	Reciprocal	Direct and Indirect	Child-Report	Child-Report	Both Guardians	Cross-Sectional	-	Europe
Pike et al. (2005)	Reciprocal	Direct and Indirect	Mixed Respondent a/o Mixed Methods**	Mixed Respondent a/o Mixed Methods**	Both Guardians	Cross-Sectional	***	Europe
Repinski & Shonk (1999)	Perpetration	Direct	Child-Report	Child-Report	Both Guardians	Cross-Sectional	Middle	North America
Richmond et al. (2005)	Reciprocal	Direct	Child-Report	Child-Report	Both Guardians	Longitudinal	Middle	North America
Ripoll et al. (2009)	Reciprocal	Direct	Child-Report	Child-Report	Both Guardians	Cross-Sectional	Middle	South America****
Sapouna & Wolke (2013)	Victimisation	Direct and Indirect	Child-Report	Child-Report	Both Guardians	Longitudinal	-	Europe

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*** These could not be grouped into any of the 5 SES categories (lower, lower-middle, middle, upper-middle and upper), as these studies had overarching SES classes that made it impossible to accurately group them into the five possible categories.

****In the moderator analysis grouped as 'other'.

Table 2.5. Study Moderators: Conflict Type and Direction, Informants, and Study Design and Measures continued

Study*	Direction of Conflict	Type of Conflict	Report of Sibling Conflict	Report of Test Variable	Guardian that reported test variable or test variable was about	Design	SES	Continent
Schaefer & Salafia (2014)	Victimised	Direct	Child-Report	Child-Report	Both Guardians	Cross-Sectional	-	North America
Seginer (1998)	Reciprocal	Direct and Indirect	Child-Report	Child-Report	Both Guardians	Cross-Sectional	Lower	Asia****
Senguttuvan et al. (2014)	Reciprocal	Direct	Child-Report	Mixed Respondent a/o Mixed Methods**	Both Guardians	Cross-Sectional	Upper-Middle	North America
Snyder et al. (2005)	Reciprocal	Direct and Indirect	Observation	Observation	Both Guardians	Cross-Sectional	Lower	North America
Soli (2009)	Reciprocal	Direct and Indirect	Child-Report	Mixed Respondent a/o Mixed Methods**	Both Guardians	Cross-Sectional	-	North America
Stocker (1994)	Perpetration	Indirect	Child-Report	Child-Report	Both Guardians	Cross-Sectional	Middle	North America
Stocker et al. (1989)	Reciprocal	Direct	Observation	Mixed Respondent a/o Mixed Methods**	Mother	Cross-Sectional	-	North America
Stocker & Youngbalde (1999)	Reciprocal	Direct and Indirect	Child-Report	Parent-Report	Both Guardians	Cross-Sectional	Middle	North America
Tippett & Wolke (2015)	Reciprocal	Direct	Child-Report	Mixed Respondent a/o Mixed Methods**	Both Guardians	Cross-Sectional	-	Europe
Ttofi & Farrington (2008)	Perpetration	Direct and Indirect	Child-Report	Child-Report	Both Guardians	Cross-Sectional	-	Europe
Tucker et al. (2013)	Victimised	Direct and Indirect	Mixed Respondent a/o Mixed Methods**	Parent-Report	-	Cross-Sectional	Middle	North America
Tucker et al. (2014)	Perpetration	Direct	Child-Report	Child-Report	Both Guardians	Cross-Sectional	Lower-Middle	North America
Tucker & Kazura (2013)	Reciprocal	Direct and Indirect	Parent-Report	Parent-Report	Both Guardians	Cross-Sectional	-	North America
Volling et al. (2002)	Perpetration	Direct and Indirect	Parent-Report	Mixed Respondent a/o Mixed Methods**	Both Guardians	Longitudinal	Upper-Middle	North America

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**Mixed Respondents a/o Mixed Methods= Studies that had several respondents (i.e. mother, parents, children) and/ or several methods to collect data (i.e. questionnaires, observation, interviews)

*** In the moderator analysis grouped as 'other'.

Table 2.5. Study Moderators: Conflict Type and Direction, Informants, and Study Design and Measures continued

Study*	Direction of Conflict	Type of Conflict	Report of Sibling Conflict	Report of Test Variable	Guardian that reported test variable or test variable was about	Design	SES	Continent
Williams et al. (2007)	Perpetration	Direct	Child-Report	Observation	Both Guardians	Longitudinal	Lower	North America
Wolke & Skew (2012)	Reciprocal	Direct	Child-Report	Child-Report	Mother	Cross-Sectional	-	Europe
Yabko et al. (2008)	Reciprocal	Direct	Child-Report	Child-Report	Both Guardians	Cross-Sectional	-	North America
Yu & Gamble (2008)	Reciprocal	Direct and Indirect	Parent-Report	Parent-Report	Mother	Cross-Sectional	***	Asia and North America****
Yu & Gamble (2008a)	Reciprocal	Direct and Indirect	Child-Report	Mixed Respondent a/o Mixed Methods**	Mother	Cross-Sectional	Middle	North America
Yu & Gamble (2009)	Reciprocal	Direct and Indirect	Child-Report	Mixed Respondent a/o Mixed Methods**	Mother	Cross-Sectional	Upper-Middle	North America

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**Mixed Respondents a/o Mixed Methods= Studies that had several respondents (i.e. mother, parents, children) and/ or several methods to collect data (i.e. questionnaires, observation, interviews)

*** These could not be grouped into any of the 5 SES categories (lower, lower-middle, middle, upper-middle and upper), as these studies had overarching SES classes that made it impossible to accurately group them into the five possible categories.

****In the moderator analysis grouped as 'other'.

2.4.3. Sibling conflicts and Proximal and Distal factors: Meta-analysis

The coded variables were analysed in groups of positive factors (proximal and distal) and negative factors (proximal and distal). For all categories a pooled effect size across studies of Hedge's g was calculated (Supplementary Tables S2-S5 indicate detailed results).

Positive proximal factors. The combined effect size showed that children who are involved in an aggressive sibling relationship were significantly less likely to have authoritative parents ($k=11$) ($g=-.29$, 95% CI [-.55, -.02], $p=.035$) and less likely to have warm and affectionate parents ($k=18$) ($g=-.39$, 95% CI [-.56, -.22], $p<.001$). The heterogeneity assessments were significant for both, $Q(10)=90.79$, $p<.000$; $I^2=88.99\%$ and $Q(17)=136.20$, $p=.00$; $I^2=87.52\%$, respectively. However, neither parental involvement and support ($k=6$) ($g=-.13$, 95% CI [-.62, .36], $p=.60$) nor parental supervision ($k=4$) ($g=-.30$, 95% CI [-.43, -.17], $p=.113$) were significantly associated with sibling conflicts. The heterogeneity assessments were significant for both (parental involvement and support: $Q(5)=317$, $p<.000$; $I^2=98.42\%$; parental supervision: $Q(3)=20.42$, $p=.000$; $I^2=85.31\%$). The pooled effect size for the overall positive proximal factors was significant ($g=-.32$, 95% CI [-.46, -.17], $p<.001$) with a significant heterogeneity between groups ($Q(38)=940.57$, $p<.000$; $I^2=95.96\%$) (Table 2.6).

Table 2.6. Positive Proximal Factors and Sibling Conflict

	Study Name	Hedge's g	Lower Limit	Upper Limit	Hedge's g and 95% CI
Authoritative Parenting	Buist et al. (2011)	-.04	-.28	.21	
	Derkman et al. (2011)	-.33	-.54	-.12	
	Ducharme (2003)	-.03	-.33	.27	
	Fosco et al. (2012)	-.31	-.60	-.01	
	Keeton et al. (2015)	-.25	-.70	.19	
	Signer (1998)	-.02	.61	.58	
	Tofi & Farrington (2008)	-.43	-.73	-.13	
	Tucker & Kazura (2013)	-.09	-.40	.22	
	Volling et al. (2002)	.11	-.41	.63	
	Wolke & Skew (2012)	-1.04	-1.20	-.89	
	Yu & Gamble (2008)	-.50	-.86	-.15	
	Overall Authoritative Parenting	-.29	-.55	-.02	
Warm and Affectionate Parenting	Brody et al. (1999)	-.47	-.91	-.02	
	Dawson et al. (2015)	-.47	-.91	-.02	
	Feinberg et al. (2003)	-.19	-.48	.10	
	Hakvoort et al. (2010)	-.90	-1.37	-.44	
	Kretschmer & Pike (2009)	-.52	-.89	-.14	
	McCoy et al. (1994)	-.64	-.99	-.29	
	McHale et al. (2007)	-.15	-.49	.19	
	Olivia & Arranz (2005)	-.25	-.43	-.08	
	Pike et al. (2005)	-.36	-.71	-.01	
	Repinski & Shonk (1999)	-.59	-1.07	-.12	
	Senguttuvan et al. (2014)	-.22	-.38	-.07	
	Soli (2009)	-.49	-.71	-.28	
	Stocker (1994)	-.47	-.91	-.03	
	Stocker et al. (1989)	.16	-.13	.45	
	Volling et al. (2002)	.01	-.51	.53	
	Wolke & Skew (2012)	-.90	-1.00	-.80	
Yu & Gamble (2008)	-.30	-.70	.09		
Yu & Gamble (2009)	-.13	-.32	.06		
	Overall Warm & Affectionate Parenting	-.39	-.56	-.22	
Parental Involvement and Support	Howe & Ross (1990)	-.40	-1.13	.33	
	Howe et al. (2003)	-.15	-.70	.41	
	McHale et al. (2007)	.46	.12	.80	
	Stocker et al. (1989)	.22	-.07	.51	
	Tippett & Wolke (2015)	-.02	-.03	-.01	
	Wolke & Skew (2012)	-.92	-1.02	-.82	
		Overall Parental Involvement and Support	-.13	-.62	
Parental Supervi.	Fosco et al. (2012)	-.02	-.31	.27	
	Kim et al. (1999)	-.21	-.43	.01	
	Kramer & Kowal (2005)	-1.56	-2.24	-.87	
	Olivia & Arranz (2005)	.02	-.15	.19	
	Overall Parental Supervision	-.30	-.65	.07	
	Overall Positive Proximal Factors	-.32	-.46	-.17	

Positive distal factors. The combined effect size showed that children who are involved in conflict relationships with their siblings were significantly less likely to be

from affluent SES ($k=5$) ($g=-.37$, 95% CI $[-.73, -.00]$, $p=.049$), less likely to come from positive family climate ($k=6$) ($g=-.36$, 95% CI $[-.53, -.20]$, $p<.000$) and less likely to live with parents with good marital quality ($k=12$) ($g=-.24$, 95% CI $[-.29, -.20]$, $p<.001$). The heterogeneity assessment was also significant (affluent SES: $Q(4)=102.06$, $p<.001$, $I^2=96.08\%$; positive family climate: $Q(5)=5.50$, $p=.358$; $I^2=9.11\%$ and good marital quality: $Q(11)=10.00$, $p=.530$, $I^2=.00\%$). The pooled effect size for the overall positive distal factors was significant $g=-.31$, 95% CI $[-.43, -.19]$, $p<.001$ with a significant heterogeneity between groups ($Q(22)=119.47$, $p<.001$; $I^2=81.59\%$) (Table 2.7).

Table 2.7. Positive Distal Factors and Sibling Conflict

	Study Name	Hedge's g	Lower Limit	Upper Limit	Hedge's g and 95% CI
Affluent Socio-Economic Status	Senguttavan et al. (2014)	-.22	-.38	-.07	
	Soli (2009)	-.06	-.26	.15	
	Tippett & Wolke (2015)	-.03	-.12	.06	
	Tucker et al. (2013)	-.77	-1.27	-.28	
	Wolke & Skew (2012)	-.85	-1.00	-.71	
	Overall Affluent SES	-.37	-.73	-.00	
Positive Family Climate	Brody et al. (1992)	-.24	-.74	.26	
	Brody et al. (1994)	-.50	-1.00	-.01	
	Brody et al. (1999)	-.69	-1.14	-.23	
	Modry-Mandell et al. (2007)	-.62	-1.15	-.10	
	Soli (2009)	-.21	-.42	-.00	
	Yu & Gamble (2008)	-.40	-.80	-.00	
Overall Positive Family Climate	-.36	-.53	-.20		
Good Marital Quality	Brody et al. (1987)	-.59	-1.24	.06	
	Brody et al. (1992)	-.31	-.81	.19	
	Brody et al. (1994)	.04	-.45	.52	
	Buist et al. (2011)	-.02	-.26	.22	
	Ducharme (2003)	-1.8	-.48	.12	
	Dunn et al. (1999)	-.25	-.31	-.18	
	Hakvoort et al. (2010)	-.41	-.84	.03	
	Liu (2006)	-.20	-.56	.16	
	McCoy et al. (1994)	-.36	-.70	-.03	
	Modry-Mandell et al. (2007)	-.55	-1.07	-.04	
	Volling et al. (2002)	.80	-.43	.59	
	Yu & Gamble (2008)	-.25	-.60	.10	
Overall Good Marital Quality	-.24	-.29	.20		
Overall Positive Distal Factors		-.31	-.43	-.19	

Negative proximal factors. The pooled effect size showed that children who are involved in conflict sibling relationships were more likely to have abusive parents ($k=24$) ($g=.45$, 95% CI [.33, .56], $p<.001$); parents with a neglectful parenting style ($k=9$) ($g=.58$, 95% CI [.38, .78], $p<.001$) and to have a more parent-child conflict ($k=8$) ($g=.31$, 95% CI [.03, .59], $p=.003$). Heterogeneity tests were also significant for abusive parenting $Q(23)=317.37$, $p<.001$ for ; $I^2=92.75\%$, neglectful parenting $Q(8)=47.92$, $p=.000$, $I^2= 83.31\%$, and for parent-child conflicts $Q(7)=279.76$; $p<.001$, $I^2=97.5\%$. On the other hand, the pooled effect size for parental differential treatment ($k=8$) was not significant ($g=.19$, 95% CI [-.38, .40], $p=.968$), while the heterogeneity test was significant $Q(7)=18.92$, $p=.008$, $I^2= 63.0\%$. The pooled effect size for the overall negative proximal factors ($g=.41$, 95% CI [.35, .46], $p<.001$) and the heterogeneity analysis ($Q(48)=1195.36$, $p=.000$; $I^2=95.98\%$) were both significant (Table 2.8).

Table 2.8. Negative Proximal Factors and Sibling Conflict

	Study Name	Hedge's g	Lower Limit	Upper Limit	Hedge's g and 95% CI
Abusive Parenting	Brody et al. (1994)	.37	-.12	.85	
	Buist et al. (2011)	.11	-.16	.38	
	Campione-Barr et al. (2014)	.80	.37	1.23	
	Criss & Shaw (2005)	.60	.32	.90	
	Dubrow & Howe (1999)	.53	-.25	1.30	
	Ducharme (2003)	.53	.22	.83	
	Garcia et al. (2000)	-.06	-.27	.15	
	Keery et al. (2005)	.13	.02	.24	
	Keeton et al. (2015)	.02	-.43	.47	
	Kim et al. (1999)	.72	.49	.96	
	Natsuaki et al. (2009)	.24	.09	.38	
	Pike et al. (2005)	.53	.17	.89	
	Repinski & Shonk (1999)	1.04	.53	1.56	
	Ripoll et al. (2009)	.58	.20	.96	
	Schaefer et al. (2014)	1.26	.73	1.79	
	Stocker et al. (1989)	.42	.12	.71	
	Tippett & Wolke (2015)	.50	.04	.96	
	Tucker & Kazura (2013)	.70	.38	1.02	
	Tucker et al. (2014)	.05	-.01	.11	
	Williams et al. (2007)	.30	.11	.49	
Wolke & Skew (2012)	.77	.63	.92		
Yabko et al. (2008)	.48	.22	.75		
Yu & Gamble (2008)	.87	.44	1.30		
Yu & Gamble (2009)	.78	.57	.98		
	Overall Abusive Parenting	.45	.33	.56	
Neglectful Parenting	Bank et al. (2004)	1.25	.90	1.59	
	Dawson et al. (2015)	.58	.38	.78	
	Dunn et al. (1999)	.56	.51	.61	
	Keeton et al. (2015)	-.05	-.49	.39	
	Kretschmer & Pike (2009)	.01	-.36	.39	
	Snyder et al. (2005)	.87	.63	1.11	
	Tucker & Kazura (2013)	.68	.35	1.00	
	Tucker et al. (2014)	.18	-.13	.49	
	Wolke & Skew (2012)	.77	.57	.98	
	Overall Neglectful Parenting	.58	.38	.78	
Parent-Child Conflict	Defoe et al. (2013)	.45	.25	.65	
	Feinberg et al. (2003)	.28	-.01	.58	
	Hakvoort et al. (2010)	-.13	-.59	.32	
	McHale et al. (2007)	.26	-.08	.60	
	Sapouna & Wolke (2013)	.65	.58	.73	
	Senguttuvan et al. (2014)	.47	.31	.63	
	Tippett & Wolke (2015)	.07	.06	.08	
	Wolke & Skew (2012)	.25	-1.97	2.47	
	Overall Parent-Child Conflict	.31	.03	.59	

-1.00 -0.50 0.00 0.50 1.00

Table 2.8. Negative Proximal Factors and Sibling Conflict continued

	Study Name	Hedge's s g	Lower Limit	Upper Limit	Hedge's g and 95% CI
Parental Differential Treatment	Brody et al. (1987)	-.39	-.97	.20	
	Brody et al. (1994)	.14	-.33	.61	
	Kowal & Kramer (1997)	.23	-.13	.60	
	McHale et al. (2007)	.63	.28	.97	
	Richmond et al. (2005)	-.19	-.53	.16	
	Ripoll et al. (2005)	.48	.11	.86	
	Stocker et al. (1989)	.36	.07	.65	
	Yu & Gamble (2008)	.01	-.38	.40	
	Overall Parental Differential Treatment	.19	-.38	.40	
Overall Negative Proximal Factors	.41	.35	.46		

Negative distal factors. The combined effect size showed that children who are involved in high conflict sibling relationships are significantly more likely to come from families with low SES ($k=7$) ($g=.26$, 95% CI [-.02, -.50], $p=.036$), adverse family atmosphere ($k=4$) ($g=.41$, 95% CI [.22, .60], $p<.001$), have parents that have a parental conflict ($k=10$) ($g=.22$, 95% CI [.12, .33], $p<.001$) and parents with mental health problems ($k=9$) ($g=.34$, 95% CI [.10, .59], $p=.007$). Heterogeneity tests were also significant (low SES: $Q(6)=103.93$, $p<.000$, $I^2=94.23\%$; adverse family atmosphere: $Q(3)=2.86$, $p=.414$, $I^2=.00\%$; parental conflict: $Q(9)=39.92$, $p<.001$, $I^2=77.45\%$; parental mental health problems: $Q(8)=46.19$, $p<.001$, $I^2=82.68$). The pooled effect size for the overall negative distal factors was also significant ($g=.29$, 95% CI [.19, .39], $p<.001$) with significant heterogeneity ($Q(29)=251.17$, $p<.001$; $I^2=88.45\%$) (Table 2.9).

Overall, negative factors ($g=.36$, 95% CI [.27, .45], $p<.001$) had a stronger effect on sibling conflicts than positive factors ($g=-.31$, 95% CI [-.40, -.22], $p<.001$) (Figure 2.3).

Table 2.9. Negative Distal Factors and Sibling Conflict

	Study Name	Hedge's g	Lower Limit	Upper Limit	Hedge's g and 95% CI
Low Socio-Economic Status	Bowes et al. (2014)	-.02	-.07	.04	
	Garcia et al. (2000)	.04	-.17	.25	
	Kretschmer & Pike (2009)	.19	-.18	.56	
	Tippett & Wolke (2015)	.02	-.01	.13	
	Tucker et al. (2013)	1.00	.33	1.68	
	Williams et al. (2007)	.16	-.03	.34	
	Wolke & Skew (2012)	.83	.67	1.00	
	Overall Low SES	.26	.02	.50	
Adverse Family Climate	Brody et al. (1992)	.33	-.18	.84	
	Brody et al. (1999)	.14	-.29	.57	
	Compton et al. (2003)	.60	.26	.94	
	Tucker et al. (2014)	.42	.12	.73	
	Overall Adverse Family Climate	.41	.22	.60	
Parental Conflict	Bowes et al. (2014)	.09	.02	.17	
	Buist et al. (2011)	.14	-.10	.38	
	Dawson et al. (2015)	.44	.24	.65	
	Dunn et al. (1999)	.31	.24	.37	
	Liu et al. (2006)	-.15	-.41	.12	
	Modry-Mandell et al. (2007)	.36	-.15	.87	
	Stocker & Youngblade (1999)	.53	.18	.87	
	Tucker et al. (2014)	.10	-.01	.20	
	Volling et al. (2002)	.25	-.27	.76	
	Yu & Gamble (2008)	.44	.08	.79	
Overall Parental Conflict	.19	.07	.31		
Parental Mental Health Problems	Brody et al. (1987)	.50	-.14	1.14	
	Brody et al. (1994)	.21	-.26	.69	
	Brody et al. (1999)	-.09	-.54	.35	
	Compton et al. (2003)	.24	-.09	.57	
	Defoe et al. (2013)	.16	-.03	.36	
	Keeton et al. (2015)	-.03	-.47	.42	
	McHale et al. (2007)	.35	.01	.69	
	Wolke & Skew (2012)	.94	.74	1.14	
	Yu & Gamble (2009)	.58	.39	.78	
Overall Parental Mental Health Problems	.34	.10	.59		
Overall Negative Distal Factors		.29	.19	.39	

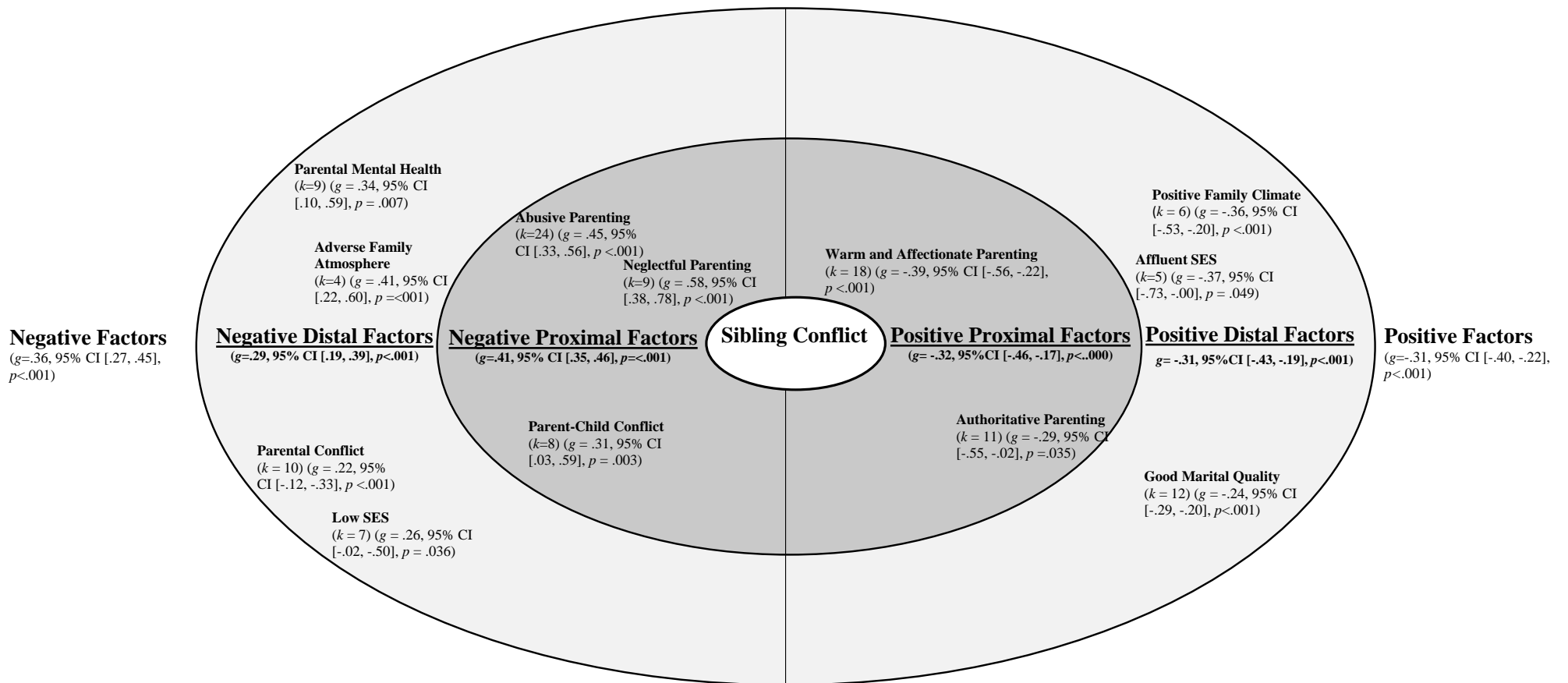


Figure 2.3. Visual depiction of significant effect sizes of negative proximal and distal factors and positive proximal and distal factors in relation to sibling conflicts. The concentric circles are based on Bronfenbrenner's Ecological Systems Theory (1986) In the middle being sibling conflicts, one layer beyond that (dark grey circle) are the proximal factors and another layer beyond that (light grey) are the distal factors. Each significant factor is positioned within the respective circle layer, based on the magnitude of the effect size, so that higher effect sizes are placed closer to the sibling conflict circle, compared to lower effect sizes.

2.4.4. Moderator Analysis

The heterogeneity analysis was significant for some proximal and distal subgroups. Moderation analyses were conducted through meta-ANOVAs for the categorical variables, for the following potential moderators: assessment method of respective proximal and distal factors (child-report, parent-report, observation or mixed); assessment method of sibling conflict (child report, parent report, observation or mixed); direction of conflict (victimised, perpetration or reciprocal); type of conflict (direct, indirect, both); gender constellation (same sex, any or other); design (longitudinal or cross-sectional); continent (Europe, North America, other) and SES (lower, lower-middle, middle, upper-middle and upper) (Appendix Supplementary Table S6-Table S20).

Positive proximal factors. Heterogeneity assessment was conducted for children who were involved in sibling conflicts. The heterogeneity assessment indicated that authoritative parenting was significantly moderated by the type of conflict that was assessed ($Qb=5.98, p=.014$). This indicated that authoritative parenting had a stronger effect on sibling conflicts when direct sibling conflicts were assessed ($g=-.72, p<.001, k=2$), compared to when both indirect and direct conflicts were assessed ($g=-.19, p=.056, k=9$). Further, warm and affectionate parenting indicated a significant moderating effect according to continent ($Qb=4.53, p=.033$) so that warm and affectionate parenting had a stronger effect on sibling conflicts in Europe ($g=-.59, p<.001, k=6$), compared to North America ($g=-.28, p=.001, k=12$). Another moderation effect was found according to SES ($Qb=9.05, p=.003$), so that studies that included a middle class sample ($g=-.53, p<.001, k=5$) indicated a stronger effect of warm and affectionate parenting on sibling conflicts, compared to upper-middle class samples ($g=-.18, p=.003, k=3$). There were several moderating effects for parental supervision. The findings for the assessment method of the proximal factors ($Qb=20.42, p<.001$)

indicated that studies with observational methods, showed significantly smaller effect size of parental supervision in relation to sibling conflicts ($g=-1.55, p<.001, k=1$), compared to mixed methods ($g=-.21, p=.058; k=1$). Further there was a moderating effect according to the assessment method of sibling conflicts ($Qb= 20.37, p<.001$), for observational studies ($g=-1.55, p= .058, k=1$) smaller effect size of parental supervision in relation to sibling conflicts compared to studies with mixed methods ($g= -.21, p=.058; k=1$). Additional moderation effects were found according to the design of the study ($Qb=16.68, p<.001$), so that longitudinal studies found lower effect sizes of parental supervision ($g=-1.55, p<.001, k=1$) in relation to sibling conflicts, compared to cross-sectional studies ($g=-.07, p=.389, k=1$). Lastly, moderation effects were found according to SES ($Qb= 13.35, p< .001$), suggesting that studies that used middle class samples ($g=-1.55, p<.001, k=1$) had lower effect sizes of parental supervision in relation to sibling conflict, compared to studies that used lower middle class samples ($g=-.21, p= .058, k=1$).

Positive distal factors. No significant moderation results were found for positive distal factors. So that none of the selected moderation variables could explain possible heterogeneity.

Negative proximal factors. The heterogeneity assessment indicated that neglectful parenting was significantly moderated by SES ($Qb=12.29, p=.002$), suggesting that studies that included samples from a lower SES found stronger effects of neglectful parenting on sibling conflicts ($g=1.04, p<.001, k=2$), compared to the lower-middle ($g=.18, p=.50, k=1$) and upper class ($g=-.05, p= .88, k=1$) samples.

Negative distal factors. Parental mental health problems indicated heterogeneity in terms of the assessment method of the proximal factor ($Qb=8.00, p=.019$), so that studies that included assessments by children ($g=.94, p<.000, k=1$) and parents ($g=.28,$

$p=.009, k=7$) found higher effect sizes of parental mental health problems on sibling conflict, compared to mixed assessment methods ($g=.16, p=.467, k=1$). Additionally, the results for parental mental health problems in association with sibling conflicts was also moderated by SES ($Qb=12.54, p=.006$), so that studies with samples from an upper-middle class ($g=.58, p<.000, k=1$) indicated higher effect sizes of parental mental health problems in relation to sibling conflicts, compared to the other SES categories (lower: $g=.24, p=.151, k=1$; middle: $g=-.09, p=.676, k=1$; upper: $g=-.03, p=.909, k=1$).

2.4.5. Publication Bias

Positive Proximal Factors. Several analyses were carried out to detect publication bias within the meta-analysis. The Rosenthal's Failsafe N analysis indicated that the '5k + 10' benchmark was not reached for parental supervision, indicating that the found effects are open for future disconfirmations. The Kendall's Tau calculations for each subgroup indicated an absence of publication bias. However, the Egger's Test indicated significant results for authoritative parenting, warm and affectionate parenting and overall positive proximal factors, indicating that publication bias might be present. Lastly, the Trim-and-Fill analysis indicated slightly different effect sizes for authoritative parenting (Table 2.10).

Positive Distal Factors. The Rosenthal's Failsafe N analysis indicated that the '5k + 10' benchmark was not reached for positive family climate, indicating publication bias. The Kendall's Tau calculations indicated publication bias for the overall positive distal factors. The Egger's Test showed publication bias for positive family climate. Lastly, the Trim-and-Fill analysis showed slightly different effect sizes for all subgroups (Table 2.10).

Negative Proximal Factors. The Rosenthal’s Failsafe N analysis indicated that the ‘5k + 10’ benchmark was not reached for PDT. The Kendall’s Tau calculation did not find any publication bias (overall negative proximal factors marginally). The Egger’s Test indicated presence of publication bias for overall negative proximal factors. The Trim-and-Fill procedure showed slightly different effect sizes for abusive parenting and PDT the confidence intervals differed slightly (Table 2.11).

Negative Distal Factors. The Rosenthal’s Failsafe N analysis indicated that the ‘5k + 10’ benchmark was not reached for adverse family atmosphere. No publication bias was found for Kendall’s tau or Egger’s test. However, slightly different confidence intervals were found for adverse family atmosphere, parental conflict and parental mental health problems (Table 2.11).

Table 2.10. Publication Bias Analysis: Positive Proximal and Distal Factors

	Fail Safe N	‘5k + 10’ Benchmark	Kendall’s Tau	Egger’s Test (95% CI)	Trim-and-Fill (95% CI)	
Positive Proximal Factors	Authoritative Parenting	163	65	.00 <i>p</i> = .500	β = 5.52 (1.17, 9.86) <i>p</i> = .001	-.28 (-.55, -.02)
	Warm and Affectionate Parenting	807	100	-.19 <i>p</i> = .136	β = 2.46 (-.38, 5.29) <i>p</i> = .042	-.39 (-.56, -.22)
	Parental Involvement and Support	100	40	-.27 <i>p</i> = .226	β = -2.82 (-13.55, 7.92) <i>p</i> = .253	-.13 (-.62, .36)
	Parental Supervision	7	30	-.50 <i>p</i> = .154	β =-.510 (-13.74, 3.53) <i>p</i> = .063	-.30 (-.65, .07)
	Overall Positive Proximal Factors	3024	205	.10 <i>p</i> = .182	β = -2.56 (-4.07, -1.05) <i>p</i> < .000	-.32 (-.46, -.17)
	Positive Distal Factors	Affluent SES	88	35	-.10 <i>p</i> = .403	β = -4.01 (-21.70, 13.67) <i>p</i> = .261
Positive Family Climate		33	40	-.27 <i>p</i> = .226	β = -2.08 (-4.33, .17) <i>p</i> = .031	-.26 (-.44, -.07)
Good Marital Quality		92	70	-.23 <i>p</i> = .152	β = .03 (-.88, .93) <i>p</i> = .473	-.23 (-.29, -.18)
Overall Positive Distal Factors		652	125	-.32 <i>p</i> = .017	β = -.74 (-2.31, .83) <i>p</i> = .170	-.31 (-.43, -.19)

Table 2.11. Publication Bias Analysis: Negative Proximal and Distal Factors

	Fail Safe N	'5k + 10' Benchmark	Kendall's Tau	Egger's Test (95% CI)	Trim-and-Fill (95% CI)	
Negative Proximal Factors	Abusive Parenting	2036	130	.14 <i>p</i> = .167	$\beta = 3.08$ (2.01, 4.15) <i>p</i> = .000	.21 (.11, .31)
	Neglectful Parenting	729	55	-.08 <i>p</i> = .377	$\beta = .18$ (-2.58, 2.95) <i>p</i> = .440	.58 (.38, .78)
	Parent-Child Conflict	494	50	-.39 <i>p</i> = .087	$\beta = 3.63$ (-1.96, 9.23) <i>p</i> =.082	.31 (.03, .59)
	PDT	9	50	-.25 <i>p</i> = .193	$\beta = -4.10$ (-11.41, 3.20) <i>p</i> = .109	.19 (-.03, .41)
	Overall Negative Proximal Factors	9759	255	-.16 <i>p</i> = .050	$\beta = 3.07$ (1.79, 4.35) <i>p</i> = .000	.41 (.35, .46)
	Negative Distal Factors	Low SES	59	45	.38 <i>p</i> = .115	$\beta = 3.58$ (-2.67, 9.83) <i>p</i> = .100
Negative Family Atmosphere		14	30	-.17 <i>p</i> = .367	$\beta = -2.58$ (-13.70, 8.54) <i>p</i> = .212	.51 (.31, .70)
Parental Conflict		160	60	.00 <i>p</i> = .500	$\beta = .272$ (-2.42, 2.96) <i>p</i> = .411	.14 (.02, .26)
Parental Mental Health Problems		118	55	.00 <i>p</i> = .500	$\beta = -2.74$ (-7.48, 2.00) <i>p</i> = .107	.44 (.21, .67)
Overall Negative Distal Factors		1302	160	.10 <i>p</i> = .211	$\beta = 1.61$ (-.05, 3.27) <i>p</i> = .028	.29 (.19, .39)

2.5. Discussion

The aim of the meta-analysis was to give an overview of the parenting and family factors most strongly associated with sibling conflicts. To our knowledge this was the first meta-analysis of this kind. The overall findings showed that positive proximal and distal factors lowered sibling conflicts and negative proximal and distal factors increased sibling conflicts, all of these four pooled effect sizes were moderate in

size. Additionally, regardless of positive or negative, proximal factors had stronger effect sizes on conflicts between siblings compared to distal factors. Interestingly, overall negative factors (proximal and distal together) had a stronger effect on sibling conflicts, compared to overall positive factors (proximal and distal together).

Considering all proximal and distal factors, it was found that neglectful parenting had the strongest effect on sibling conflicts, meaning that children who experienced sibling conflicts most likely lived with neglectful parents. It was the strongest predictor, compared to all other factors. It was moderated by SES, so that studies that included samples from low SES, found stronger effect sizes for neglectful parenting in relation to sibling conflicts compared to samples from other social classes. The second strongest predictor of sibling conflicts was abusive parenting. This relationship was not affected by any moderation. The third strongest effect size was found for adverse family atmosphere, which was also not affected by any moderation. The next three strongest effect sizes were positive factors, which lowered sibling conflicts. Warm and affectionate parenting, which was moderated by SES, so that a stronger effect of parental warmth and affection on sibling conflicts was found for studies with middle class samples, compared to studies with upper-middle class samples. Warm and affectionate parenting was also moderated by continent, so that stronger effects of warm and affectionate parenting in lowering sibling conflicts were found in Europe compared to North America. The fifth and sixth strongest effect sizes were affluent SES and positive family climate as predictors of less sibling conflicts. Positive family climate was moderated by type of conflict (though moderately significant ($.05 > p > .06$)) so that a stronger effect of positive family climate on sibling conflict was found, when direct sibling conflict was assessed, rather than both, direct and indirect. Parental mental health problems had the seventh strongest effect size in relation to sibling conflicts. It was moderated by SES so that a stronger effect of parental mental health

problems on sibling conflicts was found when the sample was in an upper-middle class, compared to lower, middle or upper class. However, this moderation should be assessed with caution as there was only one study for each SES group. Upper-middle class may have had the strongest effect, because the study in that group had the biggest sample, compared to the other studies representing lower, middle and upper class SES groups. Further, parental mental health was also moderated by the assessment method of the outcome (parental mental health), so that child-report methods indicated a stronger effect of parental mental health problems on sibling conflicts, compared to parent-reports and mixed methods. This could occur as children witness their parent's mental health problems and therefore might perceive them as more stressful and problematic than parents would in a self-report survey. The eighth strongest effect size was found for parent-child conflict, which was not affected by any moderation. The next significant factor was authoritative parenting, which was moderated by type of conflict, so that a stronger effect of authoritative parenting was found when direct conflict (direct, indirect or both) was assessed. Lastly, the weakest of the significant factors associated with sibling conflicts, was found for low SES and good marital quality, neither of these were affected by any moderation. Interestingly, the gender constellation of siblings (same sex, any or other) did not moderate any of the findings. This may have occurred as 46 studies made up the 'any' category, the large differences within the group may have resulted in the absence of any specific patterns.

The finding that negative factors increased sibling conflicts and positive factors lowered sibling conflicts was expected and is supported by the literature (Tippett & Wolke, 2014). Discussing the proximal factors, neglectful parenting was the strongest predictor of conflicts between siblings (across proximal factors and overall). This finding can be explained by the Attachment Theory by Bowlby (1973). Neglectful parenting was defined as not necessarily intentional harm-doing, however, having

neglectful parenting styles, which may have negative effects on the child. This included variables such as ineffective parenting; inconsistent/harsh parenting; hostility; dislike the mess that the child makes; rejection and anxious rearing (Table 2.3); thereby implying inconsistency in the child rearing process. Based on the Attachment Theory this may cause an insecure-disorganised attachment style in children, which in turn may have detrimental effects on the child's ability to form other social relations and regulating negative emotions (Benoit, 2004). This explains why neglectful parenting was the strongest predictor of conflicts between siblings. Similarly, the Attachment Theory (Bowlby, 1973) can also explain why warm and affectionate and authoritative parenting had significant impacts in lowering sibling conflicts. Warm and affectionate and authoritative parenting suggests a sensitive and guided parenting style, which allows for children to develop a secure attachment style towards their primary caregivers. Children use the type of relationship they have with their primary caregivers as schemas for other social relationships, hence a secure attachment style to parents allows for children to develop adaptive and nurturing relationships with other people (i.e. siblings). Furthermore, the Social Learning Theory (Bandura, 1973) also explains why warm and affectionate parenting had one of the strongest effect sizes in relation to sibling conflicts. Positive and supportive family environments can nurture security and positivity in children (Stocker, Dunn, & Plomin, 1989), which implies that warm and affectionate parenting provides protection from sibling negativity. Interestingly, warm and affectionate parenting was more impactful than authoritative parenting. Harlow's Theory of Affection and Love (Harlow, 1958) is supported with this finding as this indicates that parental affection and warmth are two of the fundamental needs of a child in order to develop positive social behaviours. In line are the findings of the meta-analysis on parenting and peer victimisation by Lereya et al. (2013). They found that warm and affectionate parenting protected from school bullying involvement. Seeing

that warm and affectionate parenting protected against sibling conflicts and involvement in peer bullying, one could draw the conclusion that there are similarities in the way children behave towards siblings and peers. This is an important finding as it could shape the way bullying interventions are run and designed. More research is needed to investigate how sibling relationships affect bullying behaviours. Should there be clear implications that sibling conflicts influence bullying behaviours at school, clinical and educational intervention programs that aim to reduce bullying at schools need to be implemented at a much younger age (Smith, Ananiadou, & Cowie, 2003). Further, it could imply a re-design of such intervention programs, so that family members play a much bigger and integrated role in intervention programs that aim to reduce bullying overall and particularly at schools (Smith et al., 2003; Smith, Kupferberg, Mora-Merchan, Samara, Bosley, & Osborn, 2012).

Further, Bandura's Social Learning Theory (Bandura, 1973) explains that abusive parenting and adverse family atmosphere and parent-child conflict could result in conflictual sibling relationships. Children learn their social behaviour by mirroring the social behaviour of their primary caregivers (Bandura, 1973), as a result children behave socially the way they have vicariously learnt it from their parents and family environment. The negative factors with the strongest effect sizes (neglectful parenting, abuse parenting, adverse family atmosphere and parent-child conflicts) again show similarities with the findings of the meta-analysis on parenting and peer victimisation by Lereya et al. (2013). In their meta-analysis maladaptive parenting was one of the strongest predictors of being involved in peer bullying, as a victim and as a bully-victim. This is interesting as this supports Duncan's (1999) findings, in that repetitive victimisation and being surrounded by negativity propagates further negativity and conflict in other social situations. This would again support the idea that the way children behave with their siblings is reflected in the way they behave with their peers

(Wolke & Samara, 2004). This further underlines the suggestion of conducting further research that investigates sibling conflicts in more detail. 'Sibling conflicts' is a broad term, which might overlook particular dynamics within sibling relationships that are key in shaping the way children behave with their peers. Finding out more about how sibling conflicts might affect peer relationships could remodel how bullying interventions are run. Possibly integrating family members in school bullying interventions might increase the effectiveness of lowering bullying rates, particularly in schools (Smith et al., 2003; Smith et al., 2012; Ttofi & Farrington, 2011). Furthermore, creating sibling conflict interventions might also have positive repercussions on school bullying, so that one catches the problem of school bullying, before it can even get started.

In line with Dawson et al. (2015) distal factors can have direct influences on sibling relationships, which supports the finding that affluent SES and positive family climate had such strong impacts on lowering sibling conflicts, beyond several other proximal factors. It is important to note though that overall proximal factors had stronger effects on sibling relationships, compared to overall distal factors. This supports the Bronfenbrenner's Ecological Systems Theory in that distal factors are in the outer layers of the concentric circles of influence on an individual. The concentric circles visually indicate that distal factors affect an individual however, less so than other factors that are closer to the individual, such as the factors that the individual also has an influence on (i.e. proximal factors) (Figure 1.1) (Bronfenbrenner, 1986; Swearer & Doll, 2001). Also noticeable was that adverse family atmosphere had stronger negative effects on sibling conflicts, than parental conflict. The same was the case for positive family climate in relation to good marital quality. Positive family climate had a stronger effect on lowering sibling conflicts compared to good marital quality. It seems that children make a distinction between the two types of negative dynamics within the

family. Adverse family atmosphere, rather than conflicts between parents, seems to affect children more as their own appraisal of a situation is involved. Children might be exempted from parental conflict completely, whereas children are more involved in and affected by adverse family atmosphere more directly. The Cognitive-Contextual Framework Theory proposed by Grych and Fincham (1990) suggests that the extent of negative repercussions parental conflict can have on a child is mediated by the extent of a child's understanding of parental conflict. Due to not necessarily being directly involved in conflicts between parents, children might not have such a profound appraisal of parental conflict, compared to the understanding and appraisal that they have for adverse family atmosphere, which they are affected by more directly. Furthermore, the Emotional Security Hypothesis (Davis and Cummings, 1994) suggests that not all negativity has the same effects on someone's wellbeing. Emotional security is influenced by the type of attachment a child has to their parents. So that securely attached children have a stronger sense of emotional security and are therefore more resilient to emotionally stressful situations. The effects of negativity are dependent on the perceived threat to someone's emotional security. As parental conflict not necessarily affects the child directly, children may not feel that their emotional security is threatened and therefore parental conflict might not affect children directly. However, children's direct involvement in adverse family atmosphere might threaten their emotional security, which in turn might evoke conflicts between siblings. Adverse family atmosphere could cause a child to feel victimised by a sibling, which might trigger a desire to retaliate. It could be the case however, that parental conflict might cause adverse family atmosphere, which in turn triggers conflict between siblings, so that parental conflict could cause negative contagion within the family. Future research should assess how parental conflicts mediate the effects adverse family atmosphere has on sibling conflicts and children's wellbeing.

The finding that overall negative factors had a stronger impact on sibling conflicts compared to overall positive factors also has great implications for clinical practice. This notion supports the negativity bias effect, which suggests that, even when of equal intensity, negativity has a stronger effect than positivity (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Rozin & Royzman, 2001). The findings of this meta-analysis show that the negativity bias also holds for family dynamics and child social development. When considering the creation of intervention programs that aim to decrease sibling conflicts, it is important to focus on lowering negativity, particularly focusing on eliminating neglectful and abusive parenting, as well as decreasing adverse family atmosphere and conflicts between parents. It seems that teaching parents constructive parenting skills could significantly lower the chances for sibling conflicts. Further, nurturing positivity, warmth and affection, in addition to lowering negativity will allow children to develop social skills in a positive environment. Based on the Social Learning Theory (Bandura, 1973), this kind of positive behaviour will then also be modelled and applied to different social environments (i.e., schools). Strengthening positivity is an important factor for conflict intervention programs. However, seeing that negativity has a strong effect on sibling conflicts; lowering negativity will have a strong effect on lowering conflicts. This approach is somewhat supported by the finding that whole-school bullying intervention methods, are more effective than small scale class-room bullying interventions or social and behavioural bullying interventions (Vreeman & Carroll, 2007). Whole-school bullying interventions usually adapt multidisciplinary approaches that aim to change the whole student body attitude by creating an environment of acceptance. Therefore, the findings of the meta-analysis show that clinical and educational interventions that need to be implemented to reduce sibling conflicts, should aim to lower negative factors and nurture positivity and warmth and affection.

Further, parental mental health had a strong negative effect on sibling conflicts. This is a particularly relevant finding as this shows the importance of creating awareness for health care practitioners of the effects of parental mental illnesses on the relationship quality of siblings. Keeton et al. (2015) found that negative sibling relationships increased the likelihood of developing psychological adjustment problems when parents suffered from psychopathologies. Overall, in most studies included in the meta-analysis on parental mental and sibling conflicts, sibling relationship quality measures were utilised as moderating variables, in order to assess the relationship between parent psychological wellbeing and child developmental outcomes. Given that the findings of the meta-analysis showed that there are negative effects of parental mental health problems on the quality of sibling relationships, this study shows that it is important to explore the direct effects of parental mental health problems on sibling conflicts. Closing this gap in research will further the understanding of family dynamics and aid in teaching children tools to learn to work with ones siblings, rather than against, in protecting from the consequences of parental mental illness.

2.5.1. Limitations

Buist et al. (2013) found that parental differential treatment (PDT) between brother pairs moderated the effects of sibling relationship quality on internalizing behaviour problems. Contrastingly, we did not find significant effects of PDT on sibling conflicts. However, this may be due to the methodological difficulties in grouping PDT. This was due to studies differing in their examination of PDT (e.g. differential control, differential treatment, differential affection, differential responsiveness, differential managing behaviours), which may have caused inconsistencies of its effects on sibling negativity. This should be further investigated as several studies have found that differential treatment of children can have harmful

effects on the quality of sibling relationships (Boll, Ferring, & Filipp 2005; McHale, Updegraff, Jackson-Newsom, Tucker, & Crouter, 2000).

The term sibling ‘conflict’ is quite broad. However, the amalgamation of related yet distinctive terms, which are examined within each study (such as hostility, anger, physical attacks, verbal attacks, rivalry) was necessary in order to create this kind of meta-analysis. If the types of sibling relationships would have been broken down further into more specific dynamics, an equally detailed exploration of proximal and distal factors related to detrimental sibling relationships would not have gathered sufficient articles in order for meta-analysis to be worthwhile. However, the broad term ‘conflicts’ might overshadow underlying types of sibling dynamics. In particular, some conflict and negativity between siblings can also be constructive (Furman & McQuaid, 1992; Kitzman, Cohen, & Lockwood, 2002), the multifaceted dynamics between siblings need to be explored in greater detail. A study that investigates the precursors of these different types of sibling negativity needs to be conducted. However, the findings of this meta-analysis are important stepping-stones for this type of investigation.

Females and males perceive the relationship with their parents differently and have different kinds of relationships with their siblings (Chang, Schwartz, Dodge, & McBride-Chang, 2003; Ostrov, Crick, & Stauffacher, 2006). This phenomenon is only marginally explored through the use of the moderator ‘gender constellation’, however, no moderation was found. Due to the variety of studies included in this meta-analysis the categories of this moderator (same sex dyads; any) were the most appropriate to choose. Unfortunately, this may have concealed possible subtleties in the relationship between the respective factors associated with sibling conflicts, caused by gender differences. Due to the considerable research on gender differences between siblings, this is an area that deserves more exploration.

The categorisation of the moderator SES (lower, lower-middle, middle, upper-middle and upper) was difficult due to the variety of ways in which SES can be reported (e.g. parental education; income; and the various social classifications based on a variety of factors which are distinctive to each country). Since it is an influential factor, it was felt necessary to include this moderator, and thus find the most appropriate and representative categorisation of social status possible. Due to the vast differentiations in reporting SES, several studies had to be excluded from the SES analysis (i.e., studies that reported mixed social class levels such as mixing lower class with middle class), which led to relatively few studies for the analysis. Despite these difficulties, SES did moderate neglectful parenting, parental mental health problems, warm and affectionate parenting, and parental supervision, showing that it is an important part of the analysis. A universal and standardised grouping framework for SES, would help future analyses of SES, particularly meta-analyses.

This study made extensive efforts to detect possible publication biases, doing four different types of publication bias analyses. In some cases publication biases could not be avoided, despite such efforts being made, for example including unpublished papers, such as conference papers and doctoral theses and not exclusively including work published in English language journals. In no case were all four publication analyses in agreement, so that if there was a publication bias detected it was only found by one type of analysis and in four cases by two. As mentioned in the methods section, as these different types of publication bias analyses take different approaches in detecting any biases, in the cases where all four analyses types found no publication biases, the results can be perceived as relatively robust. The cases in which publication bias was detected by two analyses were the following: In three cases publication bias was detected by Rosenthal's Failsafe Number method and Duvall and Tweedie's Trim-and-Fill method, this was the case for Positive Family Climate, PDT and Adverse

Family Atmosphere. In one case, for authoritative parenting, Egger's Test and Duvall and Tweedie's Trim-and-Fill method were in agreement. Considering the Rosenthal's Failsafe Number, publication bias was exclusively found for categories that were made up by relatively few studies (Parental Supervision $k=4$; Positive Family Climate $k=6$; PDT $k=8$; Adverse Family Atmosphere $k=4$) therefore the findings for these respective categories may not be considered robust, simply due to the small number of studies. Further, indications for publication bias being detected by Duvall and Tweedie's adjusted effect sizes, only abusive parenting was affected severely (for abusive parenting the effects size was almost halved). However, it should be noted that no other analyses other than the Trim-and-Fill method found any publication bias for Abusive Parenting. Overall, the publication bias analyses indicated that further investigations to support the findings of this meta-analysis need to be done in some areas of proximal and distal factors in relation to sibling conflicts.

2.5.2. Conclusions and Applications

The present study is the first meta-analysis that examined together proximal and distal factors associated with sibling conflicts, as well as explored moderators for these links. This review of 60 studies showed that parenting styles and family environments significantly influence sibling conflicts. It was found that the factors that most protect from sibling conflicts are warm and affectionate parenting and positive family climate. While the factors that are most detrimental to the quality of sibling relationships are neglectful parenting and abusive parenting. Additionally, the effect sizes of neglectful parenting, as well as warm and affectionate parenting, were moderated by the SES of the family, so that stronger effects of neglectful parenting on sibling conflicts was found for samples of lower SES, while for warm and affectionate parenting this was the case for middle versus upper-middle class samples.

Given that sibling relationships are important building blocks for children's development of psychological and social well-being (Buist et al., 2013; Dunn, 1983; Dunn, 1988; Feinberg et al., 2013), the evidence of the impact of parenting styles and family environments on the quality of sibling relationships, is striking. The findings of this meta-analysis are important for clinical practitioners, social workers, parents and schools. Based on these findings practitioners could tailor family and parenting intervention programs that prevent siblings to establish conflictual relationships with one another. Siblings can serve as protectors and supporters in adverse situations, therefore positive sibling relationships should be nurtured and encouraged. Interventions and anti-bullying policies in schools should include and involve the parents in their plans to reduce bullying and victimisation (Samara & Smith, 2008; Smith et al., 2012; Smith, Smith, Osborn, & Samara, 2008). Further, the findings underline the necessity for further research to be conducted in terms of how sibling conflicts relate to peer bullying in schools. Given that in the meta-analysis on peer victimisation by Lereya et al. (2013) found that similar factors had strong impacts on peer victimisation (maladaptive parenting and warm and affectionate parenting), it could be concluded that there are similar familial constellations that predict both sibling negativity and peer bullying. This is an important acknowledgement as peer bullying has consistently been linked to several physical and mental health problems, some of which are long lasting (Wolke, Woods, Bloomfield, & Karstadt, 2000; Gini & Pozzoli, 2009; Wolke et al., 2015). Considering that there are similar factors associated with both adverse sibling and peer relationships, there may be more similarities between these two types of dynamics than previously anticipated. Specifically, adverse sibling relationships might mediate the associations between family environments and peer relationships. This strongly suggests that the links between sibling relationships and

peer relationships and their possible precursors is a particular area of research that should be explored further.

3. Chapter 3 –Individual and Proximal Precursors and Short-Term Outcomes of Sibling Bullying and the Cross-Over Effects from Sibling Bullying to Peer Bullying

3.1. Introduction

To our knowledge, there is only one longitudinal study on sibling bullying (Bowes et al., 2014) which investigated the effects of sibling bullying on depression, anxiety and self-harming. Sibling victimisation was measured at 12 years of age and the outcomes at 18 years of age using the Avon Longitudinal Study of Parents and Children (ALSPAC). They found that a child that had been bullied by a sibling several times a week had more than twice the odds of suffering from depression and engaging in self-harming, compared to children that had not been bullied. Showing symptoms of anxiety was also a significant outcome; however, after adjusting for individual and family characteristics (e.g., child gender, number of children in the family, mother's marital status), that was no longer the case. In an extensive meta-analysis by Buist et al. (2013) on the links between psychopathology and sibling bullying, it was found that less sibling conflict was significantly associated with less internalizing and externalizing behaviour problems. Further, there are several cross-sectional studies that revealed that involvement in sibling bullying was associated with peer bullying (Duncan, 1999; Menesini et al., 2010; Tippet & Wolke, 2015; Tucker et al., 2014; Wolke & Samara, 2004; Wolke & Skew, 2012a), maternal psychological control (Campion-Barr et al., 2014; Yu & Gamble, 2008), domestic violence towards children (Button & Gealt, 2010), negative family climate and lack of family cohesion (Yu & Gamble, 2008), maternal depression (Bowes et al., 2014), stressful family events (Hardy, 2001), depression and loneliness (Duncan, 1999), unhappiness (McHale et al., 2007; Wolke & Skew, 2012a), internalizing behaviour problems (Wolke & Samara, 2004; Wolke & Skew, 2012a; Yu & Gamble, 2008), and externalizing behaviour

problems, such as delinquency, hyperactivity, and aggressive behaviours (Button & Gealt, 2010; Wolke & Samara, 2004; Wolke & Skew, 2012a). However, these studies cannot give an indication of a cause-and-effect relationship. Therefore, this current study will examine the precursors and outcomes of sibling bullying adopting a longitudinal methodology to fill the knowledge gap in this area. The current study builds on previous findings on sibling bullying by attempting to integrate the previously established related factors into the following analyses. In particular, this study will investigate what factors (individual aspects, parenting aspects and antisocial behaviour aspects) affect sibling bullying behaviours as predictors and/or as outcomes.

Of particular interest is the longitudinal investigation of how sibling bullying relates to peer bullying. It will be assessed whether sibling bullying is a precursor of peer bullying and should that be the case, do individuals take on the same role in the bullying dynamic (i.e. bully, victim, bully-victim) across the different types of relationships? The World Health Organisation has described bullying by peers and in the workplace as a major public health issue (Srabstein & Leventhal, 2010). The number of detrimental outcomes of peer bullying are alarming. These include a number of internalizing problems, such as depression, anxieties (Sapouna & Wolke, 2013; Smokowski & Holland Kopasz, 2005; Sweeting, Young, West & Der, 2006), emotional problems (Bowes, Maughan, Caspi, Moffitt, & Arseneault, 2010; Wolke & Sapouna, 2008), low self-esteem (Olweus, 1994; Sapouna & Wolke, 2013), externalizing problems, such as conduct problems (Reijntes, Kamphiusm, Prinzie, Boelen, van der Schoot, & Telch, 2011; Wolke, Woods, Bloomfield, & Karstadt, 2000; Wolke & Samara, 2004), and lower overall life satisfaction (Yucel & Yuan, 2015). In some extreme cases peer bullying can even lead to suicide (Kaminski & Fang, 2009). Peer bullying has, amongst other factors, also been linked to shooting rampages (Burgess, Garbarino, & Carlson, 2006; Kimmel & Mahler, 2003; Larkin, 2007). Because sibling

and peer bullying have been found to correlate based on some cross-sectional studies, it is of considerable importance to investigate this link longitudinally. This association can be explained through the similarities between sibling relationships and peer relationships. As discussed in the literature review, there are differences in the nature of sibling and peer relationships, based on their distinct origin and the different social settings they occur in. However, according to the Social Learning Theory (Bandura, 1973) and the Attachment Theory (Bowlby, 1971) (see section 1.2.2.2. and 1.2.2.3. respectively) sibling relationships can shape how children interact within other social settings, as they are one of the first social relationships children have. Due to the similarities between sibling and peer relationships, the already-established association between sibling bullying and peer bullying and the negative effects of peer bullying on the psychological wellbeing of children, it is important to examine whether sibling bullying may lead to peer bullying.

In accordance with Bronfenbrenner's Ecological Systems Theory (Bronfenbrenner, 1986), this study will place its main focus on child characteristics and proximal factors by including the factors that were found to be associated with sibling bullying and to also investigate whether there are other patterns that have not yet been found, such as particular parent-child conflict resolution strategies as an outcome of sibling bullying, antisocial behaviours (e.g., social alienation) and personality factors (e.g. impulsivity) as precursors of sibling bullying. Further, the meta-analysis study on the relationship between sibling conflicts and proximal and distal factors revealed that the factor most researched and having the strongest effects on sibling conflicts was parenting (Heinrich, Samara & Terry, under review). In particular, it was found that neglectful parenting was associated with more conflicts between siblings whereas warm and affectionate parenting was associated with lower rates of conflicts between siblings. Thus we will assess parenting styles as possible precursors and/or outcomes of

sibling bullying. Additionally, as established above, several personality factors and antisocial behaviour factors have been linked to sibling bullying (e.g., Buist et al. 2013; Button & Gealt, 2010; Duncan, 1999; McHale et al., 2007; Wolke & Samara, 2004; Wolke & Skew, 2012a; Yu & Gamble, 2008), so some key aspects, including self-esteem, depression, impulsivity, risk-taking behaviours, relationship with friends (such as closeness to friends, number of friends, peer pressure), social alienation, delinquency, public antisocial behaviour, attitude towards education, violation of school rules and involvement in peer bullying, will also be explored. Due to utilizing an existing longitudinal dataset, some of these variables will be explored either as precursors, outcomes or both.

Thus the research question that this study will address is what are the child characteristics and proximal predictors and outcomes of being a victim of sibling bullying and of being a perpetrator of sibling bullying? The outcomes are explored at two stages, one and two years after sibling bullying data was collected. In order to examine whether being a victim or perpetrator of sibling bullying was a unique contributor to the respective outcomes, additional outcome analyses were carried out that controlled for various factors from the previous data collection time points. Further, what are the cross-over effects of sibling bullying to peer bullying, do children remain in their role within the bullying dynamic across contexts (as bully, victims or bully-victim)? This exploration is facilitated due to the longitudinal nature of the study.

The current study is based on the Edinburgh Study of Youth Transition and Crime (ESYTC) longitudinal study (ESYTC, 2014). Edinburgh is the capital city of Scotland and is situated in the north-east of the UK. The data include a total of 4,300 pupils. The inclusion of such a large number of participants makes the sample of the study very diverse and representative of the entire city of Edinburgh. The ESYTC data was considered as useful for the purposes of this study due to its rigid methodological

scheme and assessing sibling bullying and victimisation in early adolescence (at 13.5-14.5 years of age). Sibling bullying was assessed at the second wave of data collection; this allows us to examine factors that influenced involvement in sibling bullying one year beforehand and how involvement in sibling bullying affects children one year (Time 3) and two years later (Time 4). The ESYTC data were intended primarily to examine transitions to criminal activity. They are well suited to the investigation of precursors and outcomes of sibling bullying, as sibling bullying has been linked to delinquent and aggressive behaviours and their respective correlates may also influence sibling bullying (Button & Gealt, 2010; Wolke & Samara, 2004; Wolke & Skew, 2012a).

3.2. Methodology

3.2.1. Data Source

The sample includes participants from the Edinburgh Study of Youth Transition and Crime (ESYTC), a four-year longitudinal population study on youth development in Edinburgh, with a particular focus on the development of delinquent behaviours. All schools in Edinburgh were contacted, including mainstream secondary, independent and special needs schools (McVie, 2001). The inclusion of special needs schools allowed for representation of individuals with a wide range of emotional, behavioural, learning and physical difficulties. Of the 49 schools that were approached, 40 schools agreed to participate at all four sweeps (McVie, 2001). An advisory group, which consisted of bodies from the educational, public service (police, social workers and child reporters) and central government sectors, was involved in the design of the questionnaires and the data collection. Once the study was approved by the City of

Edinburgh Council Education Department, an invitation to take part in the study was sent out to every head teacher of every secondary school in Edinburgh. Upon response, project members further discussed the research with the respective head teachers (McVie, 2001) (Appendix B). Despite the approval of the Council of Education, the headmaster of each school had the final say to either accept or decline participation (McVie, 2001). Parental consent was given on the basis of an opt-out strategy (Appendix C). This strategy assumed that participation is granted if no refusal response was received; this approach was implemented with the aim of increasing participation. In addition to parents having opted-out of the study, there were some children who refused to participate. These were categorised as non-responders or refusers. Consent letters were sent out by and returned to the head teachers of the schools (McVie, 2001). These letters were only sent out at sweep one while at the following sweeps opt-out letters were sent only to the new pupils joining the respective schools (McVie, 2001).

A unique aspect of the study is that instead of selecting a random sample from each class, entire classes were deemed eligible to participate. This was to ensure that as near as possible, the entire population of secondary school pupils in Edinburgh would be included. Pupils that moved between the participating schools were included in subsequent years of the study. As head teachers of independent schools predicted an increase in pupils at time 2 and time 3, pupils new to the respective schools were deemed as eligible at those time points as well (for further specifications on the fluctuations of numbers of participants for each year, see McVie (2001) and McVie (2003)).

Complete confidentiality was ensured as no questions were asked that might produce responses that had to be reported to authorities (such as involvement in sexual abuse). However, in cases of indirect disclosure of crucial information, contact with child protection services was allowed. This occurred in two instances, at time 1 and

time 2, and the cases were handled appropriately. Additional confidentiality was ensured through the Data Protection Act 2000, which stated that personal data was solely to be utilised for the analysis of statistics and that reports were not linked back to the respective person. Further, only members of the research team had access to the data. The ESYTC was funded by the Economic and Social Research Council (ESRC) (McVie, 2001).

3.2.2. Participants

The first wave of data collection was at the commencement of the first year of secondary school in 1998 (Table 3.1). Participants were 12.5-13.5 years old ($M=12.03$, $SD=.34$ years). Data were then collected each subsequent year, so that at time 2 in 1999 children's ages ranged from 13.5-14.5 years ($M=13.03$, $SD=.34$ years), at time 3 in 2000 from 14.5-15.5 years ($M=14.04$, $SD=.35$ years) and time 4 in 2001 from 15.5 - 16.5 years ($M=15.04$, $SD=.35$ years). The target population includes all children who were eligible to attend secondary schools in the city of Edinburgh, and overall only 3.78% of parents opted out of the study at time 1, which makes the sample demographically representative of the city of Edinburgh. The vast majority of children (above 90%) were of white British background throughout the four years of the study. In terms of employment, of those who could report it at time 1 21.53% of mothers and 6.75% of fathers did not have a job. The distribution of social classes was wide spread. At time 2, which was when the sibling bullying data were collected, 3,643 participants reported having at least one sibling. All sibling gender combinations were present, inclusive of step brothers and sisters. Further, the sibling data are not limited to dyads but also reflects the participants' relationships with any or all siblings. Most participants had 1 sibling, with the maximum number of siblings being 7 (for more details see McVie (2001) and McVie (2003)).

Table 3.1. School and pupil participation at each point of data collection

	Schools	Number of participants				Number of schools	
		Eligible participants of participating school	Participants	Boys	Girls	Schools approached	Participating schools
Time 1 11.-5-12.5 y/a	Mainstream	3,803	3,669				
	Independent	595	574				
	Special Needs	71	57				
	Total	4,469	4,300	2,172	2,128		
Time 2 12.5-13.-5y/a	Mainstream	3,786	3,630			Mainstream: 23	Mainstream: 23
	Independent	621	600			Independent: 14	Independent: 8
	Special Needs	91	69			Special Needs: 12	Special Needs: 9
	Total	4,498	4,299	2,114	2,185	Total: 49	Total: 40*
Time 3 13.5-14.5 y/a	Mainstream	3,641	3,576				
	Independent	619	618				
	Special Needs	122	102				
	Total	4,382	4,296	2,164	2,132		
Time 4 14.5-15.5 y/a	Mainstream	3,506	3,388				
	Independent	605	603				
	Special Needs	154	125				
	Total	4,265	4,143**¹	2,085	2,059		

*all forty schools participated at all four sweeps

**inclusive of the number of school leavers after that school year (N=27)

¹It should be noted that in the ESYTC technical report by McVie (2003), summation of participants at 'mainstream', 'independent', and 'special needs' schools at Time 4 included 4,143 participants, however the actual total number of participants is 4,144 according to the study datasets.

3.2.3. Materials

The questionnaires were put together in collaboration with various international research teams that were involved in other longitudinal studies on youth transitions (McVie, 2001; McVie, 2003). Some of the measures included in the questionnaire packs were adapted versions of existing questionnaires, such as the self-esteem measure (adapted version of the Rosenberg, 1965), the depression measure (adapted version from West of Scotland 11-16 Study of Teenage Health (Sweeting et al., 2006) originally validated by Kenadll & Davies, 1992)), social alienation (adapted version of the Alienation Scale of the Multidimensional Personality Questionnaire (MPQ) (Tellegen, 1982)), peer bullying and peer victimisation (adapted version of the Olweus, 1993), and the impulsivity measure (adapted version of the Junior Impulsivity Venturesome and Empathy Scale (Eysenck & Eysenck, 1980)). All other measures were put together by the research team, through extensive piloting sessions (McVie, 2001; McVie, 2003). Of the measures that were included in this study, principal component analyses were conducted and Cronbach Alpha's were calculated (Supplementary Tables S21-S58). The piloting session process for the original study was as follows: First, focus group discussions with boys and girls of the various age groups were organised to discuss questions. After that, draft sections of the questionnaires were piloted to refine individual questions in terms of content, wording and length. The last piloting session involved 128 children, last amendments were made in terms of clarity of questions and answer options. All piloting was done with pupils outside of the City of Edinburgh (McVie, 2003). The final questionnaire packs included a variety of questions, containing questions about self-esteem, neighbourhood safety, involvement with the police, drug consumption, socioeconomic status, delinquency (for further details on the design and piloting of the overall study see

McVie (2001) and ESYTC (2014)). For the present study, particular questions that are related thematically were put together to assess the precursors and outcomes of sibling bullying as a victim and/or as a perpetrator (Table 3.2). All questionnaires were completed by the children about themselves or about their experiences. All scores were reversed from the original data, so that higher scores indicated a higher weight of that respective variable. Further, for time 2 to time 4 all questions were reflective of the participants' experiences and behaviours within the past year, except for time 3, the depression questionnaire was reflective of the past month's behaviour. However, the questions for time 1 were in reference of whether that respective event or behaviour had ever occurred. For a clear and tabled depiction of all questionnaires and their reliability factors, please refer to Supplementary Tables S21-S58.

Table 3.2. Variables examined at each data collection point (Time 1- Time 4) grouped according to subgroup, with their reliability, name of measure and example item (referral time is past year except for depression at time 3 as indicated)

	Name of Measure	Example of Items	Time 1 Age: 11.5-12.5	Time 2 Age: 12.5-13.5	Time 3 Age: 13.5-14.5	Time 4 Age: 14.5-15.5
Parenting Variables	Parental Involvement (ESYTC, 1998, 2000, 2001)	When you go out, how often do your parents know where you are going?	$\alpha = .69$ (4 items)	Sibling Bully (ESYTC, 1999) $\alpha = .74$ (3 items)	$\alpha = .72$ (3 items)	$\alpha = .79$ (4 items)
	PC* Conflict (ESYTC, 1998, 2000, 2001)	How often do you disagree or argue with your parents about homework?	$\alpha = .75$ (6 items)		One item	$\alpha = .76$ (6 items)
	PC* Leisure Time (ESYTC, 1998, 2001)	How often do with parents: watch TV or videos?	$\alpha = .74$ (9 items)			$\alpha = .75$ (2 items)
	PC* Communication (ESYTC, 2000, 2001)	How often talk to parents about private/personal things?			$\alpha = .82$ (5 items)	$\alpha = .70$ (4 items)
	PC* Conflict Resolution (ESYTC, 2001)	When disagree discuss calmly with parents				$\alpha = .79$ (3 items)
Personality Variables	Self-Esteem (adapted version of the Rosenberg, 1965)	I have a low opinion of myself	$\alpha = .72$ (6 items)	Sibling Victim (ESYTC, 1999) $\alpha = .72$ (3 items)		$\alpha = .79$ (6 items)
	Impulsivity (adapted from Junior Impulsivity Venturesome and Empathy Scale (Eysenck & Eysenck, 1980)	I get into trouble because I do things without thinking	$\alpha = .79$ (6 items)		$\alpha = .74$ (6 items)	
	Depression (adapted from West of Scotland 11-16 Study of Teenage Health (Sweeting et al., 2006) originally validated by Kenadll & Davies, 1992)	How often felt unhappy, sad, depressed in last month			$\alpha = .82$ (6 items)	
	Risk-Taking Behaviour (ESYTC, 2000)	Sometimes I take a risk just for the fun of it			$\alpha = .87$ (4 items)	
Friends Variables	Closeness to Friends (ESYTC, 2000)	How often do you talk to friends about personal things?		Sibling Bully-Victim	$\alpha = .81$ (6 items)	
	Peer Pressure (ESYTC, 2000)	How pressured were you by friends to act tough/hard?			$\alpha = .86$ (6 items)	
	Number of Friends (ESYTC, 1998, 2000)	How many friends do you have altogether?	One item		One item	

*PC=Parent-Child

Table 3.2. Variables examined at each data collection point (Time 1- Time 4) grouped according to subgroup, with their reliability, name of measure and example item (referral time is past year except for depression at time 3 as indicated) continued

	Name of Measure	Example of Items	Time 1 Age: 11.5-12.5	Time 2 Age: 12.5-13.5	Time 3 Age: 13.5-14.5	Time 4 Age: 14.5-15.5
Antisocial Behaviour Variables	Social Alienation (adapted version of Alienation Scale of the Multidimensional Personality Questionnaire (MPQ) (Tellegen, 1982))	Lots of people try to push me around	$\alpha = .85$ (6 items)	Sibling Bully (ESYTC, 1999) $\alpha = .74$ (3 items)	$\alpha = .86$ (6 items)	
	Delinquency (ESYTC, 1998, 2000, 2001)	Have you ever taken something from a shop or a store without paying for it?	$\alpha = .78$ (14 items)		$\alpha = .82$ (14 items)	$\alpha = .82$ (15 items)
	Public Antisocial Behaviour (ESYTC, 2000)	When hang around, how often do you shout/swear?			$\alpha = .76$ (4 items)	
	Violence Perpetration (ESYTC, 1998)	How many times ever hit, kicked or punched someone on purpose?	one item	Sibling Victim (ESYTC, 1999) $\alpha = .72$ (3 items)		
	Victim of Violence (ESYTC, 1998)	Has anyone ever really hurt you by deliberately hitting, punching or kicking you?	$\alpha = .65$ (5 items)			
	Peer Bullying Perpetration (adapted from Olweus, 1993)	Bullied someone by hitting, spitting etc. in last year?			$\alpha = .76$ (5 items)	$\alpha = .75$ (5 items)
	Peer Bullying Victim (adapted from Olweus, 1993)	Been bullied by being slagged/called names in last year?		Sibling Bully-Victim	$\alpha = .79$ (4 items)	$\alpha = .80$ (4 items)
	Sibling Violence Perpetration (ESYTC, 2001)	During the last year, did you hit, kick, or punch a brother or sister on purpose?				One item
School Variables	Attitude towards Education (ESYTC, 2001)	School is a waste of time				$\alpha = .76$ (4 items)
	Violation of School Rules (ESYTC, 2001)	How often arrived late for class in last year?				$\alpha = .79$ (8 items)

3.2.3.1. Assessment of sibling bullying (Time 2)

Sibling bullying (ESYTC, 1999) was assessed at time 2 (12.5-13.5 year of age; $M=13.03$, $SD=.34$). There were three items for the assessment of sibling bullying perpetration and three items for the assessment of being a victim of sibling bullying (Supplementary Table S21-S22). Participants were asked ‘how often they threatened to hurt their siblings’, ‘how often they actually hurt their sibling’ and ‘how often they hurt their siblings with a weapon’. The wording for being a victim of sibling bullying was respectively changed (Table 3.3). For each bullying type, participants were asked how frequently they had shown bullying behaviours in the last year (1= hardly ever/ never; 2 = less than once a week; 3 = at least once a week and 4 = most days). Cronbach alpha tests indicated robust reliability for being a victim of sibling bullying ($\alpha = .72$) and being a perpetrator of sibling bullying ($\alpha = .74$). Furthermore, based on these frequency scores, categorical scores indicating the role within a bullying dynamic (neutral, pure bully, pure victim and bully-victim) was established. Neutrals were considered as the ones that fell into the category of ‘hardly ever/never’ for the victim and the bully questions. So that answers were recoded as 0= ‘hardly ever/never’ and all other answers (‘less than once a week’, ‘at least once a week’, ‘most days’) were recoded as 1 (frequent involvement in bullying/victimisation). As there were three items within the bully questionnaire and the victim questionnaire, the total scores for each questionnaire ranged from 0-3. Then for the sibling victim questionnaire the participants that had a total scores between 1-3 were coded as pure victim (1=frequent victimisation but hardly ever/never bullying others), while for the sibling bully questionnaire the participants that had total scores between 1-3 were recoded as pure bully (2= frequent bullying others but hardly ever/never victimised by others) and for sibling bully-victims the total sibling bully scores and sibling victims scores were added up, so that those

who were frequently bullying others as well as victimised by others were considered as bully-victims (Figure 3.1).

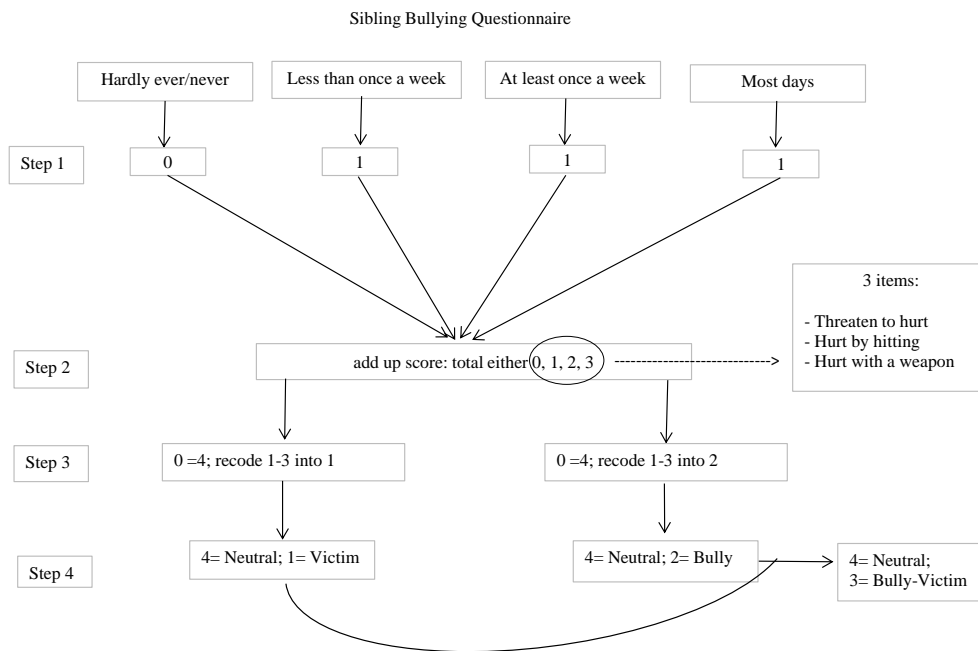


Figure 3.1. Coding for categorisation of bullying type (neutral, pure bully, pure victims, bully-victim)

Table 3.3. Frequency of being a Victim of Sibling Bullying, being a Perpetrator of Sibling Bullying, Pure Bully, Pure Victim, Bully-Victim and Neutral

	Sibling Bullying Perpetrator	Sibling Bullying Victim	
	Frequency of Bullying N (%)*	Frequency of Bullying N (%)*	
Threaten to hurt	3630 (99.64)	3629 (99.62)	
Hardly ever/never	1773 (48.67)	2073 (56.90)	
Less than once a week	770 (21.14)	581 (15.95)	
At least once a week	567 (15.56)	483 (13.26)	
Most days	520 (14.27)	489 (13.42)	
Hurt by hitting	3629 (99.61)	3632 (99.70)	
Hardly ever/never	1734 (47.60)	1891 (51.91)	
Less than once a week	886 (24.32)	737 (20.23)	
At least once a week	573 (15.73)	506 (13.89)	
Most days	456 (12.51)	498 (13.67)	
Hurt with a weapon	3619 (99.34)	3620 (99.37)	
Hardly ever/never	3184 (87.40)	3055 (83.86)	
Less than once a week	191 (5.24)	258 (7.08)	
At least once a week	118 (3.24)	162 (4.45)	
Most days	126 (3.46)	145 (3.98)	
Pure Bully N (%)	Pure Victim N (%)	Bully-Victim N (%)	Neutral N (%)
395 (10.84)	369 (10.13)	998 (27.40)	1881 (51.63)

*percentage out of total number of participants for which sibling data was available at Time 2 (N=3,643)

3.2.3.2. Assessment of precursors

Precursors were assessed at time 1 (11.5-12.5 years of age; $M=12.03$, $SD=.34$) and included parenting, children's personalities, children's friends and children's antisocial behaviour variables and scales.

3.2.3.2.1. Parenting Factors Time 1

Parenting factors were examined by means of three questionnaires:

(1) A *Parental involvement* questionnaire (ESYTC, 1998) (internal consistency $\alpha=.69$), which consisted of four questions inquiring about 'how often parents knew where their children were going', 'who they were going with', 'what time they were going to be at home' (Supplementary Table S23). The response options were on a four-point Likert scale: 1=never; 2=sometimes; 3=usually and 4=always.

(2) A *Parent-Child Leisure Time* questionnaire (ESYTC, 1998) (internal consistency $\alpha=.74$), with nine items, investigated how much time parents and children spent together. This included questions about how often parents and children watched TV together, went shopping together, played or watched sports together (Supplementary Table S24). The response options were on a four-point Likert scale: 1=never; 2=less than once a week; 3=at least once a week and 4=most days.

(3) A questionnaire about *Parent-Child Conflict* (ESYTC, 1998) (internal consistency $\alpha=.75$), which assessed the frequency of the types of conflicts parents and children had. This questionnaire included six questions about the frequency of arguments about homework, friends, tidying up the room, curfews and what children did when they were outside of the house were assessed. Further, a close ended 'other' question was inserted 'How often do you disagree or agree with your parents about other things?'. This was to cover other types of conflict that were not included in the questionnaire (Supplementary Table S25). The response options were on a four-point

Likert scale: 1=never; 2=less than once a week; 3=at least once a week and 4=most days.

3.2.3.2.2. Personality Factors Time 1

Personality factors included two factors:

(1) The *Self-Esteem* questionnaire (adapted version of Rosenberg, 1965)

(internal consistency $\alpha=.72$) was made up of six items. It asked how much the participant agreed or disagreed with the following statements: ‘I like myself’, ‘I often wish I was someone else’, ‘I am able to do things well’ (Supplementary Table S26). On a five-point Likert scale the response options were 1=disagree a lot; 2=disagree a bit; 3=not sure; 4=agree a bit; 5=agree a lot. Here three items were reverse coded.

(2) The *Impulsivity* questionnaire (adapted from Junior Impulsivity

Venturesome and Empathy Scale (Eysenck & Eysenck, 1980)) (internal consistency $\alpha=.79$) included six items, assessing to what extent participants agreed or disagreed with particular statements, such as ‘planning takes the fun out of things’, ‘I get into trouble because I do things without thinking’, ‘I get involved in things I later wish I could get out of’ (Supplementary Table S27). The participants responded on a five-point Likert scale: 1=disagree a lot; 2=disagree a bit; 3=not sure; 4=agree a bit; 5=agree a lot.

3.2.3.2.3. Friendship Factors Time 1

With regard to *children’s friends*, only the *Number of Friends* (ESYTC, 1998) was inquired about. This included one item ‘how many friends do you have all together’. The responses options were 1=none; 2=one or two; 3=three to five; 4=six to ten and 5=more than 10. Here it is important to note that the respectively coded number does not represent the number of friends participants had (Supplementary Table S28).

3.2.3.2.4. Antisocial Behaviour Factors Time 1

Antisocial Behaviour factors comprised of three questionnaires:

(1) *Social Alienation* (adapted version of Alienation Scale of the MPQ (Tellegen, 1982) (internal consistency $\alpha=.85$) questionnaire, which included six items, with questions such as ‘lots of people push me around’, ‘my friends often say or do things behind my back’, ‘I would be more successful if people didn’t make things hard for me’ (Supplementary Table S29). The answers were on a five-point Likert scale 1=disagree a lot; 2=disagree a bit; 3=not sure; 4=agree a bit; 5=agree a lot.

(2) The *Delinquency* questionnaire (ESYTC, 1998) (internal consistency $\alpha=.78$) consisted of 14 items inquiring about the frequency that participants ‘ever not paid the correct fair on a bus or train’, ‘ever taken something from a shop or store without paying for it’, ‘ever carried a weapon or knife for protection or in case it was needed in a fight’ (Supplementary Table S30). The response options were 0=0 times; 1=1 times; 2=2 times; 3=3 times; 4=4 times; 5=5 times; 6= 6-10 times; 7=more than 10 times. Also here, the respectively coded number does not represent the number of times that the behaviour occurred. This is the case for the next two variables as well.

(3) *Violence Perpetration* (ESYTC, 1998), this was one item asking the participants ‘how many times they had hit, kicked or punched someone on purpose’ (Supplementary Table S31). The response options were 0 = 0 times; 1=1 times; 2=2 times; 3=3 times; 4=4 times; 5=5 times; 6= 6-10 times; 7=more than 10 times.

(4) *Victim of Violence* (ESYTC, 1998) (internal consistency $\alpha=.65$) was inquired about through five items, by asking about the frequency of times a participant ‘was threatened to be hurt’, ‘got hurt’, ‘got hurt with a weapon’, ‘was a victim of theft’ and ‘was a victim of robbery’. The frequency options were 0=0 times; 1=1 times; 2=2

times; 3=3 times; 4=4 times; 5=5 times; 6=6-10 times; 7=more than 10 times

(Supplementary Table S32).

3.2.3.3. Assessment of the outcome variables of sibling bullying one year later (Time 3)

The outcome variables were collected one year after the sibling bullying data was collected when participants were 13.5-14.5 years old at time 3 ($M=14.04$, $SD=.35$). The overarching topics addressed parenting, children's personalities, children's friends, and children's antisocial behaviour variables.

3.2.3.3.1. Parenting Factors Time 3

Parenting factors were examined via three questionnaires:

(1) The *Parental Involvement* questionnaire (ESYTC, 2000) (internal consistency $\alpha=.72$) included three questions about parents' involvement in their children's lives, such as 'how often did parents know where you were going in the last year' (Supplementary Table S33). Response options were on a 4-point Likert scale (1=never; 2=sometimes; 3=usually; 4=always). These were the same questions as the *Parental Involvement* questionnaire at time 1, except that at time 3, one item 'how often did your parents know that you were not home on time' was not asked.

(2) The *Parent-Child Conflict* (ESYTC, 2000) assessment was one item asking about the frequency of conflict between parents and children 'how often do you argue with your parents?' (1=hardly ever/never; 2=less than once a week; 3=at least once a week; 4=most days) (Supplementary Table S34).

(3) *Parent-Child Communication* (ESYTC, 2000) (internal consistency $\alpha=.82$) was assessed with five items, which included questions, such as 'how often do you talk to parents about private/personal things'; 'how often do you ask parents for advice' (1=never; 2=sometimes; 3=often) (Supplementary Table S35).

3.2.3.3.2. Personality Factors Time 3

Personality included three factors:

(1) *Impulsivity* (adapted from Junior Impulsivity Venturesome and Empathy Scale (Eysenck & Eysenck, 1980)) (internal consistency $\alpha=.74$) was assessed with the same questionnaire as time 1 (Supplementary Table S36).

(2) The *Risk-Taking Behaviour* (ESYTC, 2000) questionnaire (internal consistency $\alpha=.87$) included four items, with questions such as ‘I like to test myself by doing something a bit risky’; ‘sometimes I take a risk just for the fun of it’ (Supplementary Table S37). The response options were on a five-point Likert scale (1=disagree a lot; 2=disagree a bit; 3=not sure; 4=agree a bit; 5=agree a lot).

(3) The *Depression* questionnaire (adapted from West of Scotland 11-16 Study of Teenage Health (Sweeting et al., 2006), originally validated by Kendall & Davies, 1992) (internal consistency $\alpha=.82$) assessed the frequency of participants feeling certain symptoms of depression within the last month. This included six items with questions such as ‘how often have you felt too tired to do things’; ‘how often have you had trouble sleeping’ (Supplementary Table S38). Response options were as follows (1=hardly ever/ never; 2=less than once a week; 3=at least once a week; 4=most days).

3.2.3.3.3. Friendship Factors Time 3

Friendship included three factors:

(1) *Closeness to Friends* (ESYTC, 2000) (internal consistency $\alpha=.81$) was examined through six items, including questions such as ‘how often do you talk to your friends about personal things’; ‘how often do you talk to your friends about problems at home’ (Supplementary Table S39). The answers were on a three-point Likert scale (1=hardly ever; 2=sometimes; 3=often).

(2) *Peer Pressure* (ESYTC, 2000) (internal consistency $\alpha=.86$) included six items with questions regarding a variety of aspects friends or peers could persuade participants to engage in, such as ‘how pressured do you feel by friends do try drugs’; how pressured do you feel by friends to dress older than you are’ (1=not at all; 2=a bit; 3=a lot) (Supplementary Table S40).

(3) *Number of Friends* (ESYTC, 2000) comprised of one question ‘how many friends do you have all together’. The responses options were 1=none; 2=one or two; 3=three to five; 4=six to ten and 5=more than 10. The respectively coded number does not represent the number of times that the behaviour occurred (Supplementary Table S41).

3.2.3.3.4. Antisocial Behaviour Factors Time 3

Antisocial behaviour outcomes were assessed in terms of social alienation; delinquency; public antisocial behaviour; peer bullying perpetration and victimisation:

(1) *Social Alienation* (adapted version of the Alienation Scale of the Multidimensional Personality Questionnaire (MPQ) (Tellegen, 1982)) (internal consistency $\alpha=.86$) were assessed with the same questionnaire as at time 1 (Supplementary Table S42).

(2) *Delinquency* (ESYTC, 2000) (internal consistency $\alpha=.82$) was examined in the same format as at time 1, however, some questions differed. Specifically, at time 3 cruelty towards animals was included and skipping school was excluded (Supplementary Table S43). In total the questionnaire comprised 14 items.

(3) *Public Antisocial behaviour* (ESYTC, 2000) (internal consistency $\alpha=.76$) was assessed through four questions that inquired about the frequency of specific antisocial behaviours when ‘hanging around’ in public e.g. ‘when hanging around, how

often do you shout/swear'; 'when hanging around, how often do you take drugs'. The answers were 1=never; 2=sometimes; 3=usually; 4=always (Supplementary Table S44).

(4) The *Peer Bullying Perpetration* (adapted from Olweus, 1993) questionnaire (internal consistency $\alpha=.76$) consisted of questions inquiring about the frequency of direct bullying ('bullied someone by hitting, spitting', 'bullied someone by calling names', 'bullied someone through threatening') and relational bullying ('bullied someone by ignoring and leaving them out of things' and 'encouraged others to bully someone'. In total there were five items. The response options were on a four-point Likert scale (1=hardly ever/never; 2=less than once a week; 3=more than once a week; 4=most days) (Supplementary Table S45)). All question responses were summed to calculate an overall peer bully score.

(5) *Peer Bullying Victimization* (adapted from Olweus, 1993) (internal consistency $\alpha=.79$) was assessed through four items, examining the frequency the participant was bullied directly ('being attacked', 'called names', 'threatened') and bullied relationally ('ignored and left out') within the last year. The answers were on a four-point Likert scale (1=never; 2=less than once a week; 3=more than once a week; 4=most days) (Supplementary Table S46). All scores were summed to calculate a total score of being a victim of peer bullying. Furthermore, based on these frequency scores, categorical scores indicating the role within a bullying dynamic (neutral, pure bully, pure victim and bully-victim) were established. Neutrals were considered as the ones that fell into the category of 'hardly ever/never'. So that answers were recoded as 0='never' and all other answers ('less than once a week', 'more than once a week', 'most days') were recoded as 1. As there were five items within the bully questionnaire and four with the victim questionnaire, the total scores for the bully questionnaire ranged

from 0-5 and for the victim questionnaire from 0-4. Then for the peer victim questionnaire the participants that had a total score between 1-4 (frequent involvement in victimisation but never or rarely bullying others) were coded as 1=pure victim; for the peer bully questionnaire the participants that had a total scores between 1-5 (frequent involvement in bullying others but never or rarely victimised by others) were recoded as 2=pure bully and for peer bully-victims the total peer bully scores and peer victims scores were added up, so that 3= bully-victim (frequent involvement in bullying and victimisation). This was the same strategy as for the categorisation of sibling bullying roles (neutral, pure victim, pure bully, bully-victim), the only difference was that there were more items in the peer bullying questionnaires, compared to the sibling bullying questionnaires (i.e., in the bully 5 for peer vs. 3 for sibling and the victim 4 for peer vs. 3 for sibling) (Figure 3.1).

3.2.3.4. Assessment of outcome variables of sibling bullying two years later (Time 4)

At time 4 children were 14.5-15.5 years old ($M=15.04$, $SD=.35$). At this sweep, parenting factors, children's personality factors, school factors and antisocial behaviour questionnaires were included.

3.2.3.4.1. Parenting Factors Time 4

Parenting variables consisted of the following questionnaires: parental involvement, parent-child leisure time, parent child communication, parent-child conflict and adaptive conflict resolution between parents and children:

(1) *Parental Involvement* (ESYTC, 2001) (internal consistency $\alpha=.79$) included four items with questions, such as 'how often did your parents know where you were going', 'how often did your parents know who you were going with'. Response options were on a four-point Likert scale (1=never; 2=sometimes; 3=usually; 4=always)

(Supplementary Table S47). These were the same questions as at Time 3, except for one question was added: ‘how often did your parents know what you were doing?’

(2) *Parent-Child Leisure Time* (ESYTC, 2001) (internal consistency $\alpha=.75$) included two items and inquired about how much time children and parents spent together on the weekends and weekdays. The response options were 1=never; 2=up to 1 hour; 3=up to 2 hours; 4=up to 4 hours; 5=more than 4 hours (Supplementary Table S48).

(3) *Parent-Child Communication* (ESYTC, 2001) (internal consistency $\alpha=.70$) included four items and questions assessed whether children kept secrets from their parents about who they were going out with and where they went out. These two items were coded as 1=often; 2=sometimes; 3=hardly ever/never. Further, it was also asked whether children tell parents about things that happen at school and what they do when they are out. These were coded as: 1=hardly ever/never; 2=sometimes; 3=often (Supplementary Table S49).

(4) *Parent-Child Conflict* (ESYTC, 2001) (internal consistency $\alpha=.76$) was assessed similarly to the parent-child conflict questionnaire at time 1 in that it asked about the frequency children argued with their parents about different things. However, at this sweep (time 4), the questions inquired about tidying up the room, about what children did when they were out of the house, what time they came home, who they hung out with, about what they wore and a close ended ‘other’ question. There were six items in total, which were coded as 1=hardly ever/never; 2=less than once a week; 3=at least once a week; 4=most days (Supplementary Table S50).

(5) *Conflict Resolution* (ESYTC, 2001) (internal consistency $\alpha=.79$) included three items and examined how adaptively a dispute is resolved between parents and

children i.e. ‘when disagreed about things with you parents, how often do you and your parents discuss it calmly’. The answers were coded as 1=never; 2=sometimes; 3=usually; 4=always (Supplementary Table S51).

3.2.3.4.2. Personality Factors Time 4

In terms of *Personality*, only self-esteem was assessed at this sweep. The *Self-Esteem* questionnaire (adapted version of Rosenberg, 1965) (internal consistency $\alpha=.79$) included six items and examined how much the participant agreed or disagreed with the following statements: ‘I like myself’, ‘I often wish I was someone else’, ‘there are some good things about me’ (Supplementary Table S52). The answer options were: 1=disagree a lot; 2=disagree a bit; 3=not sure; 4=agree a bit; 5=agree a lot.

3.2.3.4.3. School Factors Time 4

School variables included two scales:

(1) *Attitude towards Education* questionnaire (ESYTC, 2001) (internal consistency $\alpha=.76$) included four items, which assessed participants’ opinions about the value of going to school. This was examined by questions such as ‘school is a waste of time’; ‘working hard at school is important’. For these questions the responses were reversed so that a high score indicated a bad attitude towards education. The answer options were: 1=agree a lot; 2= agree a bit; 3=not sure; 4=disagree a bit; 5=disagree a lot (Supplementary Table S53). The first question was reversed coded.

(2) *Violation of School Rules* (ESYTC, 2001) questionnaire (internal consistency $\alpha=.79$) was also employed. This questionnaire included eight items, which assessed the frequency of verbal and physical attacks on teachers by the participant (Supplementary Table S54). Questions such as ‘how often have you arrived late for class within the last year’, ‘how often were you cheeky to a teacher’ were included (1=hardly ever/never; 2=less than once a week; 3=at least once a week; 4=most days).

3.2.3.4.4. Antisocial Behaviour Factors Time 4

Antisocial Behaviour factors included a delinquency questionnaire, and assessments about sibling violence perpetration and peer bullying:

(1) *Delinquency* (ESYTC, 2001) (internal consistency $\alpha=.82$) was assessed in a similar way as at previous time points. The questionnaire included 15 items, with questions about the frequency of engagement in particular behaviours. An additional question was added which asked about the frequency of selling drugs. All response options were 0=0 times; 1=1 times; 2=2 times; 3=3 times; 4=4 times; 5=5 times; 6=6-10 times; 7=more than 10 times. The coded numbers are not representative of the number of times the participant engaged in that behaviour (6= 6-10 times; 7=more than 10 times) (Supplementary Table S55).

(2) *Sibling violence perpetration* (ESYTC, 2001) was assessed with just one question asking about how many times the participant had perpetrated direct violence towards their sibling within the last year ‘how many times did you hit, kick or punch a brother or sister on purpose?’. The response options were 0=0 times; 1=1 times; 2=2 times; 3=3 times; 4=4 times; 5=5 times; 6=6-10 times; 7=more than 10 times (Supplementary Table S56).

(3) *Peer Bully Perpetration* (adapted from Olweus, 1993) (internal consistency $\alpha=.75$) (see above at time 3) (Supplementary Table S57).

(4) *Victim of Peer Bullying* (adapted from Olweus, 1993) (internal consistency $\alpha=.80$) were assessed with the same questionnaires respectively as at time 3 (Supplementary Table S58). For the categorisation of bullying types into ‘neutral’, ‘pure bully’, ‘pure victim’ and ‘bully-victim’, the same strategy as described for the bullying assessment at time 3 was adopted also (see Figure 3.1).

3.2.4. Procedure

3.2.4.1. Mainstream and independent schools

At time 1, questionnaires were administered either after school or during a particular subject, usually social education. In the sessions after school, the questionnaires could be administered in 70-90 minute sessions, which gave students sufficient time to complete them. However, for the schools that preferred the questionnaires to be completed during class, the researchers encountered some inconvenience with the time management of the data collection, as 35-45 minutes were only available to complete the questionnaires. In order to avoid substantial missing data, researchers had to spread the data collection over several weeks in order to complete the process. Due to these disruptions most schools agreed to allocate one hour for pupils to complete the questionnaires (one hour was the average time participants needed to complete the questionnaires) (McVie, 2001). This was then adopted at the following sweeps also. Further, with the aim of keeping it a population study, strategies were established to contact the absentees from schools on the days of data collection. Some head teachers of schools permitted home addresses and telephone numbers to be given to the research team; this was an efficient way in which pupils could be contacted. However, if head teachers did not reveal the contact details of the respective students, some pupils were approached on return visits to the school. Other head teachers agreed to send out letters on behalf of the research team, which was marginally successful (for further details on exact numbers of absentees that were contacted and how they were contacted see McVie (2001) and McVie (2003)).

A rigorous administrative procedure was adhered to by all researchers in order to ensure that the same conditions applied for all participants across all schools. An information sheet extensively explained the purpose of data collection. Additionally,

every point was thoroughly explained by the researchers. Particular emphasis on confidentiality was given, explaining in detail how to behave accordingly in order to maintain confidentiality during and after completion of the questionnaire (McVie, 2001). At subsequent sweeps a similar process was adopted, explaining the purpose of the study and stressing confidentiality (McVie, 2001). Pupils were spread out in the classroom, so that copying was not possible; it was instructed that the completion of questionnaires should be done in “exam-like conditions” (McVie, 2001, p. 18). Then the questionnaires were handed out and the participants completed two practice questions. Pupils that had difficulties were attended to. After the practice questions were completed, the researchers went over them, stressing on the instructions that were given previously. It was assured that researchers could be asked any questions in case something was unclear during the questionnaire completion. A distractor task was given to participants that finished early, preventing disruption to the pupils that were still working on the questionnaires (McVie, 2001; McVie, 2003).

3.2.4.2. Special assistance at mainstream and independent schools

Those students that were in mainstream and independent schools and who needed assistance to complete the questionnaire were identified prior to data collection. So called ‘readers’ were employed to assist the students; these ‘readers’ included researchers, ex-teachers and others who had experience in working with young children. In order to avoid stigmatisation of those children, the ‘readers’ were employed in the following ways: (1) If there were only one or two children in one classroom that needed assistance, then a ‘reader’ was asked to be present in the classroom and answer general questions to the class and focus slightly more on those few children in the classroom that needed assistance. (2) All children that had a very low reading age or had comprehension problems were taken out of the class and

'readers' assisted the participants in a 1:2 or 1:3 ratio. (3) Children with severe learning or behaviour problems were individually read the questionnaire to. However, as little help as possible was given, allowing the pupil privacy and autonomy in filling in the questionnaire. Further, generally an effort was made to keep the pupils together in a classroom, to reduce possible stigma (additional details on how special assistance was dealt with can be found in McVie (2001) and McVie (2003)).

3.2.4.3. Special needs schools

The questionnaires were read to the participants on a one-to-one basis. In some cases, due to physical disabilities, the researchers wrote down the answers that the participant indicated. Further, no time limit was given in which questionnaires had to be completed, and in some instances the participants requested breaks to be taken, which varied in length, therefore some sessions had to be split into two (McVie, 2001; McVie, 2003).

3.3. Plan of Analysis

Aims of the study:

1. Explore the proximal precursors of sibling bullying/victimisation.
2. Explore the outcomes of sibling bullying/victimisation and of the specific roles of sibling bullying (pure bully, pure victim, bully-victim, neutral) one year later.
3. Explore the outcomes of sibling bullying/victimisation and of the specific roles of sibling bullying (pure bully, pure victim, bully-victim, neutral) two years later.
4. Explore the cross-over effects between sibling and peer bullying and victimisation.

First the analysis for precursors of sibling bullying was conducted, then the outcomes after one year and then the outcomes after two years were explored. For the analysis of each time point in relation to sibling bullying, first sibling bullying perpetration was assessed and then sibling bullying victim was assessed. For the analysis of precursors a preliminary Pearson correlation analysis (due to the fact that the variables were normally distributed) was conducted in order to assess associations between all respective factors from time 1 and time 2. Then multiple regression analyses were carried out. Sibling bullying perpetration was entered as the dependent variable with the predictor variables (parental involvement, parent-child conflict, parent-child leisure time; self-esteem, impulsivity, number of friends, social alienation, delinquency, peer violence perpetration, victim of peer violence) at time 1 as independent variables. Then the same procedure was adopted for the precursor analysis of being a victim of sibling bullying. It was chosen to enter all predictor variables in one step together, as the main aim of the study was to explore which variables would prevail as most significant above all other respective predictors. Another reason this method was chosen, was that in previous trial analyses, the predictors were entered into separate multiple regression analysis based on their subtopics (i.e. parenting, personality, friends and antisocial variables), it was found here that most variables resulted as significant, as a result, it was decided to enter all predictor variables together into one multiple regression analysis. This allowed for the analysis to be done in a more restricted manner.

For the analysis of the outcomes of sibling bullying perpetration one year and two years later, the same procedure for each outcome stage was used. First simple linear regression analyses were conducted, with sibling bullying perpetration (and later sibling bullying victim) being the independent variable. The dependent variables were

the outcome variables at time 3. The outcomes at time 3 included parental involvement, parent-child conflict, parent-child communication, impulsivity, depression, risk-taking behaviour, closeness to friends, peer pressure, number of friends, social alienation, delinquency, public antisocial behaviour, peer bullying perpetration and peer bullying victim. The outcomes at time 4 included parental involvement, parent-child conflict, parent-child leisure times, parent-child communication, parent-child conflict resolution, self-esteem, delinquency, peer bullying perpetration, peer bullying victim, sibling violence perpetration, attitude toward education and violation of school rules. For the analysis of sibling bullying perpetration and their outcomes at time 3 and at time 4, each linear regression analysis was conducted such that all dependent variables were entered separately. The same procedure was repeated for the analysis of being a victim of sibling bullying and its outcomes at time 3 and time 4. Victim of sibling bullying was the independent variables and the respective outcome variables were entered as dependent variables.

Further explorations of the outcomes at time 3 and time 4 with the highest *beta coefficients* were conducted. Hierarchical regressions were conducted for the assessment of whether sibling bullying perpetration (and sibling bullying victim) were unique significant predictors of the respective outcomes at time 3 and time 4. For the analysis of outcomes at time 3 of being a perpetrator and a victim of sibling bullying at time 2, variables from time 1 were controlled for. And for the analysis of outcomes at time 4 of being a perpetrator and a victim of sibling bullying at time 2, variables from time 1 and time 3 were controlled for.

Additionally, the examination of outcomes at time 3 and time 4 of specific roles within sibling bullying relationships (neutral, pure bully, pure victim and bully-victim) was done through one-way ANOVAs and post-hoc tests. The F-welch and Games-

Howell post-hoc procedure were chosen for those cases where the variances between groups (sibling neutral, sibling pure bully, sibling pure victim and sibling bully-victim) were unequal. Unequal variances between groups could be assumed, due to differences in sample sizes. For the cases where the variances between groups were equal the regular F-statistic and the Tukey test were reported.

For all analyses no collinearity between variables was detected. Further, the histograms of residuals had minor positive skews. The normal Q-Q plots scatterplots indicating standardised residuals showed violations of the assumption of normality for number of friends, at time 1 and time 3, delinquency at time 1, time 3 and time 4, peer pressure at time 3 and attitude towards education at time 4 (Appendix D for SPSS output plots). As a result of this, they were excluded from analysis. These variables were only used in an alternate one-way ANOVA test, the Kruskal-Wallis H test. This was done as the Kurskal-Wallis H test can compare groups, in spite of violations of normality.

Lastly, cross tabulation with chi-square analyses were done to assess the cross-over effects of roles within a sibling bullying relationship and a peer bullying relationship. It was assessed what proportion of sibling bullies, sibling victims and sibling bully-victims at time 2 would turn into peer bullies or neutrals, peer victims or neutrals and peer bully-victims or neutrals at time 3 and time 4. Further odds ratio analyses assessed the likelihood of these cross-over effects.

3.4. Results

3.4.1. Aim 1: Explore the individual and proximal precursors of sibling bullying Preliminary correlation analysis.

The Pearson correlational analyses indicated that there were several factors at time 1 correlating with being a perpetrator and being a victim of sibling bullying at time 2 (Table 3.4). All correlation coefficients in relation to sibling bullying were significant and in the small to moderate range (except for the correlation between the number of friends and being a victim of violence a year later and being a victim of sibling bullying a year later). The correlations showed that sibling bullying and victimisation were significantly related to parenting factors, so that parental involvement was associated with less sibling bullying perpetration and victimisation. Parent-child leisure time was also associated with less bullying perpetration. Albeit being a weak negative correlation coefficient ($r=-.06$), less parent-child leisure time was associated with more sibling victimisation one year later. More parent-child conflict at time 1 was associated with more sibling bullying and victimisation at time 2. In terms of personality characteristics, lower self-esteem correlated with higher levels of sibling bullying perpetration. Further, higher self-esteem was also associated with less sibling bullying victimisation. Furthermore, more impulsivity was associated with more sibling bullying perpetration and victimisation. Number of friends had a very low positive correlation coefficient with sibling bullying perpetration, so that a high number of friends was associated with more sibling bullying perpetration and no correlation with being a victim of sibling bullying. In terms of antisocial behaviour, higher social alienation, delinquency, violence perpetration and being a victim of violence all indicated more sibling bullying perpetration and victimisation a year later. Further, it

was also found that sibling bullies and victims correlated highest with each other, so that higher sibling bullying indicated higher sibling victimisation and vice-versa.

Table 3.4. Descriptive Statistics and Pearson Correlation Analyses of Time 1 Precursor Variables and Sibling Bullying and Victimization at Time 2

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Parental Involvement T1											
2. Parent-Child Leisure Time T1	.15*** N=4288										
3. Parent-Child Conflict T1	-.31*** N=4285	.06*** N=4288									
4. Self-Esteem T1	.17*** N=4288	.16*** N=4286	-.23*** N=4284								
5. Impulsivity T1	-.30*** N=4282	-.06*** N=4280	.36*** N=4278	-.25*** N=4280							
6. Number of Friends T1	-.08*** N=4270	.07*** N=4268	.04* N=4265	.06*** N=4268	.05** N=4263						
7. Social Alienation T1	-.07*** N=4286	-.03 N=4284	.24*** N=4281	-.28*** N=4284	.34*** N=4282	-.14*** N=4267					
8. Violence Perpetration T1	-.31*** N=4233	-.07*** N=4231	.24*** N=4228	-.07*** N=4231	.30*** N=4225	.10*** N=4213	.13*** N=4229				
9. Victim of Violence T1	-.18*** N=4286	-.05** N=4284	.22*** N=4281	-.14*** N=4284	.27*** N=4285	-.01 N=4267	.39*** N=4287	.40*** N=4229			
10. Sibling Bullying Perpetration T2	-.20*** N=3508	-.05** N=3506	.22*** N=3504	-.11*** N=3506	.20*** N=3505	.03* N=3491	.13*** N=3506	.24*** N=3458	.19*** N=3507		
11. Sibling Bullying Victim T2	-.13*** N=3506	-.06** N=3504	.16*** N=3502	.14*** N=3504	.15*** N=3504	.00 N=3489	.17*** N=3504	.15*** N=3457	.21*** N=3505	.62*** N=3639	
Mean	12.83	22.20	11.54	21.10	19.16	4.65	15.49	2.0	3.72	5.09	5.0
(SD)	(2.46)	(4.66)	(4.16)	(4.57)	(5.63)	(.71)	(6.40)	(2.47)	(4.83)	(2.34)	(2.37)
N	4295	4293	4290	4293	4287	4275	4291	4238	4291	3642	3640

* $p < .05$, ** $p < .01$, *** $p < .001$; T1= Time 1; T2=Time 2

Precursors of being a perpetrator of sibling bullying: Multiple regression analysis.

A multiple regression analysis was conducted (Table 3.5). The overall model was significant $F(10, 3391)=42.65, p < .001$, explaining 11% of the variance in sibling bullying at time 2. Overall all *beta coefficients* were small. Violence perpetration at time 1 was the strongest predictor of sibling bullying perpetration at time 2. Being a victim of violence was also significantly associated with being a sibling bully. Parent-child conflict seemed to increase the likelihood of bullying between siblings. Contrastingly, children that had parents that were more involved in their lives were less likely to bully their siblings. Having a more impulsive personality and being socially more alienated was linked to being a bully of siblings one year later.

Precursors of being a victim of sibling bullying: Multiple regression analysis.

The model was significant $F(10, 3390)=27.66, p < .001$, explaining 8% of the variance in sibling bullying victimisation at time 2 (Table 3.5). Further, overall all *beta coefficients* were small. Similarly to the precursors of being a sibling bullying, violence perpetration and victimisation at time 1 were both significant precursors of being a victim of sibling bullying. Intuitively, having been a victim of violence was the strongest precursor of being a victim of sibling bullying. In line with the precursors of being a sibling bully, low parental involvement and high parent-child conflict were both significantly associated with being a victim of sibling bullying. Spending time with parents was marginally significant ($p=.05$) in predicting being a victim of sibling bullying, so that more time spent with parents resulted in lower victimisation. Having lower self-esteem and being more socially alienated were also significant precursors of being a victim of sibling bullying.

Table 3.5. Multiple Regression Analysis of Variables at Time 1 Predicting Sibling Bullying at Time 2

Variable at Time 1	Perpetrator of Sibling Bullying at Time 2			Victim of Sibling Bullying at Time 2		
	B	SE B	B	B	SE B	B
Parental Involvement	-.09	.02	-.09***	-.05	.02	-.05**
Parent-Child Leisure Time	-.01	.01	-.01	-.02	.01	-.03*m
Parent-Child Conflict	.06	.01	.10***	.04	.01	.07**
Self-Esteem	-.10	.01	-.02	-.03	.01	-.06**
Impulsivity	.02	.01	.05**	.01	.01	.02
Number of Friends	.04	.06	.01	.02	.06	.01
Social Alienation	.01	.01	.04*	.03	.01	.08***
Violence Perpetration	.12	.02	.13***	.05	.02	.07**
Victim of Violence	.03	.01	.06**	.06	.01	.12***
R²	.11***			.08***		

* $p < .05$, ** $p < .01$, *** $p < .001$; *_m = $p = .05-.06$

3.4.2. Aim 2: Explore the consequences of sibling bullying one year later

Preliminary correlation analysis.

Preliminary descriptive statistics were examined (Table 3.6). The Pearson correlational analyses indicated that sibling bullying as bullies and as victims at time 2 correlated significantly with most factors at time 3. All correlation coefficients were in the small to moderate range. Sibling bullies and sibling victims were significantly correlated with less parental involvement and less parent-child communication and more parent-child conflicts. Further, sibling bullying perpetration and being a victim of sibling bullying were both significantly associated with more impulsivity, more depression and more risk-taking behaviours. In terms of friends variables, closeness to friends was not significantly associated with being a sibling bully, however, it was significantly positively associated with being a victim of sibling bullying. Being a sibling bully and being a victim of sibling bullying were both significantly and

positively correlated with social alienation, public antisocial behaviours, peer bullying
perpetration and being a victim of peer bullying.

Table 3.6. Descriptive Statistics and Pearson Correlation Analysis of Sibling Bullying at Time 2 and Outcomes at Time 3

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Sibling Bullying Perpetrator T2													
2. Sibling Bullying Victim T2	.62*** N=3639												
3. Parental Involvement T3	-.22*** N=3495	-.14*** N=3493											
4. Parent-Child Conflict T3	.25*** N=3483	.20*** N=3481	-.26*** N=4267										
5. Parent-Child Communication T3	-.15*** N=3491	-.10*** N=3489	.39*** N=4275	-.22*** N=4272									
6. Impulsivity T3	.21*** N=3496	.14*** N=3494	-.29*** N=4280	.27*** N=4265	-.18*** N=4274								
7. Depression T3	.16*** N=3499	.19*** N=3497	-.14*** N=4286	.29*** N=4273	.01 N=4282	.25** N=4285							
8. Risk-Taking Behaviour T3	.22*** N=3488	.15*** N=3486	-.42*** N=4274	.26*** N=4259	-.27*** N=4268	.46*** N=4274	.21*** N=4279						
9. Closeness to Friends T3	.01 N=3473	.05** N=3471	-.04* N=4254	.15*** N=4241	.15*** N=4249	.09*** N=4253	.24*** N=4260	.13*** N=4250					
10. Social Alienation T3	.08*** N=3490	.15*** N=3488	-.04* N=4276	.17*** N=4260	.02* N=4269	.18*** N=4275	.44*** N=4208	.20*** N=4276	.07*** N=4251				
11. Public Antisocial Behaviour T3	.25*** N=3006	.14** N=3004	-.40*** N=3651	.28*** N=3636	-.23*** N=3646	.37*** N=3652	.18*** N=3655	.52*** N=3652	.12*** N=3641	.06*** N=3654			
12. Peer Bullying Perpetration T3	.28*** N=3451	.17*** N=3450	-.31*** N=4231	.23*** N=4218	-.20*** N=4227	.32*** N=4230	.24*** N=4238	.41*** N=4225	.06*** N=4206	.18*** N=4226	.50*** N=3606		
13. Peer Bullying Victim T3	.07*** N=3491	.13*** N=3489	.03 N=4275	.10*** N=4262	.07*** N=4271	.10*** N=4274	.36*** N=4281	.08*** N=4275	.04** N=4251	.53*** N=4276	.08*** N=3657	.19*** N=4228	
Means (SD) N	5.09 (2.34) 3642	4.99 (2.37) 3640	9.24 (2.04) 4288	2.54 (1.09) 4274	9.61 (2.85) 4283	18.74 (5.24) 4287	13.07 (4.31) 4294	11.01 (4.64) 4281	12.97 (3.11) 4262	13.32 (6.08) 4282	6.86 (2.45) 3657	7.78 (2.80) 4239	5.46 (2.26) 4283

* $p < .05$, ** $p < .01$, *** $p < .001$; * $m = p = .05-.06$; T2=Time 2; T3=Time 3

Outcomes of being a sibling bully one year later: linear regression analysis.

All regressions were significant, meaning that each assessed factor was a significant outcome of sibling bullying perpetration (Table 3.7). However, the variance of each individual factor was relatively low (R^2 's ranging from .001-.08). The *beta coefficients* were all in the low to moderate range. The highest *beta coefficient* of sibling bullying perpetration at time 2 was peer bullying perpetration at time 3. This was followed by delinquency, public antisocial behaviour and parent-child conflict at time 3. All personality factors were also in the low to moderate range. Further, the least strong coefficients were the friend's factors, indicating that sibling bullying perpetration does not have a strong effect on friend relationships. Additionally, the directions of the *beta coefficients* were mostly in the expected direction, so that more sibling bullying perpetration was associated with less parental involvement and parent-child communication. However, sibling bullying perpetration was associated with more parent-child conflict, impulsivity, depression, risk-taking behaviours, social alienation, public antisocial behaviours, peer bullying perpetration and peer bullying victimisation. Closeness to friends was not assessed in relation to sibling bullying perpetration as they did not significantly correlate with each other.

Outcomes of being a victim of sibling bullying one year later: linear regression analysis.

All regressions were significant, meaning that each assessed factor was a significant outcome of sibling bullying victimisation (Table 3.7). However, the variance of each individual factor was relatively low (R^2 's ranging from .002-.04). The *beta coefficients* were all in the low to moderate range. The highest *beta coefficient* of sibling bullying perpetration at time 2 was parent-child conflict at time 3, which was closely

followed by depression at time 3. Peer bullying perpetration was the third strongest outcome of sibling bullying victimisation. Interestingly, though significant, peer bullying victimisation at time 3 did not have a particularly strong association with sibling bullying victimisation at time 2. Before peer bullying victim as an outcome of being a victim of sibling bullying, came higher risk-taking behaviour and social alienation, lower parental involvement, higher impulsivity and higher public antisocial behaviours. Similar to the outcome of being a perpetrator of sibling bullying, the friend's factors had the lowest associations to being a victim of sibling bullying. ($\beta=.05$). Again, the directions of the *beta coefficients* were mostly in the expected direction, so that more sibling bullying victimisation was associated with less parental involvement and parent-child communication. And, more sibling bullying victimisation was associated with more parent-child conflict, impulsivity, depression, risk-taking behaviours, social alienation, public antisocial behaviours, peer bullying perpetration and peer bullying victimisation. However, more sibling bullying perpetration was also associated with more closeness to friends.

Table 3.7. Linear Regression Analysis of Sibling Bullying at Time 2 and Outcomes at Time3

Variable at Time 3	Perpetration of Sibling Bullying at Time 2					Victim of Sibling Bullying at Time 2				
	B	SE B	β	R ²	F-Ratio	B	SE B	β	R ²	F-Ratio
Parental Involvement	-.19	.01	-.22***	.05	F(1, 3493)=172.95, p<.001	-.12	.01	-.14***	.02	F(1, 3491)=66.67, p<.001
Parent-Child Conflict	.11	.01	.25***	.06	F(1, 3481)=225.14, p<.001	.09	.01	.20***	.04	F(1, 3479)=140.48, p<.001
Parent-Child Communication	-.18	.02	-.15***	.02	F(1, 3489)=80.41, p<.001	-.12	.02	-.10***	.01	F(1, 3487)=33.86, p<.001
Impulsivity	.46	.04	.21***	.04	F(1, 3494)=158.85, p<.001	.31	.04	.14***	.02	F(1, 3492)=70.41, p<.001
Depression	.29	.03	.16***	.02	F(1, 3498)=88.54, p<.001	.34	.03	.19***	.04	F(1, 3495)=127.97, p<.001
Risk-Taking Behaviour	.43	.03	.22***	.05	F(1, 3486)=171.67, p<.001	.28	.03	.15***	.02	F(1, 3484)=74.36, p<.001
Closeness to Friends	--	--	--	--	--	.06	.02	.05**	.002	F(1, 3469)=7.13, p=.008
Social Alienation	.20	.03	.08***	.01	F(1, 3488)=22.06, p<.001	.38	.04	.15***	.02	F(1, 3486)=80.42, p<.001
Public Antisocial Behaviour	.26	.02	.25***	.06	F(1, 3004)=205.98, p<.001	.14	.02	.14***	.02	F(1, 3002)=62.15, p<.001
Peer Bullying Perpetration	.33	.02	.28***	.08	F(1, 3449)=299.37, p<.001	.20	.02	.17***	.03	F(1, 3448)=100.25, p<.001
Peer Bullying Victim	.06	.02	.07***	.004	F(1, 3489)=16.07, p<.001	.12	.02	.13***	.02	F(1, 3487)=56.83, p<.001

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

Outcomes at time 3 of sibling bullying at time 2 while controlling for time 1 factors.

In order to examine whether sibling bullying perpetration and sibling bullying victimisation were unique predictors of the respective outcomes at time 3, several hierarchical regression analyses were carried out, as follow-up analyses. Respectively relevant factors from time 1 were selected as controls. The order in which control variables were inserted into the regression analysis, was based on the strength of the beta-coefficient in the linear regression analysis of the predictors of sibling bullying perpetration at time 2 and sibling bullying victimisation at time 2 (Table 3.5). For the following follow-up analyses, only the outcomes with highest *beta-coefficients* of the previously conducted linear regression (Table 3.9), so that it was assessed whether sibling bullying perpetration at time 2 was a unique predictor of parent-child conflict, impulsivity, risk-taking behaviour, public antisocial behaviour, peer bullying perpetration and peer bullying victim at time 3, separate hierarchical regression analyses were conducted (Table 3.9-Table 3.14). Further, it was assessed whether sibling bullying victimisation at time 2 was a unique predictor of parent-child conflict, depression, risk-taking behaviour, social alienation, public antisocial behaviour, peer bullying perpetration and peer bullying victim at time 3, separate hierarchical regression analyses were conducted (Table 3.15-Table 3.21). As one of the assumptions of regression analyses, all factors included in the analysis must correlate with one another. Table 3.8 indicates the correlation analyses between time 1, time 3 factors and sibling bullying factors that were included in the following hierarchical regression analyses.

Table 3.8. Pearson Correlation of Time 1 and Time 3 Factors and Sibling Bullying Perpetration and Sibling Bullying Victimization

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. Sibling Bullying Perpetrator T2																
2. Sibling Bullying Victim T2	.62*** N=3639															
3. Parent-Child Conflict Time 1	.22*** N=3504	.16*** N=3457														
4. Self-Esteem T1	-.11*** N=3506	-.14*** N=3504	-.23*** N=4284													
5. Impulsivity T1	.20*** N=3505	.15*** N=3503	.36*** N=4278	-.25*** N=4280												
6. Social Alienation T1	.13*** N=3506	.17*** N=3504	.24*** N=4281	-.28*** N=4284	.34*** N=4282											
7. Violence Perpetration T1	.24*** N=3458	.15*** N=3457	.24*** N=4228	-.07*** N=4231	.30*** N=4225	.13*** N=4229										
8. Victim of Violence T1	.19*** N=3507	.21*** N=3505	.22*** N=4281	-.14*** N=4284	.27*** N=4285	.39*** N=4287	.40*** N=4229									
9. Parent-Child Conflict T3	.25*** N=3483	.20*** N=3481	.25*** N=3999	-.16*** N=4001	.14*** N=3998	.12*** N=3998	.10*** N=3948	.10*** N=3999								
10. Impulsivity T3	.21*** N=3496	.14*** N=3494	.26*** N=4013	-.18*** N=4015	.39*** N=4012	.15*** N=4012	.19*** N=3962	.15*** N=4013	.27*** N=4265							
11. Depression T3	.16*** N=3499	.19*** N=3497	.15*** N=4018	-.26*** N=4020	.13*** N=4017	.26*** N=4017	.02 N=3967	.18*** N=4018	.29*** N=4273	.25*** N=4285						
12. Risk-Taking Behaviour T3	.22*** N=3488	.15*** N=3486	.22*** N=4007	-.09*** N=4009	.31*** N=4006	.13*** N=4006	.25*** N=3956	.19*** N=4007	.26*** N=4259	.46*** N=4274	.21*** N=4279					
13. Social Alienation T3	.08*** N=3490	.15*** N=3488	.11*** N=4008	-.17*** N=4010	.15*** N=4007	.42*** N=4007	.03 N=3957	.22*** N=4008	.17*** N=4260	.18*** N=4275	.44*** N=4280	.20*** N=4276				
14. Public Antisocial Behaviour T3	.25*** N=3006	.14*** N=3004	.22*** N=3447	-.12*** N=3448	.29*** N=3447	.09*** N=3446	.24*** N=3406	.18*** N=3447	.28*** N=3636	.37*** N=3652	.18*** N=3655	.52*** N=3652	.06*** N=3654			
15. Peer Bullying Perpetration T3	.28*** N=3451	.17*** N=3450	.17*** N=3967	-.09*** N=3969	.24*** N=3967	.13*** N=3966	.24*** N=3918	.21*** N=3967	.23*** N=4218	.32*** N=4230	.24*** N=4238	.41*** N=4225	.18*** N=4226	.50*** N=3606		
16. Peer Bullying Victim T3	.07*** N=3491	.13*** N=3489	.09*** N=4010	-.12*** N=4012	.08*** N=4009	.31*** N=4009	.03 N=3959	.23*** N=4010	.10*** N=4262	.10*** N=4274	.36*** N=4281	.08*** N=4275	.53*** N=4276	.08*** N=3657	.19*** N=4228	
Means (SD) N	5.09 (2.34) 3642	4.99 (2.37) 3640	11.54 (4.16) 4290	21.10 (4.57) 4293	19.16 (5.63) 4287	15.49 (6.40) 4291	1.97 (2.47) 4238	3.72 (4.83) 4291	2.54 (1.09) 4275	18.74 (5.24) 4187	13.07 (4.31) 4294	11.01 (4.64) 4281	13.32 (6.08) 4282	6.86 (2.45) 3657	7.78 (2.80) 4239	5.46 (2.26) 4283

* $p < .05$, ** $p < .01$, *** $p < .001$; T2=Time 2; T3=Time 3

Sibling bullying perpetration.

For the assessment of whether sibling bullying perpetration at time 2 was a unique predictor parent-child conflict at time 3, parent-child conflict at time 3 was inserted as a dependent variable. Further, social alienation, impulsivity, victim of violence, violence perpetration and parent-child conflicts at time 1 were inserted in the first model together as independent variables, for the second model sibling bullying perpetration was added as independent variable (Table 3.9). It was found that in the first model parent-child conflict at time 1 had the highest *beta-coefficient* in relation to parent-child conflict at time 3. When sibling bullying perpetration was added to the equation, there was a significant change in the variance (from $R^2=.07$ to $R^2=.11$). It resulted in parent-child conflict and sibling bullying perpetration having equally strong *beta-coefficients* in relation to parent-child conflict at time 3.

Table 3.9. Hierarchical Regression: Parent-Child Conflict at Time 3 as Outcome of Sibling bullying Perpetration at Time 2

Variables	Parent-Child Conflict at Time 3 as Outcome of Sibling Bullying Perpetration at Time 2					
	B	SE B	B	B	SE B	β
Social Alienation T1	.01	.003	.05*	.01	.003	.04*
Impulsivity T1	.01	.004	.03	.01	.004	.01
Victim of Violence T1	.01	.004	.03	.01	.004	.02
Violence Perpetration T1	.01	.01	.02	-.01	.01	-.02
PC Conflict T1	.06	.01	.22***	.05	.01	.20***
Sibling Bullying Perpetration T2				.09	.01	.20***
R²	.07			.11		
F	F(5, 3291)=50.61, p<.001			F(6, 3290)=65.80, p<.001		
	R² Change: .036***					

* $p < .05$, ** $p < .01$, *** $p < .001$; T1=Time 1; T2=Time 2

For the assessment of whether sibling bullying perpetration at time 2 was an unique predictor of impulsivity at time 3, impulsivity at time 3 was inserted as a dependent variable and parent-child conflict, victim of violence, violence perpetration and impulsivity at time 1 were inserted in the first model together as independent

variables. Further, for the second model sibling bullying perpetration was added as independent variable (Table 3.10). It was found that in the first model impulsivity at time 1 had the highest *beta-coefficient* in relation to impulsivity at time 3. When sibling bullying perpetration was added to the equation, there was a significant change in the variance (from $R^2=.18$ to $R^2=.19$). This indicated that sibling bullying perpetration at time 2 significantly contribute to impulsive behaviour at time 3 ($\beta=.12^{***}$). Although it was a unique predictor of impulsive behaviour at time 3, the added variance was minimal, so overall this finding should be perceived with caution. Impulsive behaviour at time 1 was the most significant predictor of impulsive behaviour at time 3 above and beyond all other factors. As impulsivity at time 1 predicted sibling bullying perpetration at time 2, the small change in variance is not surprising.

Table 3.10. Hierarchical Regression: Impulsivity at time 3 as outcome of sibling bullying perpetration at time 2

Variables	Impulsivity at Time 3 as Outcome of Sibling Bullying Perpetration at Time 2					
	B	SE B	B	B	SE B	B
PC Conflict T1	.14	.02	.11**	.12	.02	.09***
Victim of Violence T1	.03	.02	.03	.02	.02	.02
Violence Perpetration T1	.10	.04	.05**	.06	.04	.03
Impulsivity T1	.32	.02	.34***	.32	.02	.33***
Sibling Bullying Perpetration T2				.26	.04	.12***
R²	.18			.19		
F	F(4, 3310)=178.73, p<.001			F(5, 3309)=154.96, p<.001		
	R² Change: .012***					

* $p < .05$, ** $p < .01$, *** $p < .001$; T1=Time 1; T2=Time 2

For the assessment of whether sibling bullying perpetration at time 2 was an unique predictor of risk-taking behaviours at time 3, risk-taking behaviours at time 3 was inserted as a dependent variables and parent-child conflict, victim of violence, violence perpetration and impulsivity at time 1 were inserted in the first model together as independent variables. Further, for the second model sibling bullying perpetration

was added as another independent variable (Table 3.11). It was found that in the first model impulsivity at time 1 had the highest *beta-coefficient* in relation to risk-taking behaviour at time 3. When sibling bullying perpetration was added to the equation, there was a significant change in the variance (from $R^2=.14$ to $R^2=.15$). This indicated that sibling bullying perpetration at time 2 significantly contributed to risk-taking behaviour at time 3 ($\beta=.12^{***}$). Although sibling bullying perpetration was a unique predictor, impulsivity did remain as the strongest predictor of risk-taking behaviour. As impulsivity at time 1 predicted sibling bullying perpetration at time 2, the small change in variance is not surprising.

Table 3.11. Hierarchical Regression: Risk-Taking Behaviour at Time 3 as outcome of Sibling bullying Perpetration at Time 2

Variables	Risk-Taking Behaviour at Time 3 as Outcome of Sibling Bullying Perpetration at Time 2					
	B	SE B	B	B	SE B	B
PC Conflict T1	.10	.02	.09***	.08	.02	.07***
Victim of Violence T1	.07	.02	.07***	.06	.02	.06**
Violence Perpetration T1	.25	.03	.14***	.22	.03	.12***
Impulsivity T1	.19	.02	.22***	.18	.02	.21***
Sibling Bullying Perpetration T2				.24	.03	.12***
R²	.14			.15		
F	F(4, 3302)=129.70, p<.001			F(5, 3301)=115.33, p<.001		
	R ² Change: .013***					

* $p < .05$, ** $p < .01$, *** $p < .001$; T1=Time 1; T2=Time 2

For the assessment of whether sibling bullying perpetration at time 2 was an unique predictor of public antisocial behaviour at time 3, antisocial behaviour at time 3 was inserted as the dependent variable and parent-child conflict, victim of violence, impulsivity and violence perpetration at time 1 were inserted in the first model together as independent variable, for the second model sibling bullying perpetration was added as another independent variable (Table 3.12). It was found that in the first model violence perpetration at time 1 had the highest *beta-coefficient* in relation to risk-taking behaviour at time 3. When sibling bullying perpetration was added to the equation,

there was a significant change in the variance (from $R^2=.12$ to $R^2=.15$). This indicated that sibling bullying perpetration at time 2 significantly contributed to public antisocial behaviour at time 3 ($\beta=.17^{***}$), this was equally strong as violence perpetration at time 1. This indicates that sibling bullying perpetration is a unique and strong predictor of public antisocial behaviour at time 3.

Table 3.12. Hierarchical Regression: Public Antisocial Behaviour at Time 3 as Outcome of Sibling Bullying Perpetration at Time 2

Variables	Public Antisocial Behaviour at Time 3 as Outcome of Sibling Bullying Perpetration at Time 2					
	B	SE B	B	B	SE B	β
PC Conflict T1	.07	.01	.11***	.05	.01	.09***
Victim of Violence T1	.03	.01	.07**	.03	.01	.05**
Impulsivity T1	.08	.01	.19***	.08	.01	.17***
Violence Perpetration T1	.13	.02	.13***	.10	.02	.10***
Sibling Bullying Perpetration T2				.17	.02	.17***
R^2	.12			.15		
F	F(4, 2861)=98.58, $p<.001$			F(5, 2860)=98.70, $p<.001$		
	R^2 Change: .026***					

* $p < .05$, ** $p < .01$, *** $p < .001$; T1=Time 1; T2=Time 2

For the assessment of whether sibling bullying perpetration at time 2 was a unique predictor of peer bullying perpetration at time 3, peer bullying perpetration at time 3 was inserted as the dependent variable and parent-child conflict, victim of violence, impulsivity and violence perpetration at time 1 were inserted in the first model together as independent variables, for the second model sibling bullying perpetration was added as another independent variable (Table 3.13). Surprisingly, it was found that in the first model impulsivity, rather than, violence perpetration at time 1 had the highest *beta-coefficient* in relation to peer bullying perpetration at time 3. When sibling bullying perpetration was added to the equation, there was a significant change in the variance (from $R^2=.10$ to $R^2=.14$). This indicated that sibling bullying perpetration at time 2 significantly contributed to peer bullying perpetration at time 3 ($\beta=.21^{***}$). Further, it indicated that sibling bullying perpetration at time 2 was a

unique contributor of peer bullying perpetration with the strongest predictive power, above and beyond all other factors at time 1. Impulsivity at time 1 remained as a stronger predictor than violence perpetration at time 1.

Table 3.13. Hierarchical Regression: Peer Bullying Perpetration at Time 3 as Outcome of Sibling Bullying Perpetration at Time 2

Variables	Peer Bullying Perpetration at Time 3 as Outcome of Sibling Bullying Perpetration at Time 2					
	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>B</i>	<i>SE B</i>	β
PC Conflict T1	.03	.01	.05**	.01	.01	.02
Victim of Violence T1	.06	.01	.11***	.05	.01	.09***
Impulsivity T1	.08	.01	.15***	.07	.01	.13***
Violence Perpetration T1	.16	.02	.14***	.12	.02	.11***
Sibling Bullying Perpetration T2				.25	.02	.21***
<i>R</i> ²	.10			.14		
<i>F</i>	<i>F</i> (4, 3269)=91.85, <i>p</i> <.001			<i>F</i> (5, 3268)=107.78, <i>p</i> <.001		
	<i>R</i> ² Change: .041***					

* *p* < .05, ** *p* < .01, *** *p* < .001; T1=Time 1; T2=Time 2

For the assessment of whether sibling bullying perpetration at time 2 was a unique predictor of peer bullying victimisation at time 3, peer bullying victimisation at time 3 was inserted in the model as dependent variable and parent-child conflict, impulsivity, violence perpetration, social alienation and victim of violence at time 1 were inserted in the first model together as independent variable. Further, for the second model sibling bullying perpetration was added as another independent variable (Table 3.14). Surprisingly, it was found that in the first model social alienation, rather than, victim of violence at time 1 had the highest *beta-coefficient* in relation to being a victim of peer bullying at time 3. However, being a victim of violence at time 1 was the second strongest predictor. When sibling bullying perpetration was added to the equation, there was no significant change in the variance (from $R^2=.11$). This indicated that sibling bullying perpetration at time 2 did not significantly contribute to being a victim of peer bullying at time 3 ($\beta=.02$).

Table 3.14. Hierarchical Regression: Peer Bullying Victim at Time 3 as Outcome of Sibling Bullying Perpetration at Time 2

Variables	Peer Bullying Victim at Time 3 as Outcome of Sibling Bullying Perpetration at Time 2					
	B	SE B	B	B	SE B	B
PC Conflict T1	.01	.01	.01	.01	.01	.01
Impulsivity T1	-.02	.01	-.04*	-.02	.01	-.04*
Violence Perpetration T1	-.05	.02	-.05*	-.05	.02	-.06**
Social Alienation T1	.09	.01	.25***	.09	.01	.25***
Victim of Violence T1	.07	.01	.16***	.07	.01	.16***
Sibling Bullying Perpetration T2				.02	.02	.02
R²	.11			.11		
F	F(5, 3299)=78.65, p<.001			F(6, 3298)=65.83, p<.001		
	R ² Change: .000					

* $p < .05$, ** $p < .01$, *** $p < .001$; T1=Time 1; T2=Time 2

Sibling bullying victimisation.

For the assessment of whether sibling bullying victimisation at time 2 was a unique predictor parent-child conflict at time 3, parent-child conflict at time 3 was inserted into the model as dependent variable and social alienation, impulsivity, victim of violence, violence perpetration and parent-child conflicts at time 1 were inserted in the first model together as independent variable. Further, for the second model sibling bullying victimisation was added as another independent variable (Table 3.15). It was found that in the first model parent-child conflict at time 1 had the highest *beta-coefficient* in relation to parent-child conflict at time 3. When sibling bullying victimisation was added to the equation, there was a significant change in the variance (from $R^2=.07$ to $R^2=.09$). It resulted in parent-child conflict still had a stronger predictive power on peer victimisation at time 3, than sibling bullying victimisation. Seeing that parent-child conflict was a strong predictor of sibling bullying victimisation this result is not surprising. However, sibling bullying victimisation was a unique predictor of parent-child conflict at time 3.

Table 3.15. Hierarchical Regression: Parent-Child Conflict at Time 3 as Outcome of Sibling Bullying Victimization at Time 2

Variables	PC Conflict at Time 3 as Outcome of Sibling Bullying Victim at Time 2					
	B	SE B	B	B	SE B	B
Social Alienation T1	.01	.003	.05*	.01	.03	.04** ^m
Impulsivity T1	.01	.004	.03	.01	.004	.02
Victim of Violence T1	.01	.004	.03	.003	.004	.01
Violence Perpetration T1	.01	.01	.02	.004	.01	.01
PC Conflict T1	.06	.01	.22***	.05	.01	.21***
Sibling Bullying Victim T2				.07	.01	.15***
	R²	.07		.09		
	F	F(5, 3290)=50.36, p<.001			F(6, 3289)=56.02, p<.001	
		R ² Change: .022***				

* $p < .05$, ** $p < .01$, *** $p < .001$; *_m = $p = .05-.06$; T1=Time 1; T2=Time 2

For the assessment of whether sibling bullying victimisation at time 2 was a unique predictor of depression at time 3, depression at time 3 was inserted into the model as dependent variable and violence perpetration, parent-child conflict, social alienation, self-esteem and victim of violence at time 1 were inserted in the first model together as independent variable. Further, for the second model sibling bullying victimisation was added as another independent variable (Table 3.16). It was found that in the first model self-esteem at time 1 had the highest *beta-coefficient* in relation to depression at time 3 (so that lower self-esteem predicted higher depression). When sibling bullying victimisation was added to the equation, there was a significant change in the variance (from $R^2=.11$ to $R^2=.15$). This indicated that sibling bullying victimisation at time 2 significantly contribute to impulsive behaviour at time 3 ($\beta=.13$ ***). Although sibling victimisation was a unique predictor of depression at time 3, lower self-esteem at time 1 still contributed more to depression at time 3, than sibling victimisation at time 2. Self-esteem at time 1 was the most significant predictor of depression at time 3 above and beyond all other factors. As low self-esteem at time 1 predicted sibling bullying victimisation at time 2, the small change in variance is not surprising.

Table 3.16. Hierarchical Regression: Depression at Time 3 as Outcome of Sibling Bullying Victimization at Time 2

Variables	Depression at Time 3 as Outcome of Sibling Bullying Victimization at Time 2					
	B	SE B	B	B	SE B	B
Violence Perpetration T1	-.11	.03	-.07***	-.13	.03	-.07***
PC Conflict T1	.06	.02	.06**	.05	.02	.05**
Social Alienation T1	.10	.01	.14***	.09	.01	.13
Self-Esteem T1	-.19	.02	-.20***	-.18	.02	-.19***
Victim of Violence T1	.10	.02	.11***	.09	.02	.01***
Sibling Bullying Victim T2				.23	.02	.13***
R²		.11			.13	
F	F(5, 3202)=84.85, p<.001			F(6, 3301)=81.39, p<.001		
	R ² Change: .015***					

* $p < .05$, ** $p < .01$, *** $p < .001$; T1=Time 1; T2=Time 2

For the assessment of whether sibling bullying victimisation at time 2 was a unique predictor of risk-taking behaviour at time 3, risk-taking behaviour at time 3 was inserted into the model as dependent variable and parent-child conflict, victim of violence, self-esteem and violence perpetration at time 1 were inserted in the first model together as independent variables. Further, for the second model sibling bullying victimisation was added as another independent variable (Table 3.17). It was found that in the first model violence perpetration at time 1 had the highest *beta-coefficient* in relation to risk-taking behaviour at time 3. When sibling bullying victimisation was added to the equation, there was a significant change in the variance (from $R^2=.09$ to $R^2=.10$). This indicated that sibling bullying victimisation at time 2 significantly contributed to risk-taking behaviour at time 3 ($\beta=.08$ ***). Although sibling victimisation was a unique predictor of risk-taking behaviour at time 3, violence perpetration and parent-child conflict at time 1 still contributed more to risk-taking behaviour at time 3 than sibling victimisation at time 2. As both of these factors predicted sibling bullying victimisation at time 2, the small change in variance is not surprising, due to intercorrelation.

Table 3.17. Hierarchical Regression: Risk-Taking Behaviour at Time 3 as Outcome of Sibling Bullying Victimization at Time 2

Variables	Risk-Taking Behaviour at Time 3 as Outcome of Sibling Bullying Victim at Time 2					
	B	SE B	B	B	SE B	B
PC Conflict T1	.17	.02	.15***	.16	.02	.14***
Victim of Violence T1	.10	.02	.10***	.09	.02	.09***
Self-Esteem T1	-.03	.02	-.02	-.12	.02	-.02
Violence Perpetration T1	.32	.03	.17***	.31	.03	.16***
Sibling Bullying Victim T2				.15	.03	.08***
	R²	.09		.10		
	F	F(4, 3297)=86.57, p<.001		F(5, 3296)=73.65, p<.001		
	R ² Change: .005***					

* $p < .05$, ** $p < .01$, *** $p < .001$; T1=Time 1; T2=Time 2

For the assessment of whether sibling bullying victimisation at time 2 was a unique predictor of social alienation at time 3, social alienation at time 3 was inserted into the model as dependent variable and parent-child conflict, violence perpetration, victim of violence, self-esteem and social alienation at time 1 were inserted in the first model together as independent variables. Further, for the second model sibling bullying victimisation was added another independent variable (Table 3.18). It was found that in the first model social alienation at time 1 had the highest *beta-coefficient* in relation to social alienation at time 3. When sibling bullying victimisation was added to the equation, there was a significant but small change in the variance (R^2 remained =.19). This indicated that sibling bullying victimisation at time 2 significantly contributed to social alienation at time 3 ($\beta=.08$ ***). Although sibling victimisation was a unique predictor of social alienation at time 3, social alienation at time 1 remained by far the most significant predictor of social alienation at time 3 above and beyond all other factors, all other factors had a very similar predictive power (*beta-coefficients* ranged from .01-.09). As social alienation at time 1 predicted sibling bullying victimisation at time 2, the small change in variance is not surprising, due to intercorrelation.

Table 3.18. Hierarchical Regression: Social Alienation at Time 3 as Outcome of Sibling Bullying Victimization at Time 2

Variables	Social Alienation at Time 3 as Outcome of Sibling Bullying Victim at Time 2					
	B	SE B	B	B	SE B	β
PC Conflict T1	-.003	.03	-.002	-.01	.03	-.01
Violence Perpetration T1	-.15	.04	-.06***	-.16	.04	-.07***
Victim of Violence T1	.12	.02	.10***	.11	.02	.09***
Self-Esteem T1	-.08	.02	-.06**	-.07	.02	-.05**
Social Alienation T1	.36	.02	.38***	.36	.02	.37***
Sibling Bullying Victim T2				.19	.04	.08***
R^2		.19			.19	
F	F(5, 3294)=150.98, $p < .001$			F(6, 3293)=130.28, $p < .001$		
	R^2 Change: .005***					

* $p < .05$, ** $p < .01$, *** $p < .001$; T1=Time 1; T2=Time 2

For the assessment of whether sibling bullying victimisation at time 2 was a unique predictor of public antisocial behaviour at time 3, public antisocial behaviour at time 3 was inserted into the model as dependent variable and parent-child conflict, self-esteem, social alienation, victim of violence, and violence perpetration at time 1 were inserted in the first model together as independent variables. Further, for the second model sibling bullying victimisation was added as another independent variable (Table 3.19). It was found that in the first model violence perpetration at time 1 had the highest *beta-coefficient* in relation to public antisocial behaviour at time 3. When sibling bullying victimisation was added to the equation, there was a significant but small change in the variance (R^2 remained =.14). This indicated that sibling bullying victimisation at time 2 significantly contributed to public antisocial behaviour at time 3 ($\beta=.05^{**}$). However, violence preparation, parent-child conflict, being a victim of violence and low self-esteem at time 1 all had stronger *beta coefficients* compared to sibling victimisation at time 2. This indicates that sibling victimisation at time 2 did not contribute much towards public antisocial behaviour at time 3.

Table 3.19. Hierarchical Regression: Public Antisocial behaviour at Time 3 as Outcome of Sibling Bullying Victimization at Time 2

Variables	Public Antisocial Behaviour at Time 3 as Outcome of Sibling Bullying Victim at Time 2					
	B	SE B	B	B	SE B	β
PC Conflict T1	.48	.06	.15***	.47	.06	.15***
Self-Esteem T1	-.11	.05	-.04*	-.10	.05	-.04*
Social Alienation T1	-.12	.04	-.06**	.13	.04	-.06**
Victim of Violence T1	.38	.05	.14***	.36	.05	.13***
Violence Perpetration T1	1.26	1.00	.23***	1.24	1.0	.23***
Sibling Bullying Victim T2				.26	.09	.05**
R²	.14			.14		
F	F(5, 3303)=108.82, p<.001			F(6, 3302)=92.28, p<.001		
	R ² Change: .002**					

* $p < .05$, ** $p < .01$, *** $p < .001$; T1=Time 1; T2=Time 2

For the assessment of whether sibling bullying victimisation at time 2 was a unique predictor of peer bullying perpetration at time 3, peer bullying perpetration at time 3 was inserted into the model as dependent variable and parent-child conflict, self-esteem, social alienation, victim of violence, and violence perpetration at time 1 were inserted in the first model together as independent variable. Further, for the second model sibling bullying victimisation was added as another independent variable (Table 3.20). It was found that in the first model violence perpetration at time 1 had the highest *beta-coefficient* in relation to peer bullying perpetration at time 3. When sibling bullying victimisation was added to the equation, there was a significant but small change in the variance (from $R^2 = .08$ to $.09$). This indicated that sibling bullying victimisation at time 2 significantly contributed to peer bullying perpetration at time 3 ($\beta = .10$ ***). Although sibling victimisation was a unique predictor of peer bullying perpetration at time 3, violence perpetration at time 1 was the most significant predictor of peer bullying perpetration at time 3. Sibling victimisation at time 2 and being a victim of violence at time 1 followed violence perpetration had equal amounts of predictive value and had the second strongest predictive power.

Table 3.20. Hierarchical Regression: Peer Bullying Perpetration at Time 3 as Outcome of Sibling Bullying Victimization at Time 2

Variables	Peer Bullying Perpetration at Time 3 as Outcome of Sibling Bullying Victim at Time 2					
	B	SE B	B	B	SE B	β
PC Conflict T1	.05	.01	.08***	.05	.01	.07***
Self-Esteem T1	-.01	.01	-.02	-.01	.01	-.01
Social Alienation T1	.02	.01	.05**	.02	.01	.04*
Victim of Violence T1	.06	.01	.11***	.06	.01	.10***
Violence Perpetration T1	.19	.02	.17***	.18	.02	.16***
Sibling Bullying Victim T2				.12	.02	.10***
	R^2	.08		.09		
	F	F(5, 3259)=60.22, $p < .001$			F(6, 3258)=56.46, $p < .001$	
	R^2 Change: .001**					

* $p < .05$, ** $p < .01$, *** $p < .001$; T1=Time 1; T2=Time 2

For the assessment of whether sibling bullying victimisation at time 2 was a unique predictor of peer bullying victim at time 3, peer bullying victim at time 3 was inserted as dependent variable and parent-child conflict, violence perpetration, social alienation, self-esteem, and victim of violence at time 1 were inserted in the first model together as independent variable. Further, for the second model sibling bullying victimisation was added as another independent variable (Table 3.21). It was found that in the first model social alienation at time 1 had the highest *beta-coefficient* in relation being a victim of peer bullying at time 3. When sibling bullying victimisation was added to the equation, there was a significant but small change in the variance (R^2 remained =.11). This indicated that sibling bullying victimisation at time 2 significantly contributed to peer bullying victimisation at time 3 ($\beta=.07***$). However, social alienation and victim of violence at time 1 had stronger *beta coefficients* compared to sibling victimisation at time 2. This indicates that sibling victimisation at time 2 did not contribute much to peer bullying victimisation at time 3.

Table 3.21. Hierarchical Regression: Peer Bullying Victimization at Time 3 as Outcome of Sibling Bullying Victimization at Time 2

Variables	Peer Bullying Victim at Time 3 as Outcome of Sibling Bullying Victim at Time 2					
	B	SE B	B	B	SE B	β
PC Conflict T1	-.001	.01	-.002	-.004	.01	-.01
Violence Perpetration T1	-.05	.02	-.06**	-.06	.02	-.06***
Social Alienation T1	.08	.01	.24***	.08	.01	.23***
Self-Esteem T1	-.02	.01	-.03	-.01	.01	-.03
Victim of Violence T1	.07	.01	.16***	.07	.01	.15***
Sibling Bullying Victim T2				.06	.02	.07***
R^2	.11			.11		
F	$F(5, 3294)=78.27, p<.001$			$F(6, 3293)=68.02, p<.001$		
	R^2 Change: .004**					

* $p < .05$, ** $p < .01$, *** $p < .001$; T1=Time 1; T2=Time 2

Outcomes at time 3 of sibling bullying roles at time 2: Pure bully, pure victim, bully-victim, neutral.

Table 3.22. Descriptive Statistics: One-way ANOVA: Time 3 Variables in Relation to Sibling Bullying Subgroups at Time 2: Neutral, Pure Bully, Pure Victim and Bully-Victim

T3: Variable	T2: Sibling Bully Type	Mean (SD)/ Median	N	F-Statistic/Chi Square
Parental Involvement	Neutral ^a	9.57 (1.89) ^{bcd}	1797	$F_w(3, 958.94)=40.09***$
	Pure Bully ^b	8.79 (2.09) ^{ac}	373	
	Pure Victim ^c	9.24 (2.09) ^{abd}	355	
	Bully-Victim ^d	8.76 (2.13) ^{ac}	971	
PC Conflict	Neutral ^a	2.30 (1.05) ^{bcd}	1794	$F_w(3, 978.22)=67.67***$
	Pure Bully ^b	2.87 (1.00) ^{ac}	369	
	Pure Victim ^c	2.63 (1.06) ^{abd}	353	
	Bully-Victim ^d	2.82 (1.05) ^{ac}	968	
PC Communication	Neutral ^a	9.84 (2.84) ^{bd}	1798	$F(3, 3488)=18.75***$
	Pure Bully ^b	9.01 (2.76) ^a	371	
	Pure Victim ^c	9.45 (2.80)	354	
	Bully-Victim ^d	9.12 (2.78) ^a	969	
Impulsivity	Neutral ^a	17.85 (5.35) ^{bd}	1798	$F_w(3, 1004.92)=47.98***$
	Pure Bully ^b	20.20 (4.57) ^{ac}	373	
	Pure Victim ^c	18.58 (5.19) ^{bd}	356	
	Bully-Victim ^d	19.93 (4.85) ^{ac}	970	
Depression	Neutral ^a	12.33 (4.06) ^{bcd}	1801	$F_w(3, 966.19)=35.88***$
	Pure Bully ^b	13.19 (4.22) ^{ad}	373	
	Pure Victim ^c	13.83 (4.49) ^a	356	
	Bully-Victim ^d	13.98 (4.50) ^{ab}	970	

* $p < .05$, ** $p < .01$, *** $p < .001$; T2=Time 2; T3=Time 3; PC= Parent-Child; ^{abcd} indicates significant differences between groups; F_w =F-Statistic according to Welch-test, due to homogeneity of variance not being met, in which cases the Games-Howell post hoc test was chosen

Table 3.22. Descriptive Statistics; One-way ANOVA: Time 3 Variables in Relation to Sibling Bullying Subgroups at Time 2: Neutral, Pure Bully, Pure Victim and Bully-Victim continued

T3: Variable	T2: Sibling Bully Type	Mean (SD)/ Median	N	F-Statistic/Chi Square
Risk-Taking Behaviour	Neutral ^a	10.12 (4.59) ^{bcd}	1797	$F_{w(3, 983.74)}=49.94^{***}$
	Pure Bully ^b	12.17 (4.37) ^{ac}	372	
	Pure Victim ^c	11.07 (4.53) ^{abd}	353	
	Bully-Victim ^d	12.07 (4.45) ^{ac}	967	
Closeness to Friends	Neutral ^a	12.89 (3.05)	1788	$F_{w(3, 964.79)}=1.96$
	Pure Bully ^b	12.71 (3.11)	369	
	Pure Victim ^c	13.16 (3.18)	352	
	Bully-Victim ^d	13.08 (3.23)	965	
Peer Pressure	Neutral ^a	Median: 6 ^{bcd}	1787	$X^2(3)=16.16^{**}$
	Pure Bully ^b	Median: 6 ^a	370	
	Pure Victim ^c	Median: 7 ^a	351	
	Bully-Victim ^d	Median: 6 ^a	967	
Number of Friends	Neutral ^a	Median : 5 ^b	1796	$X^2(3)=9.00^*$
	Pure Bully ^b	Median: 5 ^{ac}	372	
	Pure Victim ^c	Median: 5 ^b	353	
	Bully-Victim ^d	Median: 5	968	
Social Alienation	Neutral ^a	12.50 (5.79) ^{bcd}	1797	$F_{w(3, 961.91)}=19.60^{***}$
	Pure Bully ^b	13.53 (6.03) ^a	373	
	Pure Victim ^c	14.39 (6.40) ^a	353	
	Bully-Victim ^d	14.09 (6.17) ^a	968	
Delinquency	Neutral ^a	Median: 3 ^{bcd}	1802	$X^2(3)=207.55^{***}$
	Pure Bully ^b	Median: 11 ^{acd}	373	
	Pure Victim ^c	Median: 4 ^{abd}	356	
	Bully-Victim ^d	Median: 9 ^{abc}	970	
Public Antisocial Behaviour	Neutral ^a	6.35 (2.00) ^{bd}	1510	$F_{w(3, 835.18)}=49.06^{***}$
	Pure Bully ^b	7.75 (2.61) ^{acd}	328	
	Pure Victim ^c	6.63 (2.24) ^{bd}	301	
	Bully-Victim ^d	7.35 (2.56) ^{abc}	868	

* $p < .05$, ** $p < .01$, *** $p < .001$; T2=Time 2; T3=Time 3; PC= Parent-Child; ^{abcd} indicates significant differences between groups; F_w =F-Statistic according to Welch-test, due to homogeneity of variance not being met, in which cases the Games-Howell post hoc test was chosen

Table 3.22. Descriptive Statistics; One-way ANOVA: Time 3 Variables in Relation to Sibling Bullying Subgroups at Time 2: Neutral, Pure Bully, Pure Victim and Bully-Victim continued

T3: Variable	T2: Sibling Bully Type	Mean (SD)/ Median	N	F-Statistic/Chi Square
Peer Bullying Perpetration	Neutral ^a	7.21 (2.36) ^{bd}	1775	$F_w(3, 937.85)=63.34^{***}$
	Pure Bully ^b	8.63 (3.0) ^{ac}	368	
	Pure Victim ^c	7.40 (2.50) ^{bd}	352	
	Bully-Victim ^d	8.58 (3.11) ^{ac}	957	
Peer Bullying Victim	Neutral ^a	5.21 (2.0) ^{cd}	1797	$F_w(3, 940.98)=11.38^{***}$
	Pure Bully ^b	5.46 (2.32)	373	
	Pure Victim ^c	5.66 (2.37) ^a	353	
	Bully-Victim ^d	5.69 (2.44) ^a	969	

* $p < .05$, ** $p < .01$, *** $p < .001$; T2=Time 2; T3=Time 3; PC= Parent-Child; ^{abcd} indicates significant differences between groups; F_w =F-Statistic according to Welch-test, due to homogeneity of variance not being met, in which cases the Games-Howell post hoc test was chosen

One-way ANOVA analyses with post-hoc tests were conducted (Table 3.22).

For all variables, but parent-child communication, homogeneity of variance was not met. Therefore the Welch-test was selected to report the respective F -ratios. This was assumed to be the case due to the unequal sample sizes between groups. The results showed that neutrals experienced significantly higher parental involvement compared to any subgroup of sibling bullies (pure bully, pure victim or bully-victim).

Furthermore, sibling pure bullies and bully/victims were significantly more likely to have lower parental involvement compared to sibling pure victims. In terms of parent-child conflict, pure sibling bullies and sibling bully-victims were significantly more likely to have conflicts with their parents compared to pure victims and neutrals.

Furthermore, sibling pure victims were significantly more likely to have conflicts with their parents compared to neutrals. Pure sibling bullies and sibling bully-victims communicated significantly less with their parents compared to neutrals. Pure sibling bullies and sibling bully-victims indicated significantly the highest amount of impulsivity a year later, compared to pure sibling victims or neutrals. No significant

differences were found between sibling pure victims and neutrals. Sibling bullying subgroups (pure bullies, pure victims and bully/victims) were significantly more likely to have depression compared to neutrals. Furthermore, sibling bully-victims were significantly more likely to show signs of depression compared to bullies. All sibling bullying subgroups reported significantly higher risk-taking compared to neutrals. In addition, sibling pure bullies and sibling bully-victims were similar in their display of risk-taking behaviours and significantly higher compared to pure victims. Closeness to friends was not significant overall. In terms of number of friends, the median scores were all the same for all subgroups (all had a median of 5), however the Kruskal-Wallis test showed that there was a significant difference in number of friends between bullies and neutrals and bullies and victims. The Kruskal-Wallis test showed that there was a significant difference in peer pressure experienced by neutrals, compared to bullies, victims and bully-victims. However, the median scores showed that victims scored highest on experiencing peer pressure (score of 7) compared to neutrals, bullies or bully-victims (score of 6). In terms of social alienation all subgroups of sibling bullying (pure bully, pure victim and bully-victims) experienced significantly more social alienation compared to neutrals. In terms of delinquency, bullies had a significantly higher median score. This was followed by the median score from bully-victims, then victims and then neutrals. Sibling pure bullies and sibling bully-victims significantly exceeded pure victims and neutrals in their delinquency scores. In terms of public antisocial behaviour and peer bullying perpetration, sibling pure bullies and sibling bully-victims scored significantly highest, compared to sibling pure victims or neutrals. Sibling pure victims and neutrals did not significantly differ in their public antisocial behaviour or peer bullying perpetration scores. In addition, sibling pure bullies had higher public antisocial behaviour compared to sibling bully/victims. Lastly, sibling pure victims and sibling bully-victims scored significantly higher on being a peer

bullying victim, compared to neutrals. Sibling pure bullies did not significantly differ from any of the other subgroups (neutral, pure sibling victims or sibling bully-victims).

3.4.3. Aim 3: Explore the outcomes of sibling bullying two years later

Correlational preliminary analysis.

Preliminary descriptive statistics were examined (Table 3.23). The Pearson correlational analyses indicated that most factors at time 4 correlated significantly with being a perpetrator and victim of sibling bullying at time 2. All correlation coefficients were in the small to moderate range. It was found that sibling bullying and victimisation were significantly negatively related to parental involvement, parent-child leisure time, parent-child communication, parent-child adaptive conflict resolution and positively related to parent-child conflict. Further, in terms of child characteristics, sibling bullying and victimisation were both negatively related to self-esteem. Violation of school rules was positively related to sibling bullying and sibling victimisation. The social alienation variables also correlated with sibling bullying and sibling victimisation as expected, so that there were positive correlations with delinquency, sibling violence, peer bullying perpetration and peer bullying victimisation.

Table 3.23. Descriptive Statistics and Pearson Correlation Analysis with Sibling Bullying and Sibling Victimization at Time 2 and Outcomes at Time 4

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Sibling Bullying Perpetrator T2												
2. Sibling Bullying Victim T2	.62*** N=3639											
3. Parental Involvement T4	-.21*** N=3392	-.12*** N=3390										
4. Parent-Child Leisure Time T4	-.11*** N=3387	-.07*** N=3385	.31*** N=4131									
5. Parent-Child Communication	-.20*** N=3391	-.14*** N=3389	.52*** N=4136	.35*** N=4130								
6. Parent-Child Conflict T4	.21*** N=3391	.20*** N=3389	-.31*** N=4134	-.22*** N=4128	-.43*** N=4135							
7. Parent-Child conflict Resolution T4	-.18*** N=3395	-.15*** N=3393	.32*** N=4133	.32*** N=4127	.39*** N=4133	-.35*** N=4132						
8. Self-Esteem T4	-.09*** N=3397	-.14*** N=3395	.13*** N=4135	.17*** N=4129	.21*** N=4134	-.29*** N=4133	.26*** N=4137					
9. Violation of School Rules T4	.23*** N=3385	.12*** N=3383	-.41*** N=4123	-.26*** N=4117	-.33*** N=4122	.35*** N=4120	-.20*** N=4124	-.11*** N=4126				
10. Sibling Violence T4	.36*** N=3341	.27*** N=3339	-.20*** N=4070	-.12*** N=4064	-.17*** N=4069	.19*** N=4067	-.22*** N=4073	-.12*** N=4073	.23*** N=4061			
11. Peer Bullying Perpetration T4	.19*** N=3388	.13*** N=3386	-.30*** N=4123	-.18*** N=4117	-.31*** N=4122	.30*** N=4121	-.17*** N=4126	-.09*** N=4127	.51*** N=4115	.21*** N=4068		
12. Peer Bullying Victim T4	.05** N=3394	.10*** N=3392	-.03** N=4130	-.01 N=4124	-.70*** N=4129	.18*** N=4127	-.05** N=4131	-.22*** N=4133	.11*** N=4122	.06*** N=4068	.21*** N=4121	
Means	5.09	4.99	11.69	5.69	8.80	11.01	7.34	21.96	12.23	2.08	7.29	5.23
(SD)	(2.34)	(2.37)	(2.73)	(2.31)	(2.06)	(4.06)	(2.28)	(4.76)	(4.13)	(2.74)	(2.56)	(2.11)
N	3642	3440	4138	4132	4137	4135	4139	4141	4129	4076	4129	4136

* $p < .05$, ** $p < .01$, *** $p < .001$; *_m = $p = .05-.06$; T2=Time 2; T4=Time 4

Outcomes of being a sibling bully two years later: linear regression analysis.

All regressions were significant. All *beta coefficients* were significant, except for parent-child conflict resolution, meaning that all other assessed factors were a significant outcome of sibling bullying perpetration (Table 3.24). However, the variance of each individual factor was relatively low (R^2 's ranging from .002-.13). The *beta coefficients* were all in the low to moderate range. The highest *beta coefficient* in relation to sibling bullying perpetration at time 2 was sibling violence at time 4. This was followed by school rule violation, parent-child conflict, parental involvement, parent-child communication. Peer bullying perpetration ($\beta=.19$) and peer bullying victimisation ($\beta=.05$) at time 4 were not very strong outcomes of sibling bullying perpetration at time 2, compared to the other factors. Additionally, the directions of the *beta coefficients* were all in the expected direction, so that more sibling bullying perpetration at time 2 was associated with less parental involvement, parent-child leisure time, parent-child communication, parent-child conflict resolution (parent-child conflict resolution not being a significant outcome of sibling bullying perpetration) and less self-esteem. However, sibling bullying perpetration at time 2 was associated with more parent-child conflict, more school rule violation, sibling violence, peer bullying perpetration and peer bullying victimisation.

Outcomes of being a victim of sibling bullying two years later: linear regression analysis.

All regressions and *beta-coefficients* were significant, meaning that each assessed factor was a significant outcome of sibling bullying victimisation (Table 3.24). However, the variance of each individual factor was relatively low (R^2 's ranging from .01-.07). The *beta coefficients* were all in the low to moderate range. The highest *beta coefficient* in relation to sibling bullying victimisation at time 2 was sibling violence at

time 4, which was followed by parent-child conflict, parent-child conflict resolution, self-esteem, peer bullying perpetration, parental involvement, delinquency and then peer bullying victimisation at time 4. Peer bullying perpetration ($\beta=.13$) and peer bullying victimisation ($\beta=.01$) at time 4 did not have a strong association to sibling bullying victimisation at time 2, compared to the rest of the factors. Further, compared to the outcomes of sibling bullying perpetration, parent-child conflict resolution did have a significant association to sibling bullying victimisation. Again, the directions of the *beta coefficients* were mostly in the expected direction, so that more sibling bullying victimisation was associated with less parental involvement, parent-child communication, parent-child conflict resolution and self-esteem. And, more sibling bullying victimisation was associated with more parent-child conflict, violation of school rules, sibling violence, peer bullying perpetration and peer bullying victimisation. Parent-child leisure time and Attitude towards education as an outcome of being a victim of sibling bullying two years later, as these two variables did not correlate with one another.

Table 3.24. Linear Regression Analysis of Sibling Bullying at Time 2 and Outcomes at Time 4

Variable at Time 4	Perpetration of Sibling Bullying at Time 2					Victim of Sibling Bullying at Time 2				
	<i>B</i>	<i>SE B</i>	β	<i>R</i> ²	<i>F</i> -Ratio	<i>B</i>	<i>SE B</i>	β	<i>R</i> ²	<i>F</i> -Ratio
Parental Involvement	-.24	.02	-.21***	.04	<i>F</i> (1, 3390)=153.25, <i>p</i> <.001	-.14	.02	-.12***	.02	<i>F</i> (1, 3388)=52.11, <i>p</i> <.001
Parent-Child Leisure Time	-.11	.02	-.02***	.01	<i>F</i> (1, 3385)=39.52, <i>p</i> <.001	--	--	--	--	--
Parent-Child Communication	-.17	.02	-.20***	.04	<i>F</i> (1, 3389)=134.34, <i>p</i> <.001	-.12	.02	-.14***	.02	<i>F</i> (1, 3387)=66.67, <i>p</i> <.001
Parent-Child Conflict	.37	.03	.21***	.05	<i>F</i> (1, 3389)=159.05, <i>p</i> <.001	.35	.03	.20***	.04	<i>F</i> (1, 3387)=147.40, <i>p</i> <.001
Parent-Child conflict Resolution	-.17	.02	-.18	.03	<i>F</i> (1, 3393)=106.89, <i>p</i> <.001	-.14	.02	-.15***	.02	<i>F</i> (1, 3391)=73.83, <i>p</i> <.001
Self-Esteem	-.19	.04	-.09***	.01	<i>F</i> (1, 3395)=29.66, <i>p</i> <.001	-.28	.03	-.14***	.02	<i>F</i> (1, 3393)=66.66, <i>p</i> <.001
Violation of School Rules	.39	.03	.26***	.05	<i>F</i> (1, 3383)=179.97, <i>p</i> <.001	.20	.03	.12***	.01	<i>F</i> (1, 3381)=47.41, <i>p</i> <.001
Sibling Violence	.44	.02	.36***	.13	<i>F</i> (1, 3339)=505.28, <i>p</i> <.001	.31	.02	.27***	.07	<i>F</i> (1, 3337)=255.35, <i>p</i> <.001
Peer Bullying Perpetration	.20	.02	.19***	.03	<i>F</i> (1, 3386)=120.86, <i>p</i> <.001	.14	.02	.13***	.02	<i>F</i> (1, 3384)=60.00, <i>p</i> <.001
Peer Bullying Victim	.04	.02	.05**	.002	<i>F</i> (1, 3392)=7.47, <i>p</i> =.006	.09	.02	.10***	.01	<i>F</i> (1, 3390)=35.54, <i>p</i> <.001

* *p* < .05, ** *p* < .01, *** *p* < .001; *_m = *p* = .05-.06

Outcomes at time 4 of sibling bullying at time 2 while controlling for time 1 and time 3 factors.

In order to examine whether sibling bullying perpetration and sibling bullying victimisation were unique predictors of the respective outcomes at time 4, several hierarchical regression analyses were carried out, as follow-up analyses. Respectively relevant factors from time 1 and time 3 were selected as controls. The order in which control variables were inserted into the regression analysis, was based on the strength of the beta-coefficient in the linear regression analysis of the predictors of sibling bullying at time 2 (Table 3.5) and the linear regression analysis of the outcomes at time 3 of sibling bullying at time 2 (Table 3.7). Only the outcomes with highest *beta-coefficients* of the previously conducted linear regression (Table 3.24) were selected for follow-up analyses. It was assessed whether sibling bullying perpetration at time 2 was a unique predictor of parent-child conflict, school rule violation, sibling violence and peer bullying perpetration at time 4 (Table 3.26-3.29). Further, it was assessed whether sibling bullying victimisation at time 2 was a unique predictor of parent-child conflict, sibling violence, self-esteem, peer bullying perpetration and peer bullying victimisation at time 4 (Table 3.30-3.34). As one of the assumptions of regression analyses, all factors included in the analysis must correlate with one another. Table 3.25 indicates the correlation analyses between time 1, time 3, sibling bullying factors and time 4 factors that were included in the following hierarchical regression analyses.

Table 3.25. Pearson's Correlation between Time 1, Time 3, Sibling Bullying Factors and Time 4 Factors

Variable	PC-Conflict T4	Self-Esteem T4	School Rule Violation T4	Sibling Violence T4	Peer Bullying Perpetration T4	Peer Bullying Victim T4
Sibling Bullying Perpetrator T2	.21*** N=3391	-.09*** N=3397	.23*** N=3385	.36*** N=3341	.19*** N=3388	.05** N=3394
Sibling Bullying Victim T2	.20*** N=3389	-.14*** N=3395	.12*** N=3383	.27*** N=3339	.13*** N=3386	.10*** N=3392
Parent-Child Conflict T1	.32*** N=3894	-.12*** N=3899	.23*** N=3887	.10*** N=3838	.15*** N=3888	.06*** N=3895
Self-Esteem T1	-.17*** N=3895	.44*** N=3900	-.10*** N=3888	-.10*** N=3838	-.05** N=3889	-.13*** N=3896
Impulsivity T1	.20*** N=3893	-.09*** N=3898	.27*** N=3886	.13*** N=3836	.19*** N=3887	.07*** N=3894
Social Alienation T1	.19*** N=3895	-.20*** N=3900	.02*** N=3888	.06*** N=3838	.11*** N=3889	.26*** N=3896
Violence Perpetration T1	.08*** N=3846	.05*** N=3851	.26*** N=3839	.19*** N=3790	.20*** N=3840	.03 N=3847
Victim of Violence T1	.15*** N=3894	-.07*** N=3899	.19*** N=3887	.14*** N=3837	.18*** N=3888	.21*** N=3895
Parent-Child Conflict T3	.36*** N=4073	-.18*** N=4079	.23*** N=4069	.18*** N=4015	.15*** N=4068	.07*** N=4074
Impulsivity T3	.28*** N=4087	-.17*** N=4092	.36*** N=4082	.16*** N=4028	.24*** N=4081	.08*** N=4087
Depression T3	.27*** N=4091	-.40*** N=4097	.16*** N=4087	.10*** N=4033	.14*** N=4086	.27*** N=4092
Risk-Taking Behaviour T3	.26*** N=4081	-.06*** N=4086	.42*** N=4076	.19*** N=4022	.33*** N=4075	.07*** N=4081
Social Alienation T3	.18*** N=4081	-.26*** N=4086	.03* N=4076	.05** N=4022	.13*** N=4075	.38*** N=4081
Public Antisocial Behaviour T3	.26*** N=3485	-.09*** N=3489	.52*** N=3480	.19*** N=3433	.36*** N=3478	.07*** N=3485
Peer Bullying Perpetration T3	.23*** N=4038	-.07*** N=4044	.40*** N=4034	.19*** N=3982	.47*** N=4033	.14*** N=4039
Peer Bullying Victim T3	.13*** N=4080	-.17*** N=4086	.06*** N=4076	.04* N=4022	.13*** N=4075	.44*** N=4081
Mean	11.01	21.96	12.23	2.07	7.39	5.23
(SD)	(4.06)	(4.76)	(4.13)	(2.74)	(2.56)	(2.11)
N	4135	4141	4129	4076	4129	4136

Sibling bullying perpetration.

For the assessment of whether sibling bullying perpetration at time 2 was an unique predictor of parent-child conflict at time 4, victim of violence, parent-child conflict at time 4 was inserted as dependent variable and violence perpetration, impulsivity and parent-child conflict at time 1 were inserted in the first model together as independent variables, for the second model peer bullying perpetration, public antisocial behaviour, risk-taking behaviour, impulsivity and parent-child conflict at time 3 were added together as independent variables, lastly for the third model sibling bullying perpetration at time 2 was added as another independent variable (Table 3.26).

It was found that in the first model parent-child conflict at time 1 had the highest *beta-coefficient* in relation to parent-child conflict at time 4. Then when the time 3 factors were added in the second model there was a significant change in variance (from $R^2=.08$ to $R^2.18$). Further, it resulted that parent-child conflict at time 3 was a stronger predictor of parent-child conflict at time 4, than parent-child conflict at time 1 (however parent-child conflict at time 1 was the second strongest predictor overall). Then when sibling bullying perpetration at time 2 was added in model three, there was a small but significant change in variance (from $R^2=.18$ to $R^2.19$), meaning that sibling bullying perpetration at time 2 significantly contributed to parent-child conflict at time 4 ($\beta=.04$, $p=.005$). However, parent-child conflict at time 1 and time 3 were still the most significant factors above all other factors.

Table 3.26. Hierarchical Regression Analysis: Parent-Child Conflict at Time 4 as Outcome of Sibling Bullying Perpetration at Time 2, while controlling for Time 1 and Time 3 Factors

Variables	Parent-Child Conflict at Time 4 as Outcome of Sibling Bullying Perpetration at Time 2								
	B	SE B	β	B	SE B	β	B	SE B	B
Victim of Violence T1	.06	.03	.07*	.05	.02	.06*	.04	.02	.06
Violence Perpetration T1	-.12	.05	-.08*	-.15	.05	-.09**	-.16	.05	-.10**
Impulsivity T1	.08	.03	.09**	.03	.03	.03	.03	.03	.03
PC Conflict T1	.23	.03	.23***	.17	.03	.16***	.16	.03	.16***
Peer Bullying Perpetration T3				.16	.04	.11***	.14	.05	.10**
Public Antisocial Behaviour T3				.16	.06	.09**	.14	.06	.09*
Risk-Taking Behaviour T3				.01	.03	.01	.02	.03	.02
Impulsivity T3				.05	.03	.05	.04	.03	.05
PC Conflict T3				1.00	.12	.24***	1.00	.12	.23***
Sibling Bullying Perpetration T2							.18	.06	.08**
R²	.07			.18			.19		
F	F(4, 1070)=23.36, p<.001			F(9, 1065)=27.32, p<.001			F(10, 1064)=25.56, p<.000		
R² Change:	.107***						.006**		

* $p < .05$, ** $p < .01$, *** $p < .001$, *^m=.05< p <.06; T1=Time 1; T2=Time 2; T3=Time 3; PC= Parent-Child

For the assessment of whether sibling bullying perpetration at time 2 was an unique predictor of school rule violation at time 4, school rule violation at time 4 was entered into the model as dependent variable and impulsivity, victim of violence, parent-child conflict, and perpetration of violence at time 1 were inserted in the first model together as independent variables, for the second model peer bullying perpetration, impulsivity, risk-taking behaviour, and public antisocial behaviour at time 3 were added together as independent variables, lastly for the third model sibling bullying perpetration at time 2 was added as another independent variable (Table 3.27). It was found that in the first model violence perpetration at time 1 followed by impulsivity at time 1 had the highest *beta-coefficient* in relation to school rule violation at time 4. Then when the time 3 factors were added in the second model there was a significant change in variance (from $R^2=.06$ to $R^2.27$). Further, impulsivity at time 1 was no longer a significant predictor of school rule violation. However, impulsivity at time 3 was a significant predictor of school rule violations at time 4. Further, public antisocial behaviours and parent-child conflict at time 3 were by far the most relevant predictors of school rule violation at time 4. These factors were followed in their predictive power of school rule violation by bullying perpetration at time 3. Then when sibling bullying perpetration at time 2 was added in model three, there was a small but significant change in variance (R^2 remained = .27), meaning that sibling bullying perpetration at time 2 significantly contributed to school rule violations at time 4 ($\beta=.05$, $p=.04$). However, public antisocial behaviours, impulsivity and peer bullying perpetration at time 3 were still the most significant factors above all other factors.

Table 3.27. Hierarchical Regression Analysis: School Rule Violation at Time 4 as Outcome of Sibling Bullying Perpetration at Time 2, while controlling for Time 1 and Time 3 Factors

Variables	School Rule Violation at Time 4 as Outcome of Sibling Bullying Perpetration at Time 2								
	B	SE B	B	B	SE B	β	B	SE B	B
PC Conflict T1	.10	.03	.09**	.03	.03	.03	.03	.03	.03
Victim of Violence T1	.06	.03	.07*	.03	.02	.03	.03	.02	.03
Violence Perpetration T1	.18	.05	.11**	.11	.05	.07*	.10	.05	.06*
Impulsivity T1	.10	.03	.11***	-.01	.03	-.01	-.01	.03	-.101
PC Conflict T3				.26	.12	.06*	.26	.12	.05** ^m
Public Antisocial Behaviour T3				.57	.06	.33*	.57	.06	.33***
Peer Bullying Perpetration T3				.15	.04	.11***	.14	.04	.10**
Risk-Taking Behaviour T3				.04	.03	.04	.04	.03	.04
Impulsivity T3				.13	.03	.13***	.17	.03	.13***
Sibling Bullying Perpetration T2							.12	.06	.06*
R²	.06			.27			.27		
F	F(4, 1070)=18.76, p<.001			F(9, 1065)=44.44, p<.001			F(10, 1064)=40.52, p<.001		
R² Change:	.21***						.003*		

* $p < .05$, ** $p < .01$, *** $p < .001$; *m = $.05 < p < .06$ T1=Time 1; T2=Time 2; T3=Time 3; PC= Parent-Child

For the assessment of whether sibling bullying perpetration at time 2 was an unique predictor of sibling violence at time 4, sibling violence at time 4 was entered into the model as dependent variable and parent-child conflict, impulsivity, victim of violence and perpetration of violence at time 1 were inserted in the first model together as independent variables, for the second model public antisocial behaviour, parent-child conflict, risk-taking behaviour, impulsivity and peer bullying perpetration at time 3 were added together as independent variables, lastly for the third model sibling bullying perpetration at time 2 was added as another independent variable (Table 3.28). It was found that in the first model having been a perpetrator of violence at time 1 had the highest *beta-coefficient* in relation to sibling violence at time 4. Then when the time 3

factors were added in the second model there was a significant change in variance (from $R^2=.03$ to $R^2.05$). Having been a perpetrator of violence at time 1 remained as significant predictors of sibling violence at time 3 with the highest *beta-coefficient*. Further, parent-child conflicts and risk-taking behaviour at time 3 added significantly to the variance explaining sibling violence at time 4. Interestingly, peer bullying perpetration at time 3 was not a significant predictor sibling violence at time 4. Then when sibling bullying perpetration at time 2 was added in model three, there was a significant change in variance (from $R^2.05$ to $R^2= .07$). This indicated that sibling bullying perpetration at time 2 was a significant and unique predictor of sibling violence at time 4 ($\beta=.15, p<.000$). Violence perpetration at time 1, parent-child conflicts and risk-taking behaviour at time 3 remained as significant predictors. However, above all other factors sibling bullying perpetration at time 2 was the most relevant predictor of sibling violence at time 4.

Table 3.28. Hierarchical Regression Analysis: Sibling Violence at Time 4 as Outcome of Sibling Bullying Perpetration at Time 2, while controlling for Time 1 and Time 3 Factors

Variables	Sibling Violence at Time 4 as Outcome of Sibling Bullying Perpetration at Time 2								
	B	SE B	B	B	SE B	β	B	SE B	β
PC Conflict T1	-.01	.02	-.01	-.03	.02	-.04	-.03	.02	-.04
Impulsivity T1	.02	.02	.04	.003	.02	.01	.001	.02	-.002
Victim of Violence T1	.03	.02	.05	.02	.02	.04	.02	.02	.03
Violence Perpetration T1	.15	.04	.04	.13	.04	.12***	.12	.04	.11**
Public Antisocial Behaviour T3				.04	.04	.03	.02	.04	.02
PC Conflict T3				.23	.09	.08**	.20	.09	.07*
Risk-Taking Behaviour T3				.06	.03	.09**	.06	.02	.09**
Impulsivity T3				.01	.02	.01	.003	.02	.004
Peer Bullying Perpetration T3				.04	.03	.05	.03	.03	.03
Sibling Bullying Perpetration T2							.22	.05	.15***
R²	.03			.05			.07		
F	F(4, 1057)=8.26, p<.001			F(9, 1052)=7.12, p<.001			F(10, 1051)=8.77, p<.001		
R² Change	.27***					.02***			

* $p < .05$, ** $p < .01$, *** $p < .001$; T1=Time 1; T2=Time 2; T3=Time 3; PC= Parent-Child

For the assessment of whether sibling bullying perpetration at time 2 was an unique predictor of peer bullying perpetration at time 4, peer bullying perpetration at time 4 was entered into the model as dependent variable and parent-child conflict, impulsivity, victim of violence and perpetration of violence at time 1 were inserted in the first model together as independent variables, for the second model parent-child conflict, risk-taking behaviour, impulsivity, public antisocial behaviour and peer bullying perpetration at time 3 were added together as independent variables, lastly for the third model sibling bullying perpetration at time 2 was added as another independent variable (Table 3.29). It was found that in the first model violence perpetration at time 1 had the highest *beta-coefficient* in relation to sibling violence at

time 4. Then when the time 3 factors were added in the second model there was a significant change in variance (from $R^2=.04$ to $R^2.22$). The most significant predictor of peer bullying perpetration at time 4 was peer bullying perpetration at time 3. The only other significant predictor of peer bullying at time 4 was public antisocial behaviour. Then when sibling bullying perpetration at time 2 was added in model three, there was no significant change in variance, which indicates that sibling bullying perpetration at time 2 was not a unique predictor of peer bullying perpetration at time 4. Above all other factors peer bullying perpetration at time 3 was the most relevant predictor of peer bullying perpetration at time 4.

Table 3.29. Hierarchical Regression Analysis: Peer bullying Perpetration at Time 4 as Outcome of Sibling Bullying Perpetration at Time 2, while controlling for Time 1 and Time 3 Factors

Peer Bullying Perpetration at Time 4 as Outcome of Sibling Bullying Perpetration at Time 2									
Variables	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>B</i>	<i>SE B</i>	β
PC Conflict T1	.03	.02	.05	.02	.02	.03	.02	.02	.03
Impulsivity T1	.04	.02	.08*	.01	.02	.01	.01	.02	.01
Victim of Violence T1	.04	.02	.07*	.02	.02	.03	.01	.02	.03
Violence Perpetration T1	.09	.03	.09**	.03	.03	.03	.03	.03	.03
PC Conflict T3				-.03	.08	-.01	-.04	.08	-.02
Risk-Taking Behaviour T3				.04	.02	.06	.04	.02	.06
Impulsivity T3				-.003	.02	-.01	-.01	.02	-.01
Public Antisocial Behaviour T3				.11	.04	.11**	.11	.04	.10**
Peer Bullying Perpetration T3				.33	.03	.37***	.33	.03	.37***
Sibling Bullying Perpetration T2							.04	.04	.03
R^2	.04			.22			.22		
F	$F(4, 1071)=11.13, p<.001$			$F(9, 1066)=34.27, p<.001$			$F(10, 1065)=30.96, p<.001$		
R^2 Change	.19***					.001			

* $p < .05$, ** $p < .01$, *** $p < .001$; T1=Time 1; T2=Time 2; T3=Time 3; PC= Parent-Child

Sibling bullying victimisation.

For the assessment of whether sibling bullying victimisation at time 2 was an unique predictor of parent-child conflict at time 4, parent-child conflict at time 4 was entered into the model as dependent variable and victim of violence, self-esteem, violence perpetration and parent-child conflict at time 1 were inserted in the first model together as independent variables, for the second model peer bullying victim, peer bullying perpetrator, risk-taking behaviour and parent-child conflict at time 3 were added together as independent variables, lastly for the third model sibling bullying victim at time 2 was added as another independent variable (Table 3.30). It was found that in the first model parent-child conflict at time was by far the most influential factor on parent-child conflict at time 4. Then when the time 3 factors were added in the second model there was a significant change in variance (from $R^2=.11$ to $R^2.23$). All factors that were entered into the model resulted as significant predictors of parent-child conflict at time 4. Parent-child conflict at time 3 and at time 1 were the most significant predictors, which was followed by peer bullying perpetration and risk-taking behaviours at time 3. Then when sibling bullying victimisation at time 2 was added in model three, there was a small but significant change in variance (R^2 remained = .23). This indicated that sibling bullying victimisation at time 2 was a significant and unique predictor of sibling violence at time 4 ($\beta=.08^{***}$). All other factors in the model remained significant, with parent-child conflict at time 1 and time 3 still being the best predictors of parent-child conflict at time 4.

Table 3.30. Hierarchical Regression Analysis: Parent-Child Conflict at Time 4 as Outcome of Sibling Bullying Victimization at Time 2, while controlling for Time 1 and Time 3 Factors

Parent-Child Conflict at Time 4 as Outcome of Sibling Bullying Victimization at Time 2									
Variables	B	SE B	β	B	SE B	B	B	SE B	β
Victim of Violence T1	.08	.02	.10***	.04	.02	.05**	.03	.02	.04*
Self-Esteem T1	-.08	.02	-	-.05	.02	-.05**	-.04	.02	-.05**
			.09***						
Violence Perpetration T1	-.05	.03	-.03	-.11	.03	-.07***	-.11	.03	-.07***
PC Conflict T1	.28	.02	.28***	.20	.02	.20***	.20	.02	.20***
Peer Bullying Victim T3				.10	.03	.05**	.09	.03	.05**
Peer Bullying Perpetration T3				.14	.03	.10***	.14	.03	.09***
Risk-Taking behaviour T3				.09	.02	.10***	.09	.02	.10***
PC Conflict T3				.97	.06	.26***	.93	.06	.25***
Sibling Bullying Victim T2							.14	.03	.08***
R²	.11			.23			.23		
F	<i>F</i> (4, 3115)=101.79, <i>p</i> <.001			<i>F</i> (8, 3111)=114.59, <i>p</i> <.001			<i>F</i> (9, 3110)=105.20, <i>p</i> <.001		
R² Change:	.11***			.01***					

* *p* < .05, ** *p* < .01, *** *p* < .001; T1=Time 1; T2=Time 2; T3=Time 3; PC= Parent-Child

For the assessment of whether sibling bullying victimisation at time 2 was an unique predictor of sibling violence at time 4, sibling violence at time 4 was entered into the model as dependent variable and parent-child conflict, self-esteem, social alienation, victim of violence and violence perpetration at time 1 were inserted in the first model together as independent variables, for the second model parent-child conflict, depression, social alienation, risk-taking behaviour, peer bullying perpetration and peer bullying victim at time 3 were added together as independent variables, lastly for the third model sibling bullying victim at time 2 was added as another independent variable (Table 3.31). It was found that in the first model violence perpetration at time was by far the most influential factor on sibling violence at time 4. Then when the time 3 factors were added in the second model there was a significant change in variance (from $R^2=.06$ to $R^2.11$). Parent-child conflict was the most important predictor of

sibling violence at time 4, followed by violence perpetration at time 1 and risk-taking behaviour at time 3. The third most relevant factor for sibling violence at time 4 was peer bullying perpetration at time 3. Then when sibling bullying victimisation at time 2 was added in model three, there was but significant change in variance (from $R^2=.11$ to $R^2.14$). This indicated that sibling bullying victimisation at time 2 was a significant and unique predictor of sibling violence at time 4 ($\beta=.20^{***}$). Further, sibling bullying victim at time 2 was the most influential factor for sibling violence at time 4, compared to all other factors entered into the model. However, parent-child conflict, risk-taking behaviour at time 3 and violence perpetration at time 1 remained as significant predictors of sibling violence at time 4.

Table 3.31. Hierarchical Regression Analysis: Sibling Violence at Time 4 as Outcome of Sibling Bullying Victimization at Time 2, while controlling for Time 1 and Time 3 Factors

Variables	Sibling Violence at Time 4 as Outcome of Sibling Bullying Victimization at Time 2								
	B	SE B	β	B	SE B	B	B	SE B	β
PC Conflict T1	.03	.01	.04*	-.01	.01	-.01	-.01	.01	-.02
Self-Esteem T1	-.05	.01	-.08***	-.04	.01	-.06**	-.03	.01	-.05**
Social Alienation T1	-.01	.01	-.02	-.01	.01	-.03	-.01	.01	-.03
Victim of Violence T1	.05	.01	.09***	.04	.01	.07**	.03	.01	.05**
Violence Perpetration T1	.17	.02	.15***	.13	.02	.11***	.12	.02	.10***
PC Conflict T3				.34	.05	.13***	.28	.05	.11***
Depression T3				.01	.01	.02	.003	.01	.004
Social Alienation T3				-.01	.01	-.02	-.01	.01	-.03
Risk-Taking Behaviour T3				.07	.01	.11***	.06	.01	.11***
Peer Bullying Victim T3				-.01	.03	-.01	-.01	.03	-.01
Peer Bullying Perpetration T3				.10	.02	.10***	.09	.02	.09***
Sibling Bullying Victimization T2							.23	.02	.20***
R²	.06			.11			.14		
F	<i>F</i> (5, 3063)=37.14, <i>p</i> <.001			<i>F</i> (11, 3057)=34.12, <i>p</i> <.001			<i>F</i> (12, 3056)=42.83, <i>p</i> <.001		
R² Change:	.05***						.04***		

* *p* < .05, ** *p* < .01, *** *p* < .001; T1=Time 1; T2=Time 2; T3=Time 3; PC= Parent-Child

For the assessment of whether sibling bullying victimisation at time 2 was an unique predictor of self-esteem at time 4, self-esteem at time 4 was entered into the model as dependent variable and parent-child conflict, violence perpetration, social alienation, victim of violence and self-esteem at time 1 were inserted in the first model together as independent variables, for the second model parent-child conflict, peer bullying perpetration, peer bullying victim, social alienation and depression at time 3 were added together as independent variables, lastly for the third model sibling bullying victim at time 2 was added as another independent variable (Table 3.32). It was found that in the first model lower self-esteem at time 1 had by far the most predictive power

over having lower self-esteem at time 3. Then when the time 3 factors were added in the second model there was a significant change in variance (from $R^2=.21$ to $R^2.30$). Lower self-esteem at time 1 remained as the most powerful predictive of lower self-esteem at time 3 (though the *beta-coefficient* was lowered). Furthermore, depression at time 3 was the second most important predictor of lower self-esteem at time 3. Then when sibling bullying victimisation at time 2 was added in model three, there was a small but significant change in variance (R^2 remained $=.30$). This indicated that sibling bullying victimisation at time 2 was a significant and unique predictor of lower self-esteem ($\beta=-.04^*$). Further, lower self-esteem at time 1 and depression at time 3 remained unchanged in their predictive power over lower self-esteem at time 4.

Table 3.32. Hierarchical Regression Analysis: Self-Esteem at Time 4 as Outcome of Sibling Bullying Victimization at Time 2, while controlling for Time 1 and Time 3 Factors

Self-Esteem at Time 4 as Outcome of Sibling Bullying Victimization at Time 2									
Variables	B	SE B	B	B	SE B	β	B	SE B	B
PC Conflict T1	-.03	.02	-.03	.002	.02	-.002	-2.39	.01	.00
Violence Perpetration T1	.16	.03	.08***	.11	.03	.06**	.11	.03	.06**
Social Alienation T1	-.06	.01	-.08***	-.02	.01	-.02	-.01	.01	-.02
Victim of Violence T1	-.02	.02	-.02	.02	.02	.02	.02	.02	.02
Self-Esteem T1	.44	.02	.42***	.38	.02	.36***	.38	.02	.36***
PC Conflict T3				-.31	.07	-.07***	-.29	.07	-.01***
Peer Bullying Perpetration T3				.06	.03	.04*	.07	.03	.04*
Peer Bullying Victim T3				-.03	.04	-.02	-.03	.04	-.01
Social Alienation T3				-.05	.02	-.06**	-.05	.02	-.06**
Depression T3				-.29	.02	-.26***	-.29	.02	-.26***
Sibling Bullying Victimization T2							-.07	.03	-.04*
R²	.21			.30			.30		
F	$F(5, 3117)=167.84, p<.001$			$F(10, 3112)=133.29, p<.001$			$F(11, 3111)=121.78, p<.001$		
R² Change:	.09***					.001*			

* $p < .05$, ** $p < .01$, *** $p < .001$; T1=Time 1; T2=Time 2; T3=Time 3; PC= Parent-Child

For the assessment of whether sibling bullying victimisation at time 2 was an unique predictor of peer bullying perpetration at time 4, peer bullying perpetration at time 4 was entered into the model as dependent variable and self-esteem, parent-child conflict and violence perpetration at time 1 were inserted in the first model together as independent variables, for the second model depression, parent-child conflict, risk-taking behaviour and peer bullying perpetration at time 3 were added together as independent variables, lastly for the third model sibling bullying victim at time 2 was added as another independent variable (Table 3.33). It was found that in the first model violence perpetration at time 1 had the most predictive power over peer bullying perpetration at time 4, which was followed in its predictive power by victim of violence at time 1. Then when the time 3 factors were added in the second model there was a significant change in variance (from $R^2=.06$ to $R^2.26$). Peer bullying perpetration at time 3 was by far the most influential factor of peer bullying perpetration at time 4. This was followed by risk-taking behaviours at time 3. All other factors had very low *beta coefficients* (ranging from .004 to .04 (as absolute value)). Then when sibling bullying victimisation at time 2 was added in model three, there was no significant change in variance. This indicated that sibling bullying victimisation at time 2 was not a significant nor was it a unique predictor of peer bullying perpetration at time 4.

Table 3.33. Hierarchical Regression Analysis: Peer Bullying Perpetration at Time 4 as Outcome of Sibling Bullying Victimization at Time 2, while controlling for Time 1 and Time 3 Factors

Variables	Peer Bullying Perpetration at Time 4 as Outcome of Sibling Bullying Perpetration at Time 2								
	B	SE B	B	B	SE B	β	B	SE B	β
Victim of Violence T1	.06	.01	.11***	.02	.01	.04*	.02	.01	.04*
Self-Esteem T1	.000	.01	.000	.01	.01	.02	.01	.01	.02
PC Conflict T1	.06	.01	.09***	.02	.01	.03*	.02	.01	.03** ^m
Violence Perpetration T1	.13	.02	.13***	.04	.02	.04*	.04	.02	.04*
Peer Bullying Victim T3				.01	.02	.01	.01	.02	.01
Depression T3				-.002	.01	-.004	-.004	.01	-.01
PC Conflict T3				.08	.04	.04*	.08	.04	.03
Risk-Taking Behaviour T3				.07	.01	.13***	.07	.01	.13***
Peer Bullying Perpetration T3				.37	.02	.40***	.36	.02	.40***
Sibling Bullying Victimization T2							.03	.02	.03
R²	.06			.26			.26		
F	<i>F</i> (4, 3111)=48.55, <i>p</i> <.001			<i>F</i> (9, 3106)=120.36, <i>p</i> <.001			<i>F</i> (10, 3105)=108.61, <i>p</i> <.001		
R² Change:	.20***						.001		

* *p* < .05, ** *p* < .01, *** *p* < .001; T1=Time 1; T2=Time 2; T3=Time 3; PC= Parent-Child

For the assessment of whether sibling bullying victimisation at time 2 was an unique predictor of peer bullying victim at time 4, peer bullying victim at time 4 was entered into the model as dependent variable and violence perpetration, parent-child conflict, self-esteem, social alienation and victim of violence at time 1 were inserted in the first model together as independent variables, for the second model peer bullying perpetration, parent-child conflict, depression, social alienation and peer bullying victim at time 3 were added together as independent variables, lastly for the third model sibling bullying victim at time 2 was added as another independent variable (Table 3.34). It was found that in the first model social alienation and being a victim of violence at time 1 had the most predictive power over peer bullying victimisation at

time 4. Then when the time 3 factors were added in the second model there was a significant change in variance (from $R^2=.09$ to $R^2.23$). Peer bullying victim at time 3 was by far the most influential factor of peer bullying victimisation at time 4. This was followed by social alienation at time 3, victim of violence at time 1 and social alienation at time 1. All other significant factors had low *beta coefficients* (ranging from .05 to .06 (as absolute value)). Then when sibling bullying victimisation at time 2 was added in model three, there was no significant change in variance. This indicated that sibling bullying victimisation at time 2 was not a significant nor was it a unique predictor of peer bullying victimisation at time 4.

Table 3.34. Hierarchical Regression Analysis: Peer Bullying Victim at Time 4 as Outcome of Sibling Bullying Victimization at Time 2, while controlling for Time 1 and Time 3 Factors

Variables	Peer Bullying Victim Time 4 as Outcome of Sibling Bullying Victimization at Time 2								
	B	SE B	β	B	SE B	β	B	SE B	β
Violence Perpetration T1	-.04	.02	-.04*	-.02	.02	-.03	-.02	.02	-.03
PC Conflict T1	-.02	.01	-.03	-.01	.01	-.03	-.01	.01	-.03
Self-Esteem T1	-.04	.01	-.08***	-.03	.01	-.06**	.03	.01	-.06**
Social Alienation T1	.06	.01	.19***	.02	.01	.06**	.02	.01	.06**
Victim of Violence T1	.06	.01	.15***	.03	.01	.08***	.03	.01	.08***
Peer Bullying Perpetration T3				.04	.01	.05**	.04	.01	.05**
PC Conflict T3				-.05	.03	-.03	-.05	.03	-.03
Depression T3				.03	.01	.06**	.03	.01	.06**
Social Alienation T3				.05	.01	.13***	.05	.01	.13***
Peer Bullying Victim T3				.27	.02	.29***	.27	.02	.29***
Sibling Bullying Victimization T2							.01	.02	.01
R²	.09			.23			.23		
F	F(5, 3114)=60.79, p<.000			F(10, 3109)=92.71, p<.000			F(11, 3108)=84.28, p<.000		
R² Change:	.14***						.000		

* $p < .05$, ** $p < .01$, *** $p < .001$; T1=Time 1; T2=Time 2; T3=Time 3; PC= Parent-Child

Outcomes of sibling bullying roles: Pure bully, pure victim, bully-victim, neutral.

Table 3.35. Descriptive Statistics: One-way ANOVA: Time 4 Outcome Variables in Relation to Sibling Bullying Subgroups at Time 2: Neutral, Pure Bully, Pure Victim and Bully-Victim

T4: Variable	T2: Sibling Bully Type	Mean (SD) /Median	N	F-Statistic/Chi Square
Parental Involvement	Neutral ^a	12.04 (2.68) ^{bd}	1756	<i>F</i> (3, 3389)=32.21***
	Pure Bully ^b	10.99 (2.61) ^{ac}	357	
	Pure Victim ^c	11.68 (2.51) ^{bd}	350	
	Bully-Victim ^d	11.11 (2.75) ^{ac}	930	
PC Leisure Time	Neutral ^a	5.85 (2.28) ^{bd}	1754	<i>F</i> (3, 3384)=9.42***
	Pure Bully ^b	5.38 (2.32) ^a	357	
	Pure Victim ^c	5.52 (2.29)	350	
	Bully-Victim ^d	5.44 (2.30) ^a	927	
PC Communication	Neutral ^a	9.08 (1.96) ^{bcd}	1756	<i>F_w</i> (3, 944.51)=30.20***
	Pure Bully ^b	8.35 (2.0) ^{ac}	357	
	Pure Victim ^c	8.75 (2.07) ^{abd}	350	
	Bully-Victim ^d	8.37 (2.14) ^{ac}	929	
PC Conflict	Neutral ^a	10.27 3.67) ^{bcd}	1756	<i>F_w</i> (3, 932.49)=42.46***
	Pure Bully ^b	11.40 (4.02) ^{ad}	357	
	Pure Victim ^c	11.38 (4.0) ^{ad}	350	
	Bully-Victim ^d	12.07 (4.40) ^{abc}	929	
PC Conflict Resolution	Neutral ^a	7.60 (2.25) ^{bcd}	1756	<i>F</i> (3, 3392)=27.04***
	Pure Bully ^b	6.85 2.19) ^a	359	
	Pure Victim ^c	7.23 (2.32) ^a	349	
	Bully-Victim ^d	6.88 (2.18) ^a	932	
Self-Esteem	Neutral ^a	22.46 (4.63) ^{cd}	1758	<i>F</i> (3, 3394)=21.19***
	Pure Bully ^b	21.86 (4.79) ^c	358	
	Pure Victim ^c	20.81 (4.74) ^{ab}	350	
	Bully-Victim ^d	21.19 (4.90) ^a	932	
Attitude towards Education	Neutral ^a	Median: 5 ^{bd}	1758	<i>X²</i> (3)=51.25***
	Pure Bully ^b	Median: 6 ^a	359	
	Pure Victim ^c	Median: 5 ^d	350	
	Bully-Victim ^d	Median: 6 ^{ac}	931	

* *p* < .05, ** *p* < .01, *** *p* < .001; T2=Time 2; T4=Time 4; PC= Parent-Child; ^{abcd} indicates significant differences between groups; *F_w*=F-Statistic according to Welch-test, due to homogeneity of variance not being met, in which cases the Games-Howell post hoc test was chosen

Table 3.35. Descriptive Statistics: One-way ANOVA: Time 4 Outcome Variables in Relation to Sibling Bullying Subgroups at Time 2: Neutral, Pure Bully, Pure Victim and Bully-Victim continued

T4: Variable	T2: Sibling Bully Type	Mean (SD)	N	F-Statistic
Violation of School Rules	Neutral ^a	11.47 (3.65) ^{bd}	1750	$F_w(3, 919.37)=41.99***$
	Pure Bully ^b	13.50 (4.41) ^{ac}	359	
	Pure Victim ^c	12.0 (4.13) ^{bd}	350	
	Bully-Victim ^d	13.0 (4.31) ^{ac}	927	
Delinquency	Neutral ^a	Median: 3 ^{bcd}	1758	$X^2(3)=156.65***$
	Pure Bully ^b	Median: 9 ^{acd}	359	
	Pure Victim ^c	Median: 4 ^{abd}	350	
	Bully-Victim ^d	Median: 5 ^{abc}	932	
Sibling Violence	Neutral ^a	1.50 (2.35) ^{bcd}	1729	$F_w(3, 890.55)=133.38***$
	Pure Bully ^b	3.32 (2.93) ^{ac}	352	
	Pure Victim ^c	2.41 (2.78) ^{abd}	341	
	Bully-Victim ^d	3.57 (3.0) ^{ac}	920	
Peer Bullying Perpetration	Neutral ^a	6.99(2.26) ^{bcd}	1753	$F_w(3, 924.28)=31.97***$
	Pure Bully ^b	7.79 (2.62) ^a	359	
	Pure Victim ^c	7.40 (2.48) ^{ad}	348	
	Bully-Victim ^d	7.37 (2.51) ^{ac}	929	
Peer Bullying Victim	Neutral ^a	5.06 (1.92) ^{cd}	1756	$F_w(3, 932.23)=8.13***$
	Pure Bully ^b	5.24 (2.00)	358	
	Pure Victim ^c	5.45 (2.21) ^a	349	
	Bully-Victim ^d	5.46 (2.40) ^a	932	

* $p < .05$, ** $p < .01$, *** $p < .001$; T2=Time 2; T4=Time 4; PC= Parent-Child; ^{abcd} indicates significant differences between groups; Fw=F-Statistic according to Welch-test, due to homogeneity of variance not being met, in which cases the Games-Howell post hoc test was chosen

One-way ANOVA and post-hoc preliminary analyses were conducted (Table 3.35). For all variables except parental involvement, parent-child leisure time, parent-child conflict and self-esteem, the homogeneity of variance was not met. Therefore the Welch-test was selected to report the respective F -ratios. This was assumed to be the case due to the unequal sample sizes between groups. The results showed that sibling pure bullies and bully/victims have significantly lower parental involvement compared to pure victims and neutrals. Furthermore, sibling pure bullies and sibling bully-victims

spend significantly less leisure time with their parents compared to neutrals. Neutrals significantly experienced the highest amount of communication with their parents, compared to all other sibling bully subgroups (pure bullies, pure victims and bully-victims). In addition, sibling pure bullies and bully/victims have significantly lower communication with their parents compared to sibling pure victims. Conflict between parents and children was significantly higher amongst sibling bully-victims compared to neutrals, pure sibling victims and sibling pure bullies. In addition, all sibling bullying subgroups (pure bullies, pure victims and bully/victims) were significantly more likely to have conflicts between parents compared to neutrals. All sibling bullying subgroups were significantly less likely to have adaptive conflict resolution with parents compared to neutrals. However, there was no significant difference in adaptive conflict resolution between sibling pure bullies, sibling pure victims and sibling bully-victims. On the other hand, pure sibling victims and bully/victims were more likely to have lower self-esteem compared to neutrals, while sibling pure victims were also more likely to have lower self-esteem compared to sibling pure bullies. Kruskal-Wallis analysis indicated that in terms of attitude towards education neutrals and victims had significantly lower median scores, compared to bullies and bully-victims. Sibling bully-victims and sibling pure bullies scored significantly higher on violating school rules and delinquency compared to neutrals and sibling pure victims. Kruskal-Wallis analyses indicated that bullies had the highest median score on the delinquency scale, followed by bully-victims, then victims and lastly neutrals. All scores significantly differed. In addition, sibling pure bullies were significantly more likely to be involved in delinquency compared to bully/victims. There was no significant difference in rates of violating school rules or delinquency between neutrals and sibling pure victims. As expected, neutrals scored significantly lower on sibling violence compared to sibling pure bullies, sibling pure victims or sibling bully-victims. Furthermore, pure victims were

significantly less likely to be involved in sibling violence compared to sibling pure bullies or sibling bully-victims. All sibling bullying subgroups were significantly more likely to be involved in peer bullying perpetration also compared to neutrals. Sibling pure bullies scored highest on peer bullying perpetration, however their scores differed significantly only from the neutrals. Sibling bully/victims were also more likely to be involved in peer bullying compared to sibling pure victims. Lastly, neutrals were significantly least likely to be involved in peer victimisation compared to pure sibling victims and sibling bully/victims. Sibling pure bullies did not significantly differ from any of the other sibling bullying subcategories and neutrals.

3.4.4. Aim 4: Cross-over Effects from Sibling Bullying at Time 2 to Peer Bullying at Time 3 and Time 4

3.4.4.1. Sibling Pure Bullies

The cross-over effects of sibling bullying to peer bullying were assessed through a cross-tabulation analysis. The analysis showed that out of all sibling pure bullies at time 2, 27.2% were significantly more likely to become peer pure bullies one year later (at time 3) compared to those who became peer neutrals at time 3 (12%) (i.e., stronger carry-over effect) ($\chi^2(1, N = 1822) = 64.21, p < .001$) (Figure 3.2). The odds ratio analysis indicated that when children are sibling pure bullies, the odds that they will become peer pure bullies one year later are 2.75 higher (OR=2.75 [2.13-3.54]), than the sibling pure bullies who became peer neutrals.

Further, out of all sibling pure bullies (at time 2), 23.1% were significantly more likely to become peer pure bullies two years later (at time 4), compared to those who became peer neutrals at time 4 (14.3%) (i.e., stronger carry over effect) ($\chi^2(1, N =$

1856) = 19.98, $p < .001$) (Figure 3.2). The odds of having been a sibling pure bully for children who are peer pure bullies two years later are 1.81 times higher, than for the sibling pure bullies who became peer neutrals two years later (OR=1.81 [1.39-2.35]).

Analyses showed that out of all sibling pure bullies (at time 2) 15.3% were peer pure victims at time 3 (one year later), compared to 12.0% who became peer neutrals at time 3 (i.e., stronger carry over effect). However, the results were not significant ($\chi^2(1, N = 1461) = 1.63, p = .125$) (Figure 3.2). The odds of having been a sibling pure bully for children who are peer pure victims one year later are 1.33 higher (OR=1.33 [.86-2.06]), than for the sibling pure bullies who became peer neutrals one year later.

Out of all sibling pure bullies at time 2 19.0% were peer pure victims at time 4 (two years later) compared to 14.3% who became peer neutrals at time 4 (i.e., stronger carry over effect). However, the results were not significant ($\chi^2(1, N = 1547) = 2.53, p = .074$) (Figure 3.2). The odds of having been a sibling pure bully for children who became peer pure victims two years later are 1.41 times higher (OR=1.41 [.92-2.16]), than for children who became peer neutrals two years later.

The analysis showed that out of all sibling pure bullies at time 2 25.9% were peer bully-victims at time 3, compared to 12.0% who became peer neutrals at time 3 ($\chi^2(1, N = 1448) = 24.70, p < .001$) (Figure 3.2). The odds of having been a sibling pure bully for children who became peer bully-victims one year later are 2.57 times higher (OR=2.57 [1.75-3.76]), than for children who became peer neutrals.

Further, out of all sibling pure bullies at time 2, 22.3% were significantly more likely to become peer bully-victims two years later (at time 4), compared to those who became peer neutrals at time 4 (14.3%) (i.e., stronger carry-over effect) ($\chi^2(1, N = 1492) = 4.96, p = .023$) (Figure 3.2). The odds ratio analysis indicated that when

children are sibling pure bullies, the odds that they will become peer bully-victims two years later are 1.73 higher (OR=1.73 [1.06-2.82]), than the sibling pure bullies who became peer neutrals.

3.4.4.2. Sibling Pure Victims

In terms of sibling pure victims and peer pure bullies, cross tabulation analysis indicated that out of all sibling pure victims at time 2, 17.7% were more likely to become peer pure bullies one year later (at time 3), compared to those who became peer neutrals at time 3 (15.1%) (i.e., stronger carry-over effect). However, the results were not significant ($\chi^2(1, N = 1806) = 1.76, p = .105$) (Figure 3.3). The odds ratio analysis indicated that when children are sibling pure victims, the odds that they will become peer pure bullies one year later are 1.21 higher (OR=1.21 [.91-1.60]), than the sibling pure victims who became peer neutrals.

Further, it was shown that out of all sibling pure victims at time 2, 19.5% were significantly more likely to become peer pure bullies two years later (at time 4), compared to those who became peer neutrals at time 4 (14.3%) (i.e., stronger carry-over effect) ($\chi^2(1, N = 1835) = 7.10, p < .005$) (Figure 3.3). The odds ratio analysis indicated that when children are sibling pure victims, the odds that they will become peer pure bullies two years later are 1.46 higher (OR=1.46 [1.10-1.93]), than the sibling pure victims who became peer neutrals.

In terms of sibling pure victims and peer pure victims, the cross-over analysis indicated that out of all sibling pure victims at time 2, 20.1% were significantly more likely to become peer pure victims one year later (at time 3), compared to those who became peer neutrals at time 3 (15.1%) (i.e., stronger carry-over effect) ($\chi^2(1, N = 1519) = 3.20, p < .049$) (Figure 3.3). The odds ratio analysis indicated that when children are sibling pure victims, the odds that they will become peer pure victims one

year later are 1.42 higher (OR=1.42 [.97-2.07]), than the sibling pure victims who became peer neutrals.

The analysis showed that out of all sibling pure victims at time 2, 22.9% were significantly more likely to become peer pure victims two years later (at time 4), compared to those who became peer neutrals at time 4 (14.3%) (i.e., stronger carry-over effect) ($\chi^2(1, N = 1555) = 8.59, p = .003$) (Figure 3.3). The odds ratio analysis indicated that when children are sibling pure victims, the odds that they will become peer pure victims two years later are 1.79 higher (OR=1.79 [1.21-2.64]), than the sibling pure victims who became peer neutrals.

Further, it was found that out of all sibling pure victims at time 2, 20.3% were more likely to become peer bully-victims one year later (at time 3), compared to those who became peer neutrals at time 3 (15.1%) (i.e., stronger carry-over effect). However, the results were only marginally significant ($\chi^2(1, N = 1483) = 2.85, p < .061$) (Figure 3.3). The odds ratio analysis indicated that when children are sibling pure victims, the odds that they will become peer bully-victims one year later are 1.43 higher (OR=1.43 [.94-2.17]), than the sibling pure victims who became peer neutrals.

In terms of sibling pure victims and peer bully-victims, cross tabulation analyses showed that out of all sibling pure victim at time 2, 25.2% were significantly more likely to become peer bully-victims two years later (at time 4), compared to those who became peer neutrals at time 4 (14.3%) (i.e., stronger carry-over effect) ($\chi^2(1, N = 1496) = 9.37, p = .003$) (Figure 3.3). The odds ratio analysis indicated that when children are sibling pure victims, the odds that they will become peer bully-victims two years later are 2.03 higher (OR=2.03 [1.28-3.22]), than the sibling pure victims who became peer neutrals.

3.4.4.3. Sibling Bully-Victims

Out of all sibling bully-victims at time 2, 46.0% were significantly more likely to become peer pure bullies one year later (at time 3), compared to those who became peer neutrals at time 3 (27%) (i.e., stronger carry-over effect) ($\chi^2(1, N = 2276) = 81.03, p < .001$) (Figure 3.4). The odds ratio analysis indicated that when children are sibling bully-victims, the odds that they will become peer pure bullies one year later are 2.75 higher (OR=2.30 [1.92-2.77]), than the sibling bully-victims who became peer neutrals.

The analysis showed that out of all sibling bully-victims at time 2, 43.8% were significantly more likely to become peer pure bullies two years later (at time 4), compared to those who became peer neutrals at time 4 (28.9%) (i.e., stronger carry-over effect) ($\chi^2(1, N = 2315) = 46.30, p < .001$) (Figure 3.4). The odds ratio analysis indicated that when children are sibling bully-victims, the odds that they will become peer pure bullies two years later are 1.92 higher (OR=1.92 [1.59-2.31]), than the sibling bully-victims who became peer neutrals.

Further, out of all sibling bully-victims at time 2, 34.3% were significantly more likely to become peer pure victims one year later (at time 3), compared to those who became peer neutrals at time 3 (27%) (i.e., stronger carry-over effect) ($\chi^2(1, N = 1778) = 5.38, p = .013$) (Figure 3.4). The odds ratio analysis indicated that when children are sibling bully-victims, the odds that they will become peer pure victims one year later are 1.41 higher (OR=1.41 [1.05-1.89]), than the sibling bully-victims who became peer neutrals.

Out of all sibling bully-victims at time 2, 36.9% were significantly more likely to become peer pure victims two years later (at time 4), compared to those who became peer neutrals at time 4 (28.9%) (i.e., stronger carry-over effect) ($\chi^2(1, N = 1878) = 5.11, p = .016$) (Figure 3.4). The odds ratio analysis indicated that when children are sibling

bully-victims, the odds that they will become peer pure victims two years later are 1.42 higher (OR=1.42 [1.05-1.93]), than the sibling bully-victims who became peer neutrals.

The analysis showed that out of all sibling bully-victims at time 2, 51.5% were significantly more likely to become peer bully-victims one year later (at time 3), compared to those who became peer neutrals at time 3 (27.0%) (i.e., stronger carry-over effect) ($\chi^2(1, N = 1802) = 62.89, p < .001$) (Figure 3.4). The odds ratio analysis indicated that when children are sibling bully-victims, the odds that they will become peer bully-victims one year later are 2.87 higher (OR=2.87 [2.20-3.75]), than the sibling bully-victims who became peer neutrals.

Further, it was found that out of all sibling bully-victims at time 2, 53.8% were significantly more likely to become peer bully-victims two years later (at time 4), compared to those who became peer neutrals at time 4 (28.9%) (i.e., stronger carry-over effect) ($\chi^2(1, N = 1849) = 44.95, p < .001$) (Figure 3.4). The odds ratio analysis indicated that when children are sibling bully-victims, the odds that they will become peer bully-victims two years later are 2.86 higher (OR=2.86 [2.08-3.92]), than the sibling bully-victims who became peer neutrals.

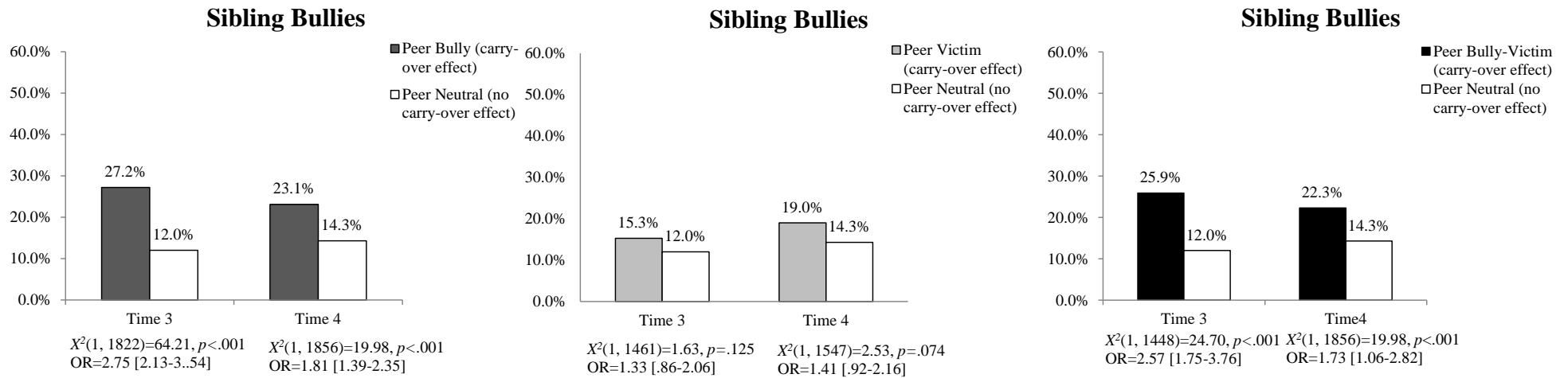


Figure 3.2. Cross-over effects of sibling pure bullies, to peer pure bullies, peer pure victims and peer bully-victims at time 3 and time 4

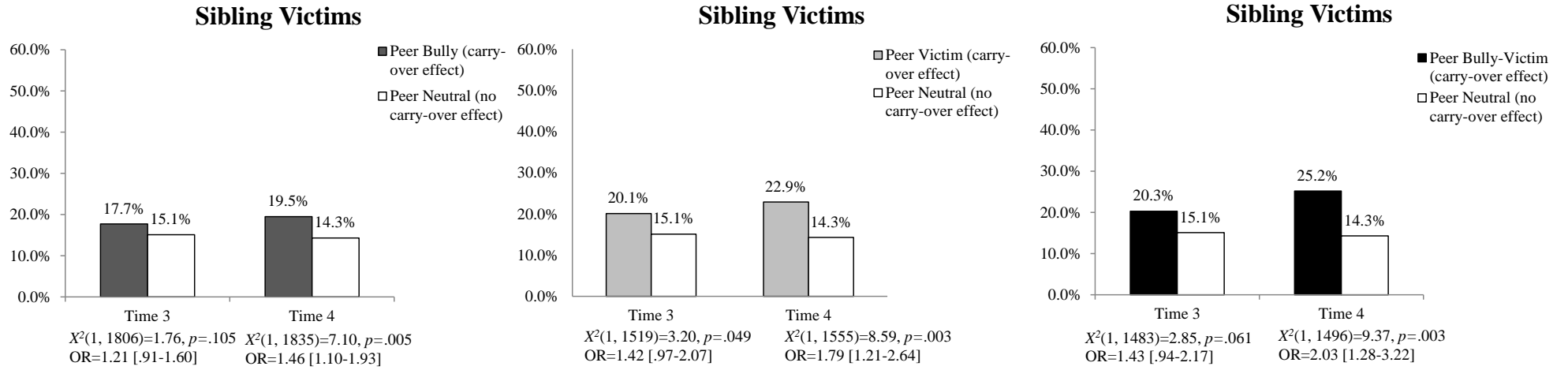


Figure 3.3. Cross-over effects of sibling pure victims, to peer pure bullies, peer pure victims and peer bully-victims at time 3 and time 4

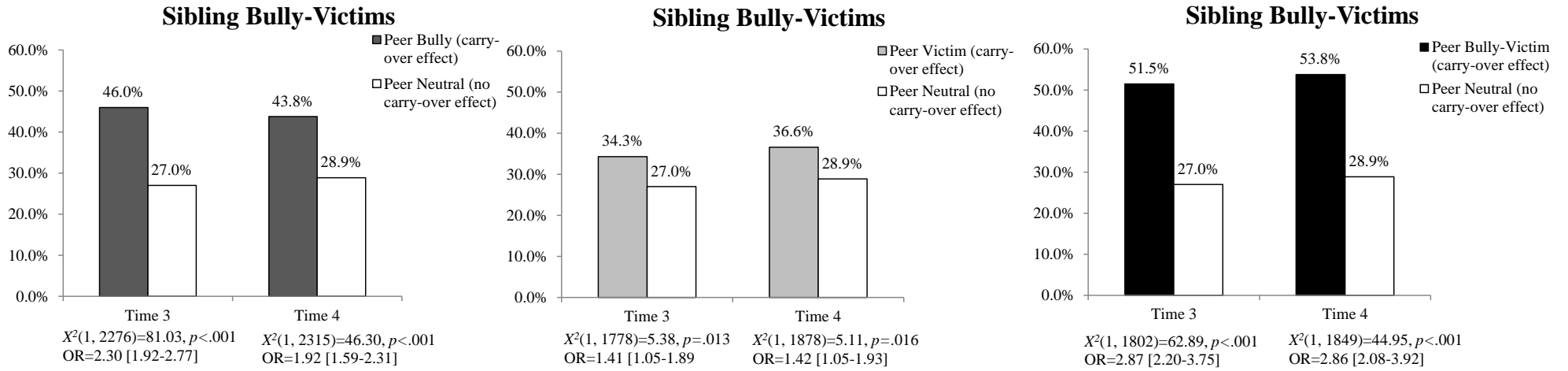


Figure 3.4. Cross-over effects of sibling bully-victims, to peer pure bullies, peer pure victims and peer bully-victims at time 3 and time 4

3.5. Discussion

3.5.1. Summary and Discussion of Findings

This study had four aims. The first aim was to assess the precursors of sibling bullying, particularly of being a perpetrator and of being a victim of sibling bullying. The second aim was to assess the outcomes after one year of sibling bullying, particularly of being a perpetrator and of being a victim of sibling bullying. Additionally, it was examined what the outcomes after one year were of sibling pure bullies, sibling pure victims and sibling bully-victims. The third aim was to assess the outcomes after two years of sibling bullying, particularly of being a perpetrator and of being a victim of sibling bullying. Additionally, it was examined what the outcomes after two years were of sibling pure bullies, sibling pure victims and sibling bully-victims. The fourth aim was to assess the cross-over effects from sibling bullying to peer bullying.

For the first aim the results show that conflicts between parents and children, violence perpetration and being a victims of violence were the most prominent factors related to being a perpetrator of sibling bullying one year later. Further, parental involvement protected most from being a perpetrator of sibling bullying. In terms of personality factors, impulsivity was most strongly related to being a perpetrator of sibling bullying. Being a victim of violence was the strongest predictor for sibling bullying one year later. Social alienation, violence perpetration and conflict between parents and children (in order of strength of association) also predicted sibling victimisation one year later. In terms of personality factors, having had low self-esteem was associated with being a victim of sibling bullying one year later.

For the second aim, results showed that sibling bullying perpetration predicted conflict between parents and children, impulsive behaviour, risk-taking behaviour,

public antisocial behaviour and peer bullying perpetration one year later. Sibling bullying perpetration was a significant predictor of these respective factors, despite controlling for various factors at time one. However, results showed that sibling bullying perpetration was not always the strongest predictor of these outcomes. Thus, parent-child conflict at time 1 had the strongest effect on parent child conflict at time 3, impulsivity at time 1 had the strongest effect on impulsivity at time 3, impulsivity at time 1 had the strongest effect on risk-taking behaviour at time 3 and impulsivity and violence perpetration at time 1 had the strongest effect on peer bullying perpetration at time 3. However, all factors at time 1 (parent-child conflict, impulsivity and violence perpetration) that predicted the respective factors at time 3, also predicted sibling bullying perpetration at time 2. It was interesting that impulsivity and violence perpetration at time 1 influenced sibling bullying perpetration at time 2 and peer bullying perpetration at time 3. This suggests that there are similarities in the nature of sibling and peer bullying perpetration and that intervention programs that aim to tackle these two factors (impulsivity and violence perpetration) could lower both sibling and peer bullying perpetration. Further, sibling bullying perpetration did not predict peer bullying victimisation. Peer bullying victimisation was predicted by social alienation and being a victim of violence at time 1, both of these factors were only slightly related to sibling bullying perpetration; however had a lot more predictive power over being a victim of sibling bullying. This suggests that having been a bully in a sibling relationship does not predict becoming a victim in a peer relationship; however, the cross-over effects analysis will be discussed later on in more detail.

Further, sibling bully victimisation predicted parent-child conflict, depression, risk-taking behaviour, social alienation, public antisocial behaviour, peer bullying perpetration and peer bullying victimisation one year later. Sibling bullying victimisation was a significant predictor of these respective factors, despite controlling

for various factors at time one. However, results showed that sibling bullying perpetration was not always the strongest predictor of these outcomes. However, all of the factors at time 1 that had stronger effects on the respective outcomes also predicted sibling bullying victimisation at time 2. Interestingly, sibling bullying victimisation at time 2 was associated with both peer bullying perpetration and victimisation at time 3. However, sibling bullying perpetration at time 2 was associated with peer bullying perpetration at time 3, but not with peer bullying victimisation at time 3. This suggests that when children were victims of sibling bullies there were more likely to be involved in both peer bullying perpetration and victimisation, compared to children who were involved in sibling bullying perpetration at time 2.

When looking at the outcomes of the different types of roles within a sibling bullying dynamic i.e. neutral, pure bully, pure victim and bully-victim, similarities emerged between pure bullies and bully-victims. For example, parental involvement and parental communication were smallest for pure bullies and bully-victims. Further, for both pure bullies and bully-victims, conflicts between children and parents were highest, so was impulsivity, risk-taking behaviour, peer pressure and peer bullying perpetration. This shows that there are similarities in outcomes one year later between sibling pure bullies and sibling bully-victims. Sibling pure victims also scored significantly lower on parental involvement and communication, compared to neutrals, while neutrals scored significantly higher on parent-child conflict, peer pressure, compared to sibling pure victims. Overall, neutrals were least affected by symptoms of depression, social alienation and delinquency, compared to pure bullies, pure victims and bully-victims. Compared to pure victims, pure bullies were more likely to show externalizing behaviour problems (impulsivity, risk-taking behaviours, delinquent behaviour, public antisocial behaviour and peer bullying perpetration). Further, compared to pure bullies, pure victims were more likely to develop internalizing

behaviour problems one year later (symptoms of depression, social alienation and peer bullying victimisation). Further, sibling pure bullies and sibling bully-victims scored highest on the peer bullying perpetration scales one year later and there was no statistical difference in scores between neutrals and victims on that scale. Contrastingly, sibling pure victims and sibling bully-victims scored highest on the peer bullying victim scale one year later. This suggests that sibling bully-victims are most likely to be involved in peer bullying, as they are more likely to be involved in peer bullying as a bully or as a victim.

For the third aim of the study it was found that sibling bullying perpetration at time 2 significantly predicted parent-child conflict at time 4. However, conflict between parents and children at time 1 and at time 3 were stronger predictors of parent-child conflict at time 4, compared to sibling bullying perpetration. Further sibling bullying perpetration also predicted more school rule violation at time 4, however, by far the most relevant predictor of school rule violations at time 4 was public antisocial behaviour at time 3, followed by impulsive behaviour at time 3. Public antisocial behaviour at time 3, which was also predicted by impulsivity at time 1, was also a significant outcome of sibling bullying perpetration at time 2. This finding suggests that impulsive behaviour at time 1 could be a personality factor that has potential to develop into several detrimental behaviours in adolescence (perpetration of sibling bullying, public antisocial behaviour, school rule violations). Furthermore, sibling bullying perpetration at time 2 was a significant predictor of sibling violence at time 4. This is an indication of sibling bullying provoking ongoing conflict between siblings. Interestingly, sibling bullying perpetration was not a predictor of peer bullying at time 4. This suggests that sibling bullying perpetration predicts peer bullying perpetration in the short run (one year later), however not in the long run (two years later).

Further, sibling bullying victimisation at time 2 significantly predicted parent-child conflict at time 4. However, conflict between parents and children at time 1 and at time 3 were stronger predictors of parent-child conflict at time 4, than being a victim of sibling bullying at time 2. Yet, parent-child conflict at time 1 did predict sibling bullying victimisation at time 2. Furthermore, sibling bullying victimisation at time 2 was also a significant predictor of sibling violence at time 4. This underlines the longevity of sibling bullying conflict. Sibling bullying victimisation did not predict peer bullying perpetration, however, did predict peer bullying victimisation. Although peer bullying victimisation at time 3, social alienation at time 1 and time 3, depression at time 3, low self-esteem at time 1 and being a victim of violence at time 1, were stronger predictors of peer victimisation at time 4, the results show that sibling victimisation at time 2 does influence peer bullying victimisation at time 4. This indicates that sibling bullying perpetration and sibling bullying victimisation at time 2, have stronger short term impacts (one year later) on peer bullying, rather than long term impacts (two years later).

When looking at the outcomes of the different types of roles within a sibling bullying dynamic i.e. neutral, pure bully, pure victim and bully-victim, again similarities emerged between pure bullies and bully-victims. Sibling pure bullies and sibling bully-victims scored lower on parental involvement, parent-child leisure time, parent-child communication, compared to neutrals and sibling pure victims. Sibling bully-victims scored highest on parent-child conflict, followed by pure bullies and pure victims and lastly neutrals. Further, neutrals scored highest on parent-child conflict resolution, compared to sibling pure bullies, pure victims or bully-victims. In terms of personality factors, sibling pure victims scored lowest on self-esteem at time 4, followed by pure bullies, bully-victims and neutrals. Pure sibling bullies and bully-victims were mostly likely to be involved in sibling violence at time 4, compared to

victims and neutrals. Neutrals at time 2 were significantly least likely to be involved in sibling violence at time 4. In terms of peer bullying involvement, sibling pure bullies, pure victims and bully-victims were all more likely to be involved in peer bullying perpetration and victimisation, compared to neutrals.

Lastly, the cross-over effects showed that overall, out of the children that were involved in sibling bullying (as a pure bully, pure victim or bully-victim), children were more likely to be involved in peer bullying (as pure bully, pure victim or bully-victim), rather than as peer neutrals one and two years later. This means that although overall most children are neutrals in sibling and peer dynamics, the likelihood of being involved in peer bullying dynamics one and two years later is higher for children that were involved in sibling bullying, compared to children that were not. This finding was supported by the chi square analyses that found that the cross-over effects were significant for having been a sibling pure bully to becoming a peer pure bully and peer bully-victim one and two years later, from having been a sibling pure victim to becoming a peer pure victim and peer bully-victim and for having been a sibling bully-victim to becoming a peer pure bully, peer pure victim and peer bully-victim. The other case where the cross-over effect was significant was for having been a sibling pure victim and becoming a peer pure bully two years later. The only cases where the cross-over effects were not significant was for having been a sibling pure bully and becoming a peer pure victim one and two years later and for having been a sibling pure victim and becoming a peer pure bully one year later. It should be noted that the strongest cross-over effect was for sibling bully-victims to peer bully-victims and peer neutrals one and two years later. More than half of all peer bully-victims one (51.5%) and two (53.8%) years later were sibling bully-victims before. Further, almost a third of all peer neutrals one (27.0%) and two (28.9%) years later were sibling bully-victims before.

Considering that it has been established by Wolke and Skew (2012a) and Wolke and

Lereya (2014) that bully-victims tend to suffer from more psychological consequences, compared to pure bullies and pure victims, this finding stresses the need for more research to be done on the behavioural consequences of sibling bullying, particularly as bully-victim. Further, in creating bullying intervention programs at school, one should be mindful of children's behaviour at home, as it plays a vital role and awareness of such factors might help in decreasing and preventing bullying behaviours at school. Furthermore, the second strongest carry-over effect was found for sibling pure bullies to peer pure bullies. This finding supports Duncan (1999) who in a cross-sectional study also found pure bullying behaviours has stronger carry-over effects, compared to pure victim behaviours. Additionally, it should be noted that for sibling pure victims the carry-over effects increased over time in all cases (to peer pure bullies, peer pure victims and peer bully-victims). For sibling pure bullies the carry-over effect increased slightly only to peer pure victims. And for sibling bully-victims the carry-over effect increases slightly to peer pure victims and peer bully-victims. These findings are very informative for school counsellors, clinicians, parents and teachers. This finding stresses the need for bullying intervention programs that take into consideration family factors. Further need for sibling bullying research needs to be done that starts at preschool ages in order to find out more about the influencing factors in bullying behaviours.

The findings of the only other longitudinal study by Bowes et al. (2014) were supported in that it was also found that sibling victimisation could lead to symptoms of depression. Bowes et al. (2014) found this to be the case at the age of 18, whereas in this study it was found that symptoms of depression can already be detected one year after sibling bullying victimisation was assessed.

The meta-analysis by Buist et al. (2013) found that sibling bullying was associated with externalising behaviours and internalising behaviours. Externalising behaviours and internalising behaviours were found to be associated with both perpetration of sibling bullying and sibling bullying victimisation, as precursors and outcomes. Overall, sibling bullying perpetration was more caused by externalising behaviour problems, rather than internalising behaviour problems, so that violence perpetration and impulsivity increased sibling bullying perpetration. This supports Button and Gealt (2010), as they found that aggressive behaviour is associated with sibling bullying perpetration. Impulsivity was also found to be an outcome of sibling bullying behaviours one year later. Additionally, overall externalising behaviours were also more likely to be consequences of sibling bullying perpetration, rather than internalising behaviour problems. Risk-taking behaviour and public antisocial behaviours were outcomes of sibling bullying perpetration, which also goes in line with cross-sectional research conducted on this topic (Button & Gealt, 2010; McHale et al., 2007; Wolke & Samara, 2004; Wolke & Skew, 2012a). Contrastingly, internalising behaviour problems, rather than externalising behaviour problems, were precursors and outcomes of being a victim of sibling bullying. Being a victim of violence, social alienation and self-esteem were found to be precursors of sibling bullying victimisation, which also goes in line with cross-sectional studies that found that overall internalising behaviour, were associated with sibling bullying victimisation (Wolke & Samara, 2004; Wolke & Skew 2012a; Yu & Gamble, 2008). In terms of outcomes of sibling bullying victimisation, depression and social alienation were outcomes after one year and self-esteem after two years, which is also in line with Campione-Barr et al. (2014). However, it was also found that risk-taking behaviour and public antisocial behaviours were outcomes of sibling bullying victimisation one year later. So far these types of externalising behaviour problems have not yet been

associated with being a victim of sibling bullying. Button & Gealt (2010) did find that having been a victim of sibling bullying was associated with delinquent behaviours. Risk-taking behaviour is an underlying risk factor of delinquent behaviour and public antisocial behaviours are associated with delinquent behaviour (Shader, 2004). So the findings that risk-taking behaviour and public antisocial behaviours were outcomes of sibling bullying victimisation is a novel finding and indirectly supported by Button and Gealt (2010).

Parenting aspects were assessed as precursors and outcomes of sibling bullying dynamics. This was done since the meta-analysis by Heinrich, Samara and Terry (Chapter Two; submitted for publication) found that a variety of parenting aspects were the most relevant factors associated with sibling conflicts, compared to other family factors. It was found that higher parental involvement lowered sibling bullying perpetration and victimisation. However, conflict between parents and children was a significant precursor and outcome one and two years later of sibling bullying perpetration and victimisation. Further, conflict between parents and children mediated several outcomes of sibling bullying perpetration (impulsivity, risk-taking behaviours and public antisocial behaviour one year later) and sibling bullying victimisation (depression, risk-taking behaviour, public antisocial behaviour and peer bullying perpetration one year later). This finding gives an indication of the extensive impact the quality of the relationship between parents and children can have on the behavioural development of children. This supports the idea of creating intervention programs that focus on family dynamics in order to prevent children from developing various externalising and internalising behaviour problems.

In terms of peer bullying as a consequence of sibling bullying, it was found that sibling bullying perpetration was a significant predictor of peer bullying perpetration

one year later, but not two years later. Further, sibling bullying perpetration did not increase peer bullying victimisation. Sibling bullying victimisation was a predictor of peer bullying perpetration one year later, but not two years later and sibling bullying victimisation was a predictor of peer bullying victimisation one year later and two years later. This was the case even when controlling for several behaviour, personality factors and parent-child conflict. However, overall the effects of sibling bullying were much stronger one year later, compared to two years later. These findings show that sibling bullying is a predictor of peer bullying, however, sibling victimisation is a stronger predictor of peer bullying involvement overall one and two years later. This finding is supported by cross-sectional research in this field (Duncan, 1999; Menesini et al., 2010; Tippett & Wolke, 2015; Tucker et al., 2014; Wolke & Samara, 2004).

Further, sibling bullying perpetration also increased school rule violation two years later. So far sibling bullying has not been assessed in relation to school factors before. This finding is not surprising, as sibling bullying perpetration also predicted risk-taking behaviour and public antisocial behaviour one year later. In spite of that, this finding does uncover another layer of the direct effects of sibling bullying perpetration. This is a particularly important finding as teachers need to be made aware of where the motivation for pupil's misbehaviour might stem from. Once misbehaviour at school and its possibly more deep rooted origin (i.e. bullying at home) is understood, it could be dealt with more efficiently, by for example offering support for the problems at home, rather than punishing problem behaviours, which might lead to further negative developments.

3.5.2. Limitations and Future Directions

Unfortunately delinquent behaviour could not be properly studied in relation to sibling bullying, as the variable was not normally distributed. This could have occurred due to the way the variable was coded. Attempts were made to study delinquency in relation to sibling bullying as much as possible, as a result it was included in the one-way ANOVA analysis, as the non-parametric alternative, the Kruskal-Wallis analysis could be done. The Kruskal-Wallis analyses did show that delinquent behaviour was significantly higher for sibling pure bullies and bully victims one year before. Then as an outcome one and two years later sibling pure bullies displayed significantly more delinquent behaviour compared to all other sibling bullying subgroups. This was followed by sibling bully-victims, sibling pure victims and then neutrals. As delinquency has been linked to sibling bullying behaviours in the literature (McHale et al., 2007), it is important to investigate delinquency as a precursor and outcome of sibling bullying perpetration and victimisation in more detail.

The findings of this study contribute to knowledge as this is the first study to assess the precursors and outcomes of sibling bullying in a longitudinal manner. In particular, the links that have been found between parenting and personality factors in relation to sibling bullying (as precursors and outcomes), could improve family intervention programs that aim to lower sibling bullying and increase children's wellbeing. However, a limitation of this study was that sibling bullying was assessed at the mean age of 12 and the respective precursors were assessed at the mean age of 11. As a result, it is possible that there are other factors that occur before the age of 11 that could also influence sibling bullying, which were not assessed here. Further, this study found that sibling bullying predicts peer bullying, however, since children at the age of 12 are already at school, it is possible that peer bullying actually predicted sibling bullying, as they may have experienced it before sibling bullying was assessed. It was

attempted to overcome this problem by incorporating the variables ‘victim of violence’ and ‘perpetrator of violence’ at time 1. These variables did give some indication of the violence trajectory of children, however, the term violence is too general to properly relate these findings to the possible effects of peer bullying on sibling bullying. Nevertheless it is stressed that having been a victim or perpetrator of violence did influence the effects that sibling bullying victimisation and bullying perpetrator had on the respective outcomes. In the hierarchical regression analyses at time 3 and time 4, the effects that violence involvement at time 1 had on the respectively assessed outcomes (at time 3 and time 4), were decreased when sibling bullying at time 2 was added to the equation. However, in some cases violence involvement at time 1 was a stronger predictor or remained equally strong. This might suggest that the effects of sibling bullying at the age of 12 might be mediated by previous confrontations with violence (either as a perpetrator or as a victim). This indicates that future longitudinal research should assess the effects of sibling bullying at preschool ages and/or assess the effects of sibling bullying while controlling for previous involvement in peer bullying. When researching bullying before the age of 12 years, it is important to be mindful of children’s cognitive capacities. Smith and Monks (2008) have found that only as of the age of 12 years children were able to fully conceptualise the intricacies (power imbalance) that define bullying and therefore identify aggressive behaviour as such. Due to this, complex methodologies might need to be employed in order to study bullying behaviours before the age of 12 years. A combination of observation and qualitative interviews might be helpful in identifying repetition, intention of harm doing and power imbalances, which define bullying. This would help in finding the origins of bullying behaviours. Nonetheless, the findings of this study are important stepping stones to attain that goal.

4. Chapter 4 – The Distal Precursors and Long-Term Outcomes of Sibling Bullying and the Cross-Over Effects from Sibling Bullying to Peer Bullying

4.1. Introduction

The first study (Chapter Two: meta-analysis) revealed several specific proximal and distal factors that are associated with sibling *conflicts*. This outcome provided guidance in identifying possible precursors and outcomes associated with sibling *bullying*. The second study (Chapter Three) was based on data from a four-year longitudinal study on the proximal precursors of sibling bullying and on the outcomes of sibling bullying. In line with Bowes et al. (2014), the only other published longitudinal study on sibling bullying, it was found that depression was an outcome of being a victim of sibling bullying. Further, it was found that sibling bullying was consistently related to peer bullying. These results support several cross-sectional studies that have also found these cross-over effects (Duncan, 1999; Menesini et al. 2010; Tucker et al., 2014; Wolke & Samara, 2004). In line with the meta-analysis of this thesis, sibling bullying and parenting styles were consistently closely related. This was the case both for precursors and outcomes of sibling bullying. Overall, sibling bullying was associated with all outcome subgroups established for that study: parenting, friends, personality and social/antisocial aspects.

Based on the findings of the meta-analysis, this next chapter turns its focus on distal precursors associated with sibling bullying. In particular, it investigates how parental relationship quality factors and maternal mental health factors affect sibling bullying. The meta-analysis indicated that parental mental health problems had a strong negative effect on sibling relationship qualities. Furthermore, the meta-analysis found that there is lack of research assessing the direct association between parental mental

health and sibling relationships: there were relatively few studies that could be included in the meta-analysis assessing parental mental health problems in relation to sibling conflicts. Most studies included in the meta-analysis use a sibling relationship quality measure as a mediator variable in order to assess the relationship between parent psychological wellbeing and child developmental outcomes (Brody et al., 1999; Compton et al., 2003; Defoe et al., 2013; Keeton et al., 2015; Yu & Gamble, 2009). The only other longitudinal study on sibling bullying found that maternal depression is a precursor of sibling bullying (Bowes et al., 2014). Therefore, it was considered important to examine further the direct effects of several parental mental health problems (including maternal depression) and sibling bullying.

Also based on the findings of Chapter Two, the present study examined the effects of the relationship qualities of parents on sibling bullying. A strong focus will be placed on domestic violence between parents. Based on Bandura's Social Learning Theory (Bandura, 1973) children model behaviours of individuals they consider their role models. Eriksen and Jensen (2006) suggested that violence between siblings can stem from having experienced overall negativity between and from parents. However, having witnessed violence between parents has been found to be more significant for the perpetration of violence among siblings than actually having been the victim of violence perpetrated by a parent (Fagan, Steward, & Hansen, 1983). A cross-sectional study by Yu and Gamble (2008) found that negative family climate and lack of family cohesion were associated with sibling conflicts. Conflict between parents - even if it is unassociated with the children - still creates a negative family climate that legitimises the usage of violence in order to solve problems, as proposed by Bandura (1973). Contrastingly, strong bonds between parents lower the likelihood of sibling bullying. The meta-analysis (Chapter two) does suggest that positive family climate and good parental relationships lower sibling conflicts (Hakvoort et al., 2010; Modry-Mandell et

al., 2007; Volling et al., 2002; Yu & Gamble, 2008). As sibling bullying is a particular type of sibling conflict, which has not yet been examined in relation to parent relationship qualities longitudinally, this study will examine this association further.

Moreover, this chapter will also investigate the long term outcomes of sibling bullying. The previous chapter presented a short-term longitudinal study, which examined the outcomes of sibling bullying one and two years after sibling bullying data were collected, at a mean age of 12 years. This chapter will explore the long-term outcomes of sibling bullying, so that outcomes of sibling bullying will be examined at various time points, after sibling bullying data was collected at 12 years of age, up until a mean age of 17.5 years. The previous study (Chapter Three) found several internalizing and externalizing behaviour problems associated with sibling bullying. In terms of internalizing behaviour problems, depression was an outcome of being a victim of sibling bullying one year later, and low self-esteem was an outcome of being a victim of sibling bullying two years later. Bowes et al. (2014) also found that depression was an outcome of sibling bullying. Additionally, several cross-sectional studies have found associations between sibling bullying and internalizing behaviour problems (Wolke & Samara, 2004; Wolke & Skew, 2012a; Yu & Gamble, 2008). Therefore the present study will examine whether depression and low self-esteem are long-term outcomes of sibling bullying involvement (either as a perpetrator or victim).

In terms of externalizing behaviour problems, in the previous chapter it was found that impulsive behaviours, delinquency and public antisocial behaviours were significant outcomes of having been a sibling bully one year later, but not two years later. Previous cross-sectional studies have linked sibling bullying with a number of externalizing behaviour problems, including delinquency, hyperactivity and aggressive behaviours (Button & Gealt, 2010; Wolke & Samara, 2004; Wolke & Skew, 2012a). In

this chapter the long-term association of externalizing behaviour problems as outcomes of sibling bullying will be explored further. This will be done through an analysis of several of the “Strengths and Difficulties Questionnaire” subscales (Goodman, 1997): conduct problems, hyperactivity problems and peer relationship problems.

Lastly, involvement in peer bullying will also be examined as a long term outcome of sibling bullying. Several cross-sectional studies have examined the cross over effects of sibling bullying involvement to peer bullying involvement (Duncan, 1999; Menesini et al., 2010; Tippett & Wolke, 2015; Tucker et al., 2014; Wolke & Samara, 2004; Wolke & Skew, 2012a). However, due to being cross-sectional, cause-and-effect cannot be inferred, hence it is important to explore the link between sibling and peer bullying longitudinally. Despite the previous chapter being the first study that has shown these links longitudinally, sibling bullying was assessed at the age of 12, which means that previous relationships with peers could have influenced sibling bullying, which could imply that sibling bullying is not necessarily a unique precursor of peer bullying later on. As a result, this current study will explore peer relationship qualities as a precursor of sibling bullying. Furthermore, peer bullying will be assessed as an outcome of sibling bullying on a long-term basis (at the mean age of 17.5 years).

This study has three aims. The first aim is to assess distal factors (maternal mental health factors and parent relationship quality factors) as precursors of sibling bullying. The second goal is to examine how sibling bullying involvement affects the child’s psychological wellbeing in the long run. And the third goal is to assess the cross-over effects from sibling bullying to peer bullying.

This is the first study, to our knowledge, that examines distal factors (parental mental health and parent relationship quality) as precursors of sibling bullying longitudinally. Furthermore, it is also the first study, to our knowledge, to examine

externalizing behaviour problems as an outcome of sibling bullying, longitudinally, and lastly exploring peer bullying as a long-term outcome of sibling bullying.

This study was conducted with the Avon Longitudinal Study of Parents and Children (ALSPAC) sample. It is an extensive longitudinal population study based in Bristol, UK. Data collection was started when mothers were pregnant with the target children (1990-1992) and continued to be collected on a yearly basis up until present day. Data is collected relating to a wide range of research areas, including but not limited to medicine, psychology, education, socio-economy, physiology and phonetics. Data is collected on the target children, their mothers and the mother's partners. For several measures, various respondents were utilized (mother, partner and target children), so that answers could be cross-referenced. This breadth of detail makes this data unique and vastly informative. The data that is included in this study exclusively focuses on child and adolescent development, therefore the latest data collection point included in this study is 17.5 years. Furthermore, for the analysis of the effects of parental mental health on sibling bullying, exclusively mother's mental health is examined, as the father figure that is chosen in the ALSPAC study data is referred to as 'mother's partner', due to this, one cannot be sure of the relatedness to the study child. Therefore, in order to maintain the relatedness between children and parents standardized across the sample, it was decided to exclusively examine the effects of maternal mental health problems on sibling bullying. In conclusion, this study examines family distal factors as precursors of sibling bullying and the long term consequences of sibling bullying based on the ALSPAC sample.

4.2. Methodology

4.2.1. Data Source and Procedure

The ALSPAC study, which is based in Bristol, is also referred to as the study of the Children of the 90s, as the recruitment restriction was that mothers' delivery date had to fall between 1 April 1991 and 31 December 1992 inclusive (Boyd et al., 2012). The sample of the data is drawn from the population of Avon. The catchment area included three health administration districts (Southmead, Frenchay and Bristol & Weston-super-Mare), which form part of the 'Bristol & District Health Authority'. Pregnant women were recruited through means of opportunistic sampling and recruitment was run based on an 'opt-out' strategy (Boyd et al., 2013; Fraser et al., 2013; Golding, Pembrey, Jones, & ALSPAC, 2001). The recruitment strategies included posters being hung up in preschools, pharmacies, toddler groups and doctors waiting rooms. Women were also approached at routine ultrasound checks, through midwives and at the hospital after given birth. Further, the 'Children of the 90s' study was also advertised through various media outlets, such as on the radio and through television (Golding et al., 2001). By returning the study leaflets mothers could request further information about the study or decline their participation. Mothers were informed about details about the study and their right to decline or cease to participate at any time during the study (Golding et al., 2001). Mothers who moved away from the catchment area shortly after enrolment to the study were excluded. All mothers who completed the follow-up questionnaires held during their third trimester were kept in the study even if they moved away from the catchment area before having delivered. It should be noted that external validity analyses compared the enrolled children to those who were not enrolled in Bristol and elsewhere in the UK. It was found that overall children who were enrolled in the study, indicated on average a significantly higher academic attainment (Boyd et al., 2013) and were on average in a higher socioeconomic class

(Fraser et al., 2013). Socioeconomic class features included owning a car, persons/room ratios, marital status, non-white mother and owning occupied accommodation (Fraser et al., 2013). As a result the overall ALSPAC sample is relatively unrepresentative of less affluent groups and non-White populations (Boyd et al., 2013).

In total the enrolled number of mothers at the first recruitment stage makes up all mothers that were: (1) eligible for this study, (2) enrolled and (3) at least attended one of the 'Child in Focus' clinic sessions by the year 1999 (at this point children's ages ranged from 5-6 years of age). These were 14,541 mothers. A break-down of the recruitment process is described in Figure 4.1. (Boyd et al., 2013; Samara, 2008). In order to increase the number of participants that were eligible to participate at the initial time of recruitment, a second and third recruitment phase was created. This was done when the oldest enrolled children were approximately seven years of age. This allowed for 452 additional pregnancies to be added to the sample. In a third recruitment phase (one year later when the children were a mean age of 8 years) another 254 pregnancies were added to the sample, so that at the end of phase III 15,247 eligible pregnancies were enrolled in ALSPAC at the end of phase III (Boyd et al., 2012). Overall, at the age of 18 there were 15,541 pregnancies involved (Boyd et al., 2013) (for further information about birth outcomes, refer to Boyd et al., 2013).

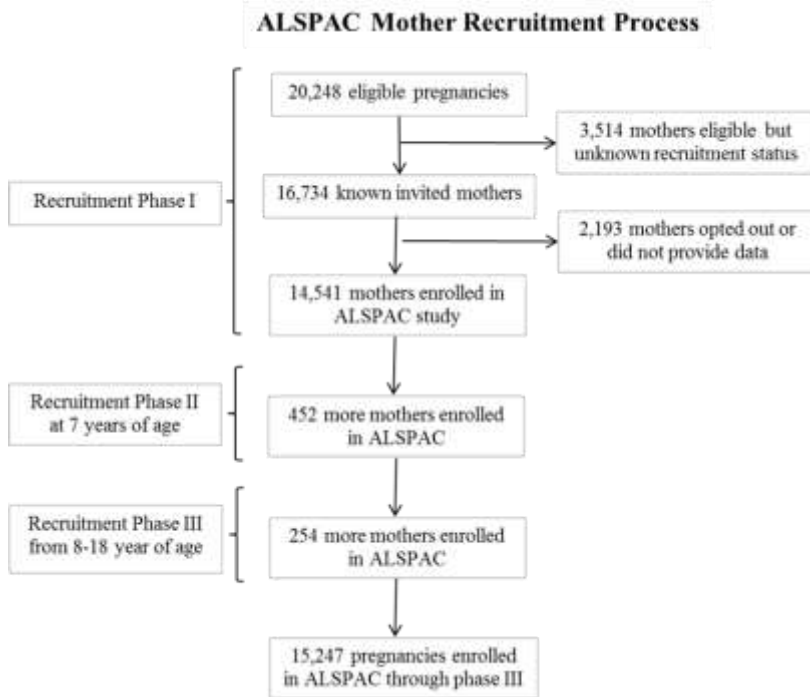


Figure 4.1. Recruitment process of mothers (Boyd et al., 2013; Samara, 2008)

The currently available data commences at 8 weeks of gestation until the children’s age of 18 years. A break-down of the number of study children is displayed in Figure 4.2. (Boyd et al., 2012; Northstone, Bonnell, Sadler & Carmichael, 2005; Samara, 2008). Any data that refers to events preceding 8 weeks of gestation is collected retrospectively (i.e. information on the children’s grandparents, mother’s childhood). The research areas in which data was collected annually, include mental health, genetic, social development, fine/gross motor development, language development, cognitive development, socioeconomic factors, physiological factors, biological factors, social dynamic factors (parental, sibling, family, peer, pupil-teacher), lifestyle factors, teacher assessments, academic achievement indicators, school environment, neighbourhood environment, and parents’ parents history (mental health, physiological health and lifestyle). This data is collected through means of questionnaires, observations, open ended/structured interviews and medical examinations. Additionally, school variables include school evaluation reports (school

structure, class sizes, school ethos). This amounts to a total of 59 questionnaire packets, which were administered over a time span from when children were 4 weeks to 18 years old. In addition, 9 clinical assessments were done, which were administered over a time span from 7 years of age to 17 years (Boyd et al., 2013). The respondents are mothers, partners, study children, teachers and respective medical practitioners.

Partners of mothers were only involved with the mother's approval, if she did not want her partner to be involved, they were not approached and the mother did not have to give any explanation as to why she chose to exclude her partner from this study

(Golding et al., 2001). In order to get the different participants' perspectives, data was collected in all of the above mentioned areas from all respondents (where applicable).

This cross examination also aided to validate answers. The longevity of this research, in a number of research areas from multiple respondents, makes the ALSPAC dataset substantially extensive and vastly informative. It offers researchers indefinite combinations of variables to suit their research needs.

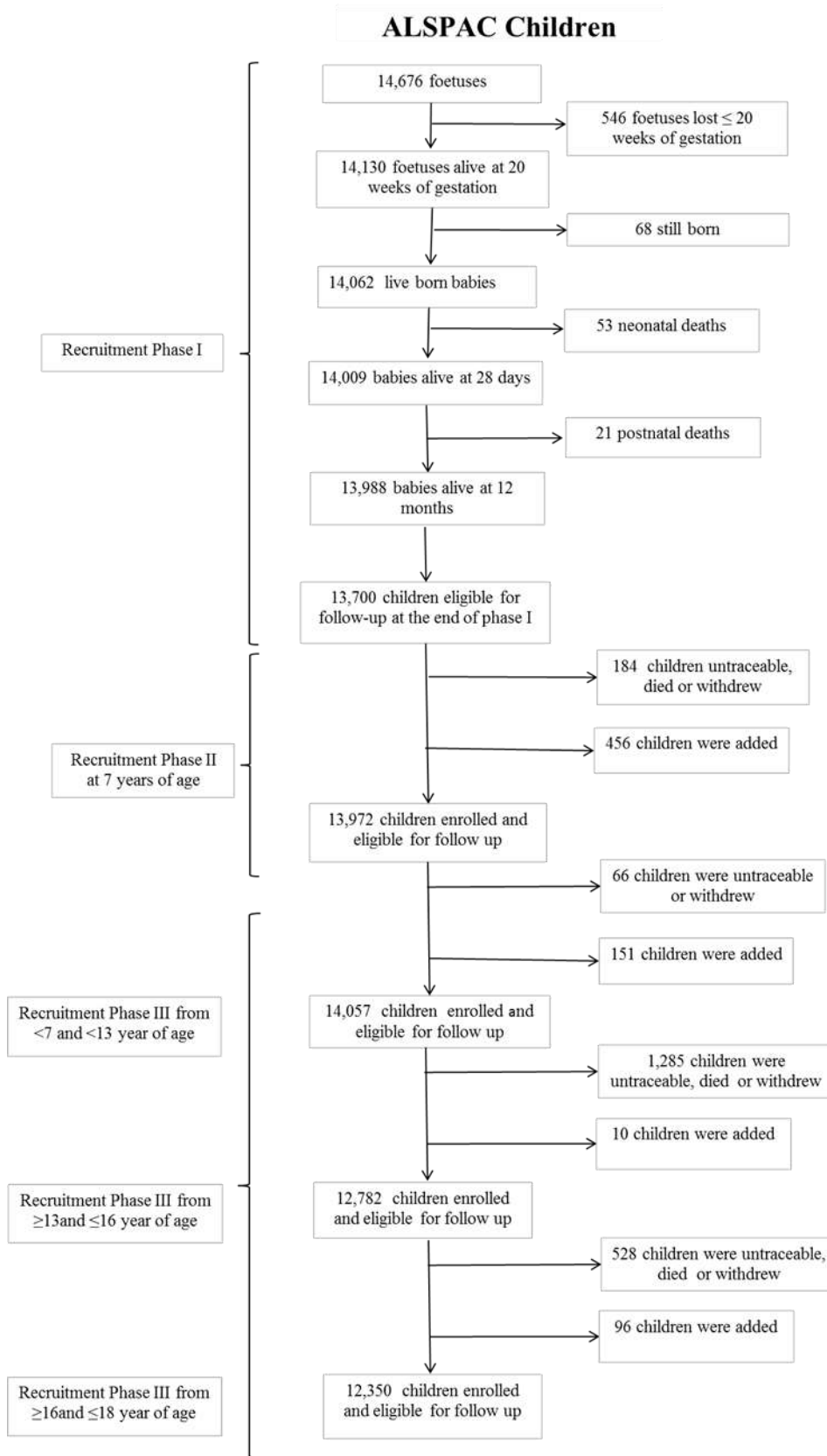


Figure 4.2. Children of ALSPAC (Boyd et al., 2013; Northstone et al., 2005; Samara, 2008)

4.2.2. Process of Data Application and Reception

A research proposal for this project was sent to ALSPAC. The proposal included a description of the project and the type of data we were interested in. The data request was accepted and subsequently access to ALSPAC complete database (except for genetic data) was granted. This was a total of 57,869 variables. Based on the way the database is set up, the intricacy lies in extracting the variables that are relevant for this research. The way the data base is set up is described in the following.

The database is subdivided based on respondent and/or research area. The categories are as follows: ‘child based variables’, ‘child clinical variables’, ‘child completed variables’, ‘mother based variables’, ‘paternal based variables’, ‘parental clinical variables’, ‘education variables’, ‘school based variables’, ‘biological variables’, and ‘other miscellaneous variables’. Each of these subgroups is then chronologically subdivided by data collection year. Each year then contains all items of each questionnaire. Each questionnaire packet for each year for each respondent (or research area) contained six subsections on average. Each subsection included various questionnaires about relevant topics.

The ‘child based variables’ are items about the study child, which are completed by the mother. Factors include the child’s physical health, mental and cognitive issues, diet and nutrition, environmental exposures, social aspects, parenting aspects, child care and schooling, employment, substance use, activities/hobbies and miscellaneous other factors (ALSPAC, 2013).

The ‘child completed variables’ are items about the study child completed by the study child. These include the same subcategories as the ‘child based variables’, which are completed by the mother. The ‘child clinical variables’ are items about the study child completed by relevant practitioners. For these variables there were two age cut offs in which different data were collected. The first age cut off was between 4

weeks and 61 months where the following factors were included: blood samples, cognitive measures, day care measures, environmental measures, parenting measures, physical measures, and seeing, hearing and speaking measures (ALSPAC, 2013). The second cut off commenced as of 7 years of age and the following factors were included: biological samples, health measures, literacy and numeracy measures, motor skills, physiological measures, psychological measures, puberty measures and social measures (ALSPAC, 2013). The ‘mother based variables’ are completed by the mother about the mother and her perspectives of respective aspects (such as her child or her relationship with her partner). Factors included are general physical health, obstetric health and history, mental health, social, partner, housing, neighbourhood, environment exposures, substance use, parenting, childcare, child development, and miscellaneous other factors (ALSPAC, 2013). The ‘partner based variables’ are completed by the mother’s partner. These include the same factors as the ‘mother based variables’. The ‘parental clinical variables’ are completed by relevant practitioners; factors included physiological measures, blood samples, verbal IQ and total IQ measures. The ‘education variables’ are gathered from the National Pupil Database, which includes national tests in English and maths. Further, it also includes information of each school’s census. The ‘school based variables’ are completed by teachers and head teachers, these include measures about the school’s environment, catchment area and school ethos. The ‘biological variables’ are completed by practitioners; these include data about the children’s and mother’s haematologics and metabolomics (ALSPAC, 2013). Lastly, the ‘other variables’ are completed by practitioners and include obstetric and neonatal data. This is the database, from which one then chooses the variables that are to be included in one’s research.

The data selection process is rather intricate, particularly because the database is made up of lists of the items that are contained in each of questionnaire, which are

outlined above. This amounts to 57,869 items. After gaining access to the database, items of the variables lists were then selected. One had to go through these lists of items in order to select the ones that were suitable for this project based on the initial research proposal that was submitted. As ALSPAC provided samples of each questionnaire packs for each time point, it was possible to cross-reference the items in the database with the questionnaires in the questionnaire packs, in order to find out the names of the respective measures. Then it was necessary to cross-reference which measures were available for what time points. Another complication was that there were some variables for which various types of measures were utilized (e.g. closed ended interviews, questionnaire and/or observation). Further, the total scores for the respective measures were scarcely existent (at least that was the case for this project), so all items within a respective measure had to be found in order to be requested, so that a total score for a respective measure could be calculated. Once this process is completed, the data request was sent back to ALSPAC. After the costing was dealt with, the dataset for the project was then provided.

4.2.3. Participants

Participants

Out of the 14,062 live born children, 78% (10,957) were invited to complete the questionnaire when the children were 12.5 years old. Of these 6,488 children attended the data collection session and of these 4,544 attended a 'Fast Track' version of the questionnaire and 1,938 did the full version of the questionnaire packet. A 'Fast Track' version was created due to funding shortages (ALSPAC, 2011). Of the children that attended the data collection session, there were 3,873 participants for whom there are fully completed sibling bullying questionnaires. This was made up of 1,809 boys and

2,064 girls. Most children were first born, 3,823 (1,786 boys; 2,035 girls; two mothers did not consent participation) and 53 were second born (23 boys; 29 girls; one mother did not consent participation).

4.2.4. Materials

Overall, the ALSPAC questionnaires went through a lengthy piloting process, including 100 parents at respectively appropriate stages (prenatal, neonatal and postnatal). Questions and response options were corrected accordingly in order to avoid confusions and ambiguities (Goulding et al., 2001). Self-completion and clinical questionnaires were cross-examined in order to assess their validity (Table 4.2).

4.2.4.1. Assessment of sibling bullying

Sibling bullying perpetration and sibling bullying victimisation were assessed when the study children were 12.5 years old (Supplementary Table S59-S60). The questionnaire was completed by the study child (Wolke & Samara, 2004) and reflected on the behaviour of the child with his siblings in the past six months. It consisted of questions inquiring about physical bullying (hitting, kicking, pushing or shoving or threatened to do so; things damaged or taken away, including money), verbal (called a sibling nasty and hateful names; made fun of a sibling) and relational bullying (leaving a sibling out of things and ignoring; telling lies and spreading rumours about a sibling) (Table 4.1). All questions were summed up to create a total bullying score ($\alpha = .71$). The same questions were asked to enquire about being a sibling bullying victim ($\alpha = .78$). The answer options were on a five-point Likert scale: 1=never, 2=only ever once/twice, 3=two/three times, 4=about once a week, 5=several times a week. Higher scores indicated more bullying experience (either as a bully or as a victim). For the analyses (ANOVA and cross-over effects) of the roles within bullying dynamics (neutral, pure

bully, pure victim and bully-victim) the scores were recorded based on the same principles as displayed in Figure 3.1.

Table 4.1. Frequency of being a Victim and being a Perpetrator of Sibling Bullying

	Sibling Bullying Perpetrator	Sibling Bullying Victim
	Frequency of Bullying <i>N</i> (%)	Frequency of Bullying <i>N</i> (%)
Hit, pushed, shoved	2,774	3,270
Never	495 (17.8)	835 (25.5)
Only ever once/twice	965 (34.8)	908 (27.8)
Two/three times a month	554 (20.0)	512 (15.7)
About once a week	499 (18.0)	600 (18.3)
Several times a week	261 (9.4)	415 (12.7)
Things taken	2,751	3,213
Never	2,126 (77.3)	2,055 (64.0)
Only ever once/twice	456 (16.6)	715 (22.3)
Two/three times a month	104 (3.8)	233 (7.3)
About once a week	39 (1.4)	145(4.5)
Several times a week	26 (.9)	65 (2.0)
Calling Names	2,789	3,286
Never	293 (10.5)	479 (14.6)
Only ever once/twice	959 (34.4)	889 (27.1)
Two/three times a month	592 (21.2)	561 (17.1)
About once a week	539 (19.3)	599 (18.2)
Several times a week	406 (14.6)	758 (23.1)
Made fun of	2,741	3,264
Never	1,016 (37.1)	819 (25.1)
Only ever once/twice	734 (26.8)	893 (27.4)
Two/three times a month	429 (26.8)	531 (16.3)
About once a week	346 (12.6)	519 (15.9)
Several times a week	216 (7.9)	502 (15.4)
Ignored	2,741	3,231
Never	1,672 (60.7)	1,852 (57.3)
Only ever once/twice	603 (21.9)	690 (21.4)
Two/three times a month	253 (9.2)	332 (10.3)
About once a week	147 (5.3)	200 (6.2)
Several times a week	80 (2.9)	157 (4.9)
Rumours spread	2,752	3,256
Never	2,352 (85.5)	2,187 (67.2)
Only ever once/twice	262 (9.5)	595 (18.3)
Two/three times a month	84 (3.1)	204 (6.3)
About once a week	25 (.9)	156 (4.8)
Several times a week	29 (1.1)	114 (3.5)
Other	2,459	2,937
Never	2,315 (94.1)	2,676 (91.1)
Only ever once/twice	53 (2.2)	82 (2.8)
Two/three times a month	34 (1.4)	53 (1.8)
About once a week	26 (1.1)	52 (1.8)
Several times a week	31 (1.3)	74 (2.5)

4.2.4.2. Assessment of Precursor Variables

4.2.4.2.1. Sibling Relationship Quality and Peer Relationship Quality

At the age of 57 months (four years and nine months) sibling relationship quality and peer relationship quality were assessed (Supplementary Table S61-S62). These questionnaires were put together by the ALSPAC research team, respectively adapted for the assessment of relationship quality between siblings ($\alpha=.71$) and the quality of relationship between peers ($\alpha=.75$). Both questionnaires were completed by the study child's mother. There were six items in each questionnaire (e.g., Is the child deliberately teased by brothers or sisters (other children)?). All answer options were on a three point Likert scale (1=often, 2=sometimes, 3=never), so that a high score indicated a good relationship.

4.2.4.2.2. Maternal Mental Health

When children were 61 months old (five years and one month) mothers' mental health was assessed. All maternal health questionnaires included in the current study were completed by the mother herself. The Crown Crisp Experiential Index (CCEI) (Crown & Crisp, 1979) was utilized (Supplementary Table S63). The questionnaire consisted of three subscales: anxiety (e.g., frequency mother has had dreams which upset her when she wakes) ($\alpha=.84$), depression (e.g., frequency mother feels life is too much effort) ($\alpha=.77$) and somaticism (e.g., frequency mother is troubled by dizziness or shortness of breath) ($\alpha=.66$) subscales. All subscales included 8 items. Answer options were reversed so that a high score indicated high symptomology of the respective subscale (1=never, 2=not very often, 3=often, 4=very often). Additionally, mothers' self-esteem was measured with the Bachman Self-Esteem Scale (Bachman & O'Malley, 1977) ($\alpha=.89$) (Supplementary Table S64). The questionnaire included 11 items (e.g., mother feels she is a person of worth, at least equal to others), five of which were reverse coded so that a higher score indicated a high self-esteem with a five

answer options (5=always true, 4=often true, 3=sometimes, 2=seldom true, 1=never true).

4.2.4.2.3. Mother-Partner Relationship Quality

This block included two scales: Mother-Partner Bond: When children were the age of 73 months (six years and one month) the mother was asked about the relationship quality and the bond between the mother and her partner using a questionnaire created by ALSPAC ($\alpha=.85$) (Supplementary Table S65). The questionnaire included 6 items (e.g., frequency respondent and partner laugh together in a week) and the answer options were 1=never, 2=less than once a week, 3=1-3 times a week, 4=most days. A higher score indicated a better bond between the mother and the partner.

Domestic Violence: When children had a mean age of eight years and one month, domestic violence between mother and partner was assessed. Verbal, physical and extreme violence from mother towards partner and from partner towards mother were assessed separately. These questions were also put together as a questionnaire by the ALSPAC research team. ALSPAC created one questionnaire with detailed questions (15 items) about a variety of types of domestic violence. A principle component analysis on these questions was conducted. The rotational method was an oblique technique, specifically the Direct Oblimin. This was chosen as it was assumed that the factors are intercorrelated (Tabachnick & Fidell, 2013, p.642). For mother-to-partner violence and partner-to-mother violence, three subscales emerged: verbal violence; physical violence and extreme violence. For all questions the answer options were 1=no, 2=sometimes, 3=often. Higher scores indicated higher frequencies of that respective type of violence (Supplementary Table S66-S71). Mother-to-partner and the partner-to-mother verbal violence questionnaires included questions such as ‘mother/partner has sworn at partner/mother’. The reliability factor for mother-to-

partner violence ($\alpha=.53$) and partner-to-mother ($\alpha=.60$) were relatively low, however, based on Cortina (1993) these can be acceptable reliability values, as there were only three items in these scales (Supplementary Table S66-S67). The mother-to-partner and partner-to-mother physical violence questionnaires included 6 items with questions such as ‘mother/partner has pushed, grabbed, or shoved partner/mother’. These two questionnaires were the same, except that they differed in their last question for mother-to-partner physical violence questionnaire the last question was ‘mother has ever tried to hit partner with something’ and for the partner-to-mother physical violence questionnaire the last question was ‘partner has ever tried to throw bodily’. Reliability analyses indicated robust internal consistency (mother-to-partner ($\alpha=.75$) and partner-to-mother ($\alpha=.76$) (Supplementary Table S68-69). Lastly mother-to-partner and partner-to-mother extreme violence questionnaires included questions such as ‘mother/partner has ever beaten partner/mother up’. Again, due to only including four items for these scales, the internal consistency resulted as relatively low: mother-to-partner extreme violence ($\alpha=.59$) and partner-to-mother extreme violence ($\alpha=.61$) (Supplementary Table S70-71).

4.2.4.3. Assessment of Outcome Variables

4.2.4.3.1. Internalizing behaviour problems

Child depression. Children's depression was measured twice: once when children were 13 years of age and six months and once when children were 16 years of age and six months. This was assessed with the Short Moods and Feelings Questionnaire (SMFQ) (Angold, Messer, Pickles, Winder & Silver, 1995). There were 16 items in the SMFQ and the internal consistency of the questionnaire were high (13 years old: $\alpha=.86$; 16 years old: $\alpha=.90$). Questions were reversed so that a high score indicated a high rate of depression (e.g., teenager felt miserable or unhappy in the last

two weeks). The answer options were on a 3-point Likert scale: 1=not at all, 2=sometimes, 3= true (Supplementary Table S72-S73).

Emotional problems. The emotional problems subscale of the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997) was used when children were 16 years of age and 6 months old. The SDQ consists of five subscales an emotion subscale, conduct problems subscale, hyperactivity subscale, peer problems subscale, prosocial behaviour subscale and a total difficulties scale. No internal consistency could be calculated for the SDQ subscales, as the scales were obtained by ALSPAC as total scores, rather than having received the individual items for each subscale. The emotional problems scale contains five items. The questionnaire included items such as, 'I worry a lot'. The answer options were 0=not true, 1= somewhat true, 2=certainly true. A high score indicated a high rate of emotional problems (for further details on the SDQ, see www.sdqinfo.com) (Supplementary Table S75).

Child Self-Esteem. Child self-esteem was assessed using an adapted version of the Bachman Self-Esteem Scale called RSE-B (Angold et al., 1995). This was administered when children were 17 years and 6 months of age. There were 10 items and the internal consistency of the questionnaire was $\alpha=.89$. Items were reverse coded so that a high score indicated high self-esteem. An example of a question is 'young person feels that life is not very useful' and response options were 1=almost always true, 2=often true, 3=sometimes true, 4=not often true, 5=never true (Supplementary Table S74).

4.2.4.3.2. Externalizing behaviour problems

Several SDQ subscales (Goodman, 1997) were used for the assessment of child externalizing behaviour problems: conduct problems subscale (e.g. I fight a lot), hyperactivity subscale (e.g. I am restless) and the peer problems subscale (e.g. I am usually on my own). This was also when children were 16.5 years old. Again, no

internal consistency could be calculated for the SDQs as the scales were received as total scores. Each subscale contains five items. All answer options were 0=not true, 1=somewhat true, 2=certainly true. High scores indicate high rates of the respective subscale (for further details on the SDQ, see www.sdqinfo.com) (Supplementary Table S75).

4.2.4.3.3. Peer bullying

Peer bullying was assessed when children were 17 years and 6 months of age. Victimization and bullying perpetration were assessed with the same questions (Adapted version of Olweus Bullying Questionnaire (Olweus, 2007)), respectively differently worded: frequency of direct bullying; frequency of relational bullying and frequency of cyber bullying. Response options were 1=never, 2=not much, 3= quite a lot, 4=a lot. Due to few items for each assessment, the alpha values were respectively moderate, for victimisation: $\alpha=.56$ and for bullying: $\alpha=.51$ (Cortina, 1993) (Supplementary Table S76-S77). For the analyses (ANOVA and cross-over effects) of the roles within bullying dynamics (neutral, pure bully, pure victim and bully-victim) the scores were recoded based on the same principles as displayed in Figure 3.1

Table 4.2. Description of Precursors, Outcomes and Target Variables

			Name of Measure	Example of Item	Answer Scale	Internal Consistency	Children's Age
Target Variables	Sibling Bullying	Sibling Bullying Victim	Adapted version of Olweus Bullying Questionnaire (Olweus, 2007)	I was made fun of (7 items)	1=never; 2=only ever once/twice; 3=two/three times a month; 4=about once a week; 5=several times a week	$\alpha=.71$	12 years and 6 months
		Sibling Bully	Adapted version of Olweus Bullying Questionnaire (Olweus, 2007)	I made fun of someone (7 items)	1=never; 2=only ever once/twice; 3=two/three times a month; 4=about once a week; 5=several times a week	$\alpha=.78$	12 years and 6 months
Precursors	Peer and Sibling RQ	Sibling Relationship Quality	Measure put together by ALSPAC (adapted from Dunn, 1983)	Is the child deliberately teased by brothers or sisters? (6 items)	1=often; 2=sometimes; 3=never	$\alpha=.71$	57 months (4 years and 9 months)
		Peer Relationship Quality	Measure put together by ALSPAC (adapted from Dunn, 1983)	Is the child deliberately teased by other children? (6 items)	1=often; 2=sometimes; 3=never	$\alpha=.75$	57 months (4 years and 9 months)
	Maternal Mental Health	Anxiety	Crown Crisp Experiential Index (Crown & Crisp, 1979)	Frequency mother has dreams which upset her when she wakes? (8 items)	1=never; 2=not very often; 3=often; 4=very often	$\alpha=.84$	61 months (5 years and 1 month)
		Depression	Crown Crisp Experiential Index (Crown & Crisp, 1979)	Frequency mother feels life is too much effort? (8 items)	1=never; 2=not very often; 3=often; 4=very often	$\alpha=.77$	61 months (5 years and 1 month)
		Somaticism	Crown Crisp Experiential Index (Crown & Crisp, 1979)	Frequency mother is troubled by dizziness or shortness of breath? (8 items)	1=never; 2=not very often; 3=often; 4=very often	$\alpha=.66$	61 months (5 years and 1 month)
		Self-Esteem	Bachman Self-Esteem Scale (Bachman & O'Malley, 1977)	Mother feels she is a person of worth, at least equal to others (11 items)	1=always; 2=often true; 3=sometimes; 4=seldom true; 5=never	$\alpha=.89$	61 months (5 years and 1 month)

Table 4.2. Description of Precursors, Outcomes and Target Variables continued

		Name of Measure	Example of Item	Answer Scale	Internal Consistency	Children's Age	
Precursors	Mother-Partner Relationship Quality and Bond	Mother and Partner Bond	Measure out together by ALSPAC	Frequency respondent and partner laugh together in a week (6 items)	1=never; 2=less than once a week; 3=1-3 times a week; 4=most days	$\alpha=.85$	6 years and 1 month
		Mother-to-partner/Partner-to-mother verbal violence	Measure out together by ALSPAC	Mother/partner has sworn at partner/mother (3 items)	1=no; 2=sometimes; 3=often	MP* $\alpha=.53$ PM* $\alpha=.60$	8 years and 1 month
		Mother-to-partner/Partner-to-mother physical violence	Measure out together by ALSPAC	Mother/partner has pushed, grabbed, or shoved partner/mother (6 items)	1=no; 2=sometimes; 3=often	MP* $\alpha=.75$ PM* $\alpha=.76$	8 years and 1 month
		Mother-to-partner/Partner-to-mother extreme violence	Measure out together by ALSPAC	Mother/partner has ever beaten partner/mother up (4 items)	1=no; 2=sometimes; 3=often	MP* $\alpha=.59$ PM* $\alpha=.61$	8 years and 1 month
Outcomes	Internalizing Behaviour Problems	Child Depression	Short Moods and Feelings Questionnaire (Angold et al., 1995)	Teenager felt miserable or unhappy in the last two weeks (16 items)	1=not at all; 2=sometimes; 3=true	$\alpha=.86$	13 years and 6 months
		Child Depression	Short Moods and Feelings Questionnaire (Angold et al., 1995)	Teenager felt miserable or unhappy in the last two weeks (17 items)	1=not at all; 2=sometimes; 3=true	$\alpha=.90$	16 years and 6 months
		Child Emotional Problems	Emotional Problems Subscale of the Strengths and Difficulties Questionnaire (Goodman, 1997)	I worry a lot (5 items)	0=not true; 1=somewhat true; 2=certainly true		16 years and 6 months
		Child Self-Esteem	Adapted version of the Bachman Self-Esteem Scale called (Angold et al., 1995)	Young person feels that life is not very useful (10 items)	1=almost always true; 2=often true; 3=sometimes true; 4=not often true; 5=never true	$\alpha=.89$	17 years and 6 months

*MP=mother-to-partner; PM=partner-to-mother

Table 4.2. Description of Precursors, Outcomes and Target Variables continued

		Name of Measure	Example of Item	Answer Scale	Internal Consistency	Children's Age	
Outcomes	Externalizing Behaviour Problems	Child Conduct Problems	Conduct Problems Subscale of the Strengths and Difficulties Questionnaire (Goodman, 1997)	I fight a lot (5 items)	1=almost always true; 2=often true; 3=sometimes true; 4=not often true; 5=never true		16 years and 6 months
		Hyperactivity Problems	Hyperactivity Problems Subscale of the Strengths and Difficulties Questionnaire (Goodman, 1997)	I am restless (5 items)	1=almost always true; 2=often true; 3=sometimes true; 4=not often true; 5=never true		16 years and 6 months
		Peer Problems	Peer Problems Subscale of the Strengths and Difficulties Questionnaire (Goodman, 1997)	I am usually on my own (5 items)	1=almost always true; 2=often true; 3=sometimes true; 4=not often true; 5=never true		16 years and 6 months
		Peer Bullying Victim	Adapted version of Olweus Bullying Questionnaire (Olweus, 2007)	Frequency child was directly bullied (3 items)	1=never; 2=not much; 3=quite a lot; 4=a lot	$\alpha=.56$	17 years and 6 months
		Peer Bully	Adapted version of Olweus Bullying Questionnaire (Olweus, 2007)	Frequency child was directly bullied by someone (3 items)	1=never; 2=not much; 3=quite a lot; 4=a lot	$\alpha=.51$	17 years and 6 months

4.3. Plan of Analysis

Aims of the study:

1. Exploration of distal predictors and the long-term outcomes of sibling bullying perpetration.
2. Exploration of distal predictors and long-term consequences of sibling victimisation
3. Explore the long term outcomes of specific sibling bullying roles (pure bully, pure victim, bully-victim, neutral).
4. Explore the cross-over effects of sibling and peer bullying/victimisation.

A preliminary Pearson correlation analysis was conducted. First, all precursor variables (maternal mental health factors and mother-partner relationship factors), sibling bullying perpetration and sibling bullying victimisation were assessed (Table 4.3). Next, all outcome variables (child internalising behaviour problems and child externalising behaviour problems), sibling bullying perpetration and sibling bullying victimisation were assessed in the correlation analysis (Table 4.4).

Then unlike in the previous chapter, first the precursors and outcomes of sibling bullying perpetration were assessed and then the precursors and outcomes of sibling bullying victimisation were assessed. The maternal mental health factors (maternal anxiety, maternal depression, maternal somaticism and maternal self-esteem when children were 5.08 years old) were entered into a linear regression (Table 4.5), with sibling bullying being the dependent variable. And then the mother-partner relationship quality factors were entered into a linear regression (Table 4.6), with sibling bullying being the dependent variable. Due to intercorrelation of the mother-to-partner and partner-to-mother domestic violence factors, two hierarchical regressions were conducted, one where mother-partner bond was entered in the first step, then mother-

to-partner domestic violence factors were entered in the second step and partner-to-mother domestic violence factors were entered in the third step (Table 4.7). This was followed by a hierarchical regression analysis where in the second step the partner-to-mother domestic violence factors were entered and then in the third step mother-to-partner domestic violence factors were entered (Table 4.8). This was done instead of combining the mother-to-partner and partner-to-mother domestic violence factors, into parental domestic violence factors, as it was of interest to find out the difference in effects on sibling bullying when domestic violence was perpetrated by the mother or by the father. Lastly, with the intention of finding the most relevant distal precursors of sibling bullying perpetration, the significant maternal mental health factors and mother and partner relationship quality factors in relation to sibling bullying perpetration from the previous regressions, were entered into one linear regression (Table 4.9).

Then the outcomes of sibling bullying were assessed. A linear regression analysis was conducted to assess the internalising behaviour problems, externalising behaviour problems and peer bullying behaviour as outcomes of sibling bullying perpetration (Table 4.10). Each outcome factor was entered as dependent variable into separate linear regressions with sibling bullying perpetration being the independent variable. Further, in order to assess whether sibling bullying perpetration at 12.5 years of age was a unique predictor of peer bullying perpetration at 17.5 years of age, the internalising behaviour problem variables were entered into the first step of a hierarchical regression and the sibling bullying perpetration in the second step with peer bullying perpetration as the dependent variable (Table 4.11). The same was done with externalising behaviour problems, so that the externalising behaviour problem variables were put into the first step of a hierarchical regression and the sibling bullying perpetration in the second step with peer bullying perpetration as the dependent variable (Table 4.12). The same procedure was repeated for the assessment of

precursors and outcomes of sibling bullying victimisation (Table 4.13-4.21).

Then the sibling bullying variables were recoded into a categorical score, so that there was a neutral, sibling pure bully, sibling pure victim and sibling bully-victim score. This categorical score was then entered into a one-way ANOVA analysis as an independent variable and the outcome variables were entered as dependent variables (Table 4.22). Post hoc tests were conducted as well. For the groups where the variances were equal, the Tukey post hoc test was chosen and for the groups where variances were not equal, the Games-Howell post hoc test was chosen. The Games-Howell test was chosen as it is favourable to use when the groups have different sample sizes.

For the cross-over analysis the sibling and peer bullying scores were categorised into neutrals, pure bullies, pure victims and bully-victims for sibling bullying and peer bullying respectively. A cross-tabulation analysis was done with chi square, indicating the percentage distribution of sibling pure bullies, sibling pure victims and sibling bully-victims as peer pure bullies, peer pure victims and peer bully-victims versus peer neutrals. Odds ratio analyses were also carried out indicating the likelihood of the respective cross-overs.

Missing data.

Lastly, due to the length of the study (over 17 years) and the consequent drop-out rate (see participants section), a missing data analysis was conducted. SPSS indicated that overall there were 58.59% missing values. As was done in the longitudinal study on outcomes of sibling bullying victimisation by Bowes et al. (2014), which was also based on the ALSPAC study, the multiple imputation method was used for the missing data analysis. Further, also adopted from the longitudinal study by Bowes et al. (2014), the previously outlined analyses were conducted with full, completed data. This method will also be employed here. The multiple imputation

method has been found to yield reliable results (Hendry, Naidoo, Zewotir, North & Mentz, 2014; Spratt, Carpenter, Sterne, Carlin, Heron, Henderson & Tilling, 2010; Sterne, White, Carlin, Spratt, Royston, Kenward, Wood & Carpenter, 2009; Winglee, Kalton, Rust & Kasprzyk, 2001). Five imputations were done, and where possible the respectively pooled results were reported. The exact same analysis for the assessment of precursors and outcomes of sibling bullying perpetration and sibling bullying victimisation was re-run with a multiple imputation analysis (Spratt et al., 2010). Due to the substantial amount of data missing, there was usually one of five imputations that produced results that deviated from the other four imputations; this influenced the pooled imputation results (Spratt et al., 2010). This resulted in the pooled multiple imputation Pearson correlation to indicate that only maternal somaticism, maternal self-esteem, mother-to-partner physical violence and partner-to-mother verbal violence correlated with sibling bullying perpetration and only sibling relationship quality and maternal depression correlated with sibling bullying victimisation. As imputations 1, 2, 3 and 5 indicated significant correlations very similar to the original correlation analyses, the regressions that followed the correlation analyses were run anyway under the missing data constraint, even if the pooled multiple imputation correlation indicated that there was no correlation between respective variables. SPSS does not calculate pooled adjusted R^2 , so a mean of all five imputed adjusted R^2 was calculated. An average of the R^2 change was reported however, the significance of the R^2 change could not be reported as the p-value varied slightly for each imputation. Further, SPSS does not create pooled adjusted beta coefficients, so that unadjusted coefficients were reported. SPSS also does not calculate pooled F -ratios, so the F -ratio of each imputation was reported (Appendix E). Missing data analysis was not re-run for the one-way ANOVA as SPSS does not calculate a pooled score for the F -ratios or post hoc tests and choosing one of the five imputed scores could have led to invalid reporting.

4.4. Results

Table 4.3 and Table 4.4 show the first preliminary Pearson correlation analyses and descriptive statistics. Table 4.3 displays the analyses between all precursor variables and being a perpetrator and being a victim of sibling bullying. Results indicated that sibling bullying perpetration and sibling bullying victimisation correlated significantly with almost all precursors. Neither sibling bullying perpetration nor sibling bullying victimisation correlated significantly with partner-mother extreme violence. Strangely, sibling bullying perpetration at 12.5 years did not correlate with sibling relationship quality at 4.75 years. However, sibling bullying perpetration at 12.5 years of age did correlate with peer relationship quality when children were 4.75 years old, so that a worse peer relationship quality at 4.75 correlated with more sibling bullying at 12.5 years. Further, better sibling relationship quality and peer relationship quality when children were 4.75 years old correlated with less sibling bullying victimisation at 12.5 years of age. Further, in terms of maternal mental health factors, more maternal anxiety, maternal somaticism and maternal depression when children were 5.08 years old correlated with more sibling bullying perpetration and sibling bullying victimisation when children were 12.5 years old. Maternal higher self-esteem when children were 5.08 years old correlated with less sibling bullying perpetration and sibling bullying victimisation at 12.5 years old. In terms of mother and partner relationship quality factors, stronger bonds between the mother and her partner at 6.08 years of age correlated with less sibling bullying perpetration and victimisation at 12.5 years of age. Further, higher mother-to-partner and partner-to-mother verbal violence and physical violence at 6.08 years correlated with higher sibling bullying perpetration and victimisation at 12.5 years of age. And higher mother-to-partner extreme violence at 6.08 years correlated with higher sibling bullying perpetration and victimisation at 12.5 years. Overall, the highest correlation coefficient was between sibling bullying

perpetration and sibling bullying victimisation.

Table 4.4. shows the correlation analyses between all outcome variables and sibling bullying perpetration and victimisation at 12.5 years of age. Results indicated that higher sibling bullying perpetration was associated with more peer bullying perpetration; however it seemed unrelated to peer bullying victimisation when children were 17.5 years old. However, more sibling bullying victimisation was associated with both more peer bullying perpetration and peer bullying victimisation when children were 17.5 years old. Further, in terms of internalising behaviour problems more sibling bullying perpetration and sibling bully victimisation both correlated with more symptoms of depression when children were 13.5 years old and when children were 16 years old and with more emotional problems when children were 16.5 years old. More sibling bullying victimisation when children were 12.5 years old was also associated with less self-esteem at the age of 17.5 years. However, sibling bullying perpetration when children were 12.5 years old appeared to be unrelated to self-esteem five years later when children were 17.5 years old. In terms of externalising behaviour problems more sibling bullying perpetration and victimisation both correlated with more conduct problems, hyperactivity problems and peer relationship problems when children were 16.5 years old.

Table 4.3. Preliminary Pearson Correlation Analysis Sibling Bullying Perpetrator and Victim with all Precursor Variables

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. Sibling Bullying Perpetrator at 12.5^a															
2. Sibling Bullying Victim at 12.5^a	.63*** N=2284														
3. SRQ^b at 4.75^a	-.03 N=2152	-.09*** N=2600													
4. PRQ^d at 4.75^a	-.05* N=2143	-.05* N=2547	.21*** N=7188												
5. Anxiety (M) at 5.08^a	.07** N=2159	.10*** N=2559	-.16*** N=6618	-.09*** N=7184											
6. Depression (M) at 5.08^a	.08*** N=2159	.08*** N=2578	-.16*** N=6683	-.10*** N=7271	.78*** N=8007										
7. Somaticism (M) at 5.08^a	.09*** N=1874	.07** N=2221	-.15*** N=5780	-.09*** N=6312	.67*** N=6971	.60*** N=7023									
8. Self-Esteem (M) at 5.08^a	-.05* N=2299	-.09*** N=2717	.13*** N=7084	.09*** N=7688	-.58*** N=8355	-.61*** N=8450	-.41*** N=7343								
9. Mother-Partner Bond at 6.08^a	-.06** N=2118	-.04* N=2518	.07*** N=6332	.05*** N=6732	-.16*** N=6809	-.21*** N=6865	-.15*** N=5947	-.21*** N=7280							
10. MP Verbal Violence at 8.08^a	.07** N=2111	.05* N=2518	-.09*** N=5583	-.04** N=5982	.19*** N=5987	.19*** N=6049	.17*** N=5215	.14*** N=6413	-.11*** N=6229						
11. MP Physical Violence at 8.08^a	.05* N=1967	.04** N=2343	-.05*** N=5318	-.02 N=5699	.15*** N=5695	.16*** N=5750	.14*** N=4955	.11*** N=6104	-.08*** N=5928	.39*** N=6928					
12. MP Extreme Violence at 8.08^a	.05* N=2098	.05* N=2485	-.02 N=5566	-.02 N=5963	.07*** N=5962	.07*** N=6022	.09*** N=5190	.05*** N=6387	-.06*** N=6203	.16*** N=7269	.36*** N=6928				
13. PM Verbal Violence at 8.08^a	.07** N=2104	.08*** N=2484	-.09*** N=5573	-.03* N=5968	.15*** N=5974	.16*** N=6036	.14*** N=5201	.14*** N=6398	-.10*** N=6213	.73*** N=7291	.34*** N=6914	.13*** N=7253			
14. PM Physical Violence at 8.08^a	.05* N=2028	.07** N=2413	-.05*** N=5417	-.04** N=5804	.15*** N=5809	.15*** N=5868	.12*** N=5041	.10*** N=6223	-.12*** N=6041	.28*** N=7078	.57*** N=6793	.28*** N=7076	.39*** N=7063		
15. PM Extreme Violence at 8.08^a	.03 N=2098	.02 N=2485	-.03 N=5566	-.02 N=5963	.06*** N=5962	.07*** N=6022	.07*** N=5190	.04*** N=6387	-.05*** N=6204	.10*** N=7269	.25*** N=6928	.51*** N=7282	.17** N=7253	.50*** N=7076	
Means (SD) N	12.79 (4.47) 2831	14.19 (5.48) 3328	12.30 (2.17) 7912	11.97 (4.04) 8575	14.12 (3.73) 8411	14.18 (3.53) 8503	11.50 (2.70) 7393	43.60 (6.96) 8983	20.86 (3.44) 7897	4.63 (1.10) 7312	6.52 (1.15) 6939	4.02 (.21) 7282	4.51 (1.16) 7296	6.34 (1.00) 7087	4.03 (.25) 7283

* $p < .05$; ** $p < .01$; *** $p < .001$; *m = $p = .05-.06$; ^a = years of age; ^b = Sibling Relationship Quality; ^c = months; ^d = Peer Relationship Quality; (M) = Maternal; MP = mother towards partner; PM = partner towards mother

Table 4.4. Preliminary Pearson Correlation Analysis Sibling Bullying Perpetrator and Victim with all Outcome Variables

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Sibling Bullying Perpetrator at 12.5^a											
2. Sibling Bullying Victim at 12.5^a	.63*** N=2284										
3. Peer Bullying Victim at 17.5^a	.01 N=1261	.08** N=1492									
4. Peer Bullying Perpetrator at 17.5^a	.07* N=1261	.07** N=1492	.47*** N=4077								
5. Depression at 13.5^a	.11*** N=1934	.17*** N=2291	.16*** N=3448	.11*** N=3447							
6. Depression at 16.5^a	.07** N=1687	.14*** N=1985	.24*** N=2957	.12*** N=2956	.40*** N=3854						
7. Self-Esteem at 17.5^a	-.03 N=1402	-.11*** N=1647	-.17*** N=3692	-.05** N=3691	-.29*** N=3608	-.45*** N=3259					
8. SDQ Emotion at 16.5^a	.02 N=1810	.07** N=2151	.15*** N=3064	.03* ^m N=3062	.24*** N=4322	.34*** N=4140	-.28*** N=3337				
9. SDQ Conduct at 16.5^a	.11*** N=1809	.10*** N=2153	.05** N=3066	.03* ^m N=3064	.11*** N=4330	.20*** N=4144	-.16*** N=3339	.33*** N=5646			
10. SDQ Hyperactivity at 16.5^a	.14*** N=1812	.09*** N=2156	.06** N=3069	.05** N=3067	.12*** N=4331	.15*** N=4145	-.15*** N=3341	.32*** N=5650	.48*** N=5655		
11. SDQ Peer at 16.5^a	.09*** N=1808	.08*** N=2151	.14*** N=3062	.06** N=3060	.14*** N=4323	.18*** N=4137	-.16*** N=3338	.38*** N=5638	.19*** N=5646	.21*** N=5645	
Mean	12.79	14.19	3.43	3.22	21.66	24.29	39.13	1.50	1.03	2.55	1.11
(SD)	(4.47)	(5.48)	(.89)	(.61)	(5.03)	(6.50)	(6.59)	(1.86)	(1.36)	(2.12)	(1.50)
N	2831	3329	4079	4079	6078	5095	4497	5656	5666	5666	5658

* $p < .05$; ** $p < .01$; *** $p < .001$; *_m = $p = .05-.06$; ^a = years of age

4.4.1. Aim 1. Explore distal predictors and the long-term outcomes of sibling bullying perpetration

Maternal mental health, mother-father relationship quality as precursors of being a perpetrator of sibling bullying

Table 4.5. Multiple Regression Analysis on Maternal Mental Health and its effects on Perpetrators of Sibling Bullying at 12.5 years of age

Variables	Perpetrator of Sibling Bullying at 12.5 years of age		
	B	SE B	B
Maternal Anxiety at 5.08 ^a	-.03	.05	-.03
Maternal Depression at 5.08 ^a	.09	.05	.07
Maternal Somaticism at 5.08 ^a	.12	.06	.07*
Maternal Self-Esteem at 5.08 ^a	-.01	.02	-.01
R²	.01**		
F	F(4, 1684)=3.90, p=.004		

* $p < .05$; ** $p < .01$; *** $p < .001$; *m= $p=.05-.06$; ^a=age in years

Table 4.6. Linear Regression Analysis on Mother-Partner Relationship Quality and its effects on Perpetrators of Sibling Bullying at 12.5 years of age

Variables	Perpetrator of Sibling Bullying at 12.5 years of age		
	B	SE B	B
Mother-Partner Bond at 6.08 ^a	-.08	.03	-.06*
MP Verbal Violence at 8.08 ^a	.12	.15	.03
MP Physical Violence at 8.08 ^a	.04	.13	.01
MP Extreme Violence at 8.08 ^a	.06	.59	.003
PM Verbal Violence at 8.08 ^a	.16	.14	.04
PM Physical Violence at 8.08 ^a	.001	.16	.000
R²	.01**		
F	F(6, 1657)=2.89, p=.008		

* $p < .05$; ** $p < .01$; *** $p < .001$; *m= $p=.05-.06$; ^a=age in years; MP= mother toward partner; PM= partner towards mother

First a linear regression analysis was carried out with maternal mental health factors as precursors (Table 4.5). It was found that maternal somaticism was the only significant predictor of being a sibling bully ($\beta = .07, p = .037$). The second linear regression assessed how mother-partner relationship quality affected sibling bullying perpetration (Table 4.6). This analysis indicated that mother-partner bond was the only significant predictor of sibling bullying perpetration, so that mother-partner bond

significantly lowered sibling bullying perpetration. It was assumed that none of the mother towards partner/ partner towards mother verbal, physical and extreme violence resulted as significant in the multiple regressions, due to intercollinearity.

Table 4.7. Hierarchical Regression Analysis on Mother-Partner Relationship Quality and its effects on Perpetrators of Sibling Bullying

Variables	Perpetrator of Sibling Bullying at 12.5 years of age								
	B	SE B	B	B	SE B	β	B	SE B	B
Mother-Partner Bond at 6.08 ^a	-.10	.03	-.07**	-.09	.03	-.07**	-.09	.03	-.06*
MP Verbal Violence at 8.08 ^a				.24	.11	.06*	.12	.15	.03
MP Physical Violence at 8.08 ^a				.06	.11	.01	.04	.13	.01
MP Extreme Violence at 8.08 ^a				.04	.58	.002	.06	.59	.003
PM Verbal Violence at 8.08 ^a							.16	.14	.04
PM Physical Violence at 8.08 ^a							-.001	.16	.000
R²	.001**			.01**			.01**		
F	F(1, 1662)=9.02, p=.003			F(4, 1659)=3.95, p=.003			F(6, 1657)=2.89, p=.008		
R² change	.004				.001				

* $p < .05$; ** $p < .01$; *** $p < .001$; *m= $p=.05-.06$; ^a=age in years; MP= mother toward partner; PM= partner towards mother

Table 4.8. Hierarchical Regression Analysis on Mother-Partner Relationship Quality and its effects on Perpetrators of Sibling Bullying

Variables	Perpetrator of Sibling Bullying at 12.5 years of age								
	B	SE B	β	B	SE B	β	B	SE B	B
Mother-Partner Bond at 6.08 ^a	-.10	.03	-.71**	-.08	.03	-.06*	-.08	.03	-.06*
PM Verbal Violence at 8.08 ^a				.25	.10	.06*	.16	.14	.04
PM Physical Violence at 8.08 ^a				.03	.13	.01	.001	.16	.000
MP Verbal Violence at 8.08 ^a							.13	.15	.03
MP Physical Violence at 8.08 ^a							.04	.13	.01
MP Extreme Violence at 8.08 ^a							.06	.59	.003
R²	.01**			.01**			.01*		
F	F(1, 1662)=9.02, p=.003			F(3, 1660)=5.41, p=.001			F(6, 1657)=2.89, p=.009		
R² change	.004*				.001				

* $p < .05$; ** $p < .01$; *** $p < .001$; *m= $p=.05-.06$; ^a=age in years; MP= mother toward partner; PM= partner towards mother

Therefore, two hierarchical regressions were carried out (Tables 4.7-4.8). In the first one, mother-towards-partner violence factors were entered first (Table 4.7) and then the partner-towards-mother violence factors, in the second hierarchical regression (Table 4.8) the sequences was reversed. For the hierarchical regression in which mother-to-partner violence was inserted first (Table 4.7) it was found that when the mother-to-partner violence factors were added to the regression (second step), mother-to-partner verbal violence was significant ($\beta = .06, p = .032$) and mother and partner bond remained significant as it was in the first step as well. This indicates that the mother and partner bond is a significant predictor of sibling bullying perpetration despite the domestic violence factors that were inserted in the second step. Then in the third step partner-to-mother verbal and physical violence were added into the regression (partner-to-mother extreme violence was not inserted as it did not correlate significantly with sibling bullying perpetration). Results showed that only mother and partner bond were significant predictors of sibling bullying perpetration, so that a stronger bond between parents lowered sibling bullying perpetration. Table 4.8 shows the hierarchical regression in which the partner-to-mother domestic violence factors were inserted in the second step and then the mother-to-partner domestic violence factors were inserted in the third step. The results showed that mother and partner bond was still a significant predictor in the second step after partner-to-mother verbal violence and physical violence were inserted into the model. Further, partner-to-mother verbal violence was also a significant predictor of sibling bullying perpetration, so that more verbal violence from the partner towards the mother significantly increased sibling bullying perpetration ($\beta = .06, p = .015$). Then in the third step when mother-to-partner domestic violence factors were inserted, only mother and partner bond remained as a significant predictor of sibling bullying perpetration, so that a stronger bond between the mother and her partner significantly lowered sibling bullying perpetration. This was followed

by a multiple regression entering all significant precursors together into one model (Table 4.9). Maternal depression was added as well, despite not having been one of the significant precursors in the multiple regression analysis on maternal mental health in relation to sibling bullying perpetration. This was decided as maternal depression has been found to be related to negative sibling relationships (Compton, Snyder, Schrepferman, Bank and Short, 2003; Defoe et al., 2013; Keeton, Teetsel, Dull, & Ginsberg, 2015). Therefore, maternal depression in relation to sibling bullying perpetration was investigated further. In this multiple regression (Table 4.9) mother and partner bond was the only significant precursor of sibling bullying perpetration ($\beta = -.06, p=.027$), so that a better bond between mother and father, lowered sibling bullying perpetration.

Table 4.9. Multiple Regression on significant Maternal Mental Health and Mother-Partner Relationship Quality Factors and their effects on Perpetrators of Sibling Bullying

Variables	Perpetrator of Sibling Bullying at 12.5 years of age		
	B	SE B	B
Maternal Depression 5.08 ^a	.05	.04	.04
Maternal Somaticism at 5.08 ^a	.11	.06	.06
Mother-Partner Bond 6.08 ^a	-.08	.04	-.06*
MP Verbal Violence at 8.08 ^a	.12	.15	.03
PM Verbal Violence at 8.08 ^a	.14	.14	.04
R²	.02***		
F	F(5, 1346)=5.84, p<.001		

* $p < .05$; ** $p < .01$; *** $p < .001$; *m= $p=.05-.06$; ^a=age in years; MP= mother toward partner; PM= partner towards mother

Psychological wellbeing factors as outcomes of sibling bullying

Table 4.10. Linear Regression Analysis of Sibling Bullying Perpetration and the Psychological Wellbeing of children

Outcome Variables	Perpetration of Sibling Bullying at 12.5 years of age				
	B	SE B	B	R²	F-Ratio
Depression at 13.5 ^a	.14	.03	.11***	.01	<i>F</i> (1, 1932)=24.73, <i>p</i> <.001
Depression at 16.5 ^a	.11	.04	.07**	.004	<i>F</i> (1, 1685)=8.55, <i>p</i> =.004
Conduct Problems at 16.5 ^a	.04	.01	.10***	.01	<i>F</i> (1, 1808)=19.74, <i>p</i> <.001
Hyperactivity Problems at 16.5 ^a	.07	.01	.14***	.02	<i>F</i> (1, 1810)=34.15, <i>p</i> <.001
Peer Problems at 16.5 ^a	.03	.01	.09***	.01	<i>F</i> (1, 1806)=14.67, <i>p</i> <.001
Peer Bullying Perpetration at 17.5 ^a	.01	.004	.07*	.004	<i>F</i> (1, 1259)=5.87, <i>p</i> =.016

* *p* < .05; ** *p* < .01; *** *p* < .001; ^a=age in years

The linear regression analysis showed that, overall, all adjusted *R*² values were significant but relatively low in predictive power (ranging from .004-.02) (Table 4.10). This suggests that sibling bullying perpetration does have an impact on depression at 13.5 and 16.5 years, conduct problems, hyperactivity problems, peer problems at 16.5 years and on peer bullying perpetration at 17.5 years. However, the impact is relatively low. Sibling bullying perpetration seemed to have the biggest impact on hyperactivity problems at 16.5 years of age (β =.14, *p*<.001).

Two hierarchical regressions were conducted in order to assess whether sibling bullying perpetration at 12.5 years was still a significant predictor of peer bullying perpetration at 17.5 years, while controlling for internalising and externalising behaviour problems. The first hierarchical regression controlled for internalising behaviour problems (Table 4.11). It was found that sibling bullying perpetration at 12.5 years was not a unique predictor of peer bullying perpetration at 17.5 years. In the second step of the regression, depression at 16 years (β =.10, *p*=.007) was the only

significant predictor of peer bullying perpetration at 17.5 years.

Table 4.11. Hierarchical Regression Analysis Sibling Bullying Perpetration as Predictor of Peer Bullying Perpetration while controlling for Internalising Behaviour Problems

Variables	Perpetrator of Peer Bullying at 17.5 years of age					
	B	SE B	B	B	SE B	B
Depression at 13.5 ^a	.01	.01	.07	.01	.01	.06
Depression at 16.5 ^a	.01	.004	.10	.01	.004	.10**
Sibling Bullying Perpetration at 12.5 ^a				.10	.01	.05
R²	.02***			.02***		
F	F(2, 904)=9.12, p<.001			F(3, 903)=6.73, p<.001		
R² Change	.002					

* p < .05; ** p < .01; *** p < .001; *m= p=.05-.06; ^a= age in years

Then sibling bullying perpetration at 12.5 years was assessed as a unique predictor of peer bullying perpetration when children were 17.5 years, taking account of externalising behaviour problems when children were 16.5 years old (Table 4.12). None of the models were significant. When assessing the histogram and P-P plots, it appeared that the variables were not normally distributed. When the missing data analysis was conducted for this assessment, the problem was resolved (Table 10 in Appendix E). Here it appeared that having had peer problems at the age of 16.5 years significantly predicted peer bullying perpetration behaviour at the age of 17.5 years ($\beta = .02, p = .008$). Sibling bullying perpetration when children were 12.5 years old was not a significant predictor of peer bullying perpetration when children were 17.5 years old when controlling for externalising behaviour problems.

Table 4.12. Hierarchical Regression Analysis of Sibling Bullying Perpetration as Predictor of Peer Bullying Perpetration while controlling for Externalising Behaviour Problems

Variables	Perpetrator of Peer Bullying at 17.5 years of age					
	B	SE B	B	B	SE B	B
Conduct Problems at 16.5 ^a	-.01	.02	-.02	-.01	.02	-.02
Hyperactivity Problems at 16.5 ^a	.02	.01	.07	.02	.01	.06
Peer Problems at 16.5 ^a	.02	.02	.03	.01	.02	.03
Sibling Bullying Perpetration at 12.5 ^a				.01	.01	.04
R²	.002			.003		
F	F(3, 1003)=1.74, p=.157			F(4, 1002)=1.79, p=.130		
R² Change	.002					

* $p < .05$; ** $p < .01$; *** $p < .001$; *m= $p=.05-.06$; ^a= age in years

4.4.2. Aim 2: Explore distal predictors and the long-term outcomes of sibling bullying victimisation

Maternal mental health, mother-father relationship quality as precursors of being a victim of sibling bullying

Table 4.13. Multiple Regression Analysis on Maternal Mental Health and its effects on Victims of Sibling Bullying at 12.5 years of age

Variables	Victim of Sibling Bullying at 12.5 years of age		
	B	SE B	B
Maternal Anxiety at 5.08 ^a	.07	.06	.04
Maternal Depression at 5.08 ^a	.05	.06	.03
Maternal Somaticism at 5.08 ^a	.04	.06	.02
Maternal Self-Esteem at 5.08 ^a	-.003	.02	-.003
R²	.01**		
F	F(4, 2010)=3.59, $p < .006$		

* $p < .05$; ** $p < .01$; *** $p < .001$; *m= $p=.05-.06$; ^a=age of child in years

Table 4.14. Multiple Regression Analysis on Mother-Partner Relationship Quality and its effects on Victims of Sibling Bullying at 12.5 years of age

Variables	Victim of Sibling Bullying at 12.5 years of age		
	B	SE B	β
Mother-Partner Bond at 6.08 ^a	-.02	.04	-.01
MP Verbal Violence at 8.08 ^a	-.10	.17	-.02
MP Physical Violence 8.08 ^a	-.05	.15	-.01
MP Extreme Violence 8.08 ^a	.27	.50	.01
PM Verbal Violence 8.08 ^a	.34	.16	.07*
PM Physical Violence 8.08 ^a	.08	.17	.01
R²	.003		
F	F(6, 1997)=1.99, p=.064		

* $p < .05$; ** $p < .01$; *** $p < .001$; *m= $p=.05-.06$; ^a=age of child in years; MP= mother toward partner; PM= partner towards mother

Table 4.13 indicates the results of the multiple regression analyses carried out on the assessment of the effects of maternal mental health on being a victim of sibling bullying. The overall model was significant, despite having a relatively low impact on being a victim of sibling bullying. None of the maternal mental health factors was associated with sibling bullying victimisation. Correlation among the independent factors could have caused this outcome, despite collinearity diagnostics being run and not flagging up any significant collinearities. Table 4.14 shows the results of the multiple regression analysis on the assessment of how the quality of the mother-partner relationship affects being a victim of sibling bullying. Again the overall model indicated a very low impact and was not significant ($R^2=.01$, $p=.064$). It was assumed that none of the mother towards partner/ partner towards mother verbal, physical and extreme violence variables were significant in the multiple regressions due to intercollinearity. Therefore, two hierarchical regressions were carried out (Tables 4.15-4.16). In the first one, mother towards partner violence factors were entered first (Table 4.15) and then the partner towards mother violence factors; in the second hierarchical regression (Table 4.16) the sequences was reversed. For the hierarchical regression in which mother-to-partner violence was inserted first (Table 4.15) no models were significant. Only the last model when partner to mother domestic violence factors were

added approached significance ($p=.058$). In the third model, partner-to-mother verbal violence was a significant predictor of sibling bullying victimisation, so that more verbal violence from the partner towards the mother at 8.08 years of age, increased sibling bullying victimisation at 12.08 years of age ($\beta =.07, p=.032$). Table 4.16 shows the hierarchical regression in which the partner-to-mother domestic violence factors were inserted in the second step and then the mother-to-partner domestic violence factors were inserted in the third step. Verbal violence from the partner towards the mother predicted sibling bullying victimisation, above all other factors, so that more verbal violence from the partner towards the mother was associated with more bullying victimisation of a sibling ($\beta =.07, p=.032$).

Table 4.15. Hierarchical Regression Analysis on Mother-Partner Relationship Quality and its effects on Victims of Sibling Bullying

Variables	Victim of Sibling Bullying at 12.5 years of age								
	B	SE B	B	B	SE B	B	B	SE B	β
Mother-Partner Bond at 6.08 ^a	-.04	.04	-.03	-.03	.04	-.02	-.02	.04	-.01
MP Verbal Violence at 8.08 ^a				.16	.13	.03	-.10	.17	-.02
MP Physical Violence at 8.08 ^a				.11	.13	.02	.05	.15	.01
MP Extreme Violence at 8.08 ^a				.25	.50	.01	.27	.50	.01
PM Verbal Violence at 8.08 ^a							.34	.16	.07*
PM Physical Violence at 8.08 ^a							.08	.17	.01
R²	.000			.01**			.03		
F	F(1, 2002)=1.32, p=.251			F(4, 1999)=1.55, p=.184			F(6, 1997)=1.99, p=.064		
R² change	.002						.003* ^m		

* $p < .05$; ** $p < .01$; *** $p < .001$; *_m = $p = .05-.06$; ^a = age in years; MP = mother toward partner; PM = partner towards mother

Table 4.16. Hierarchical Regression Analysis on Mother-Partner Relationship Quality and its effects on Victim of Sibling Bullying

Variables	Victim of Sibling Bullying at 12.5 years of age								
	B	SE B	β	B	SE B	B	B	SE B	β
Mother-Partner Bond at 6.08 ^a	-.04	.04	-.03	-.02	.04	-.01	-.02	.04	-.01
PM Verbal Violence at 8.08 ^a				.29	.12	.06*	.34	.16	.07*
PM Physical Violence at 8.08 ^a				.14	.15	.02	.08	.17	.01
MP Verbal Violence at 8.08 ^a							-.10	.17	-.02
MP Physical Violence at 8.08 ^a							.05	.15	.01
MP Extreme Violence at 8.08 ^a							.27	.50	.01
R²	.000			.04*			.03		
F	F(1, 2002)=1.32, p=.251			F(3, 200)=3.73, p=.011			F(6, 1997)=1.99, p=.064		
R² change	.005**						.001		

* $p < .05$; ** $p < .01$; *** $p < .001$; *_m = $p = .05-.06$; ^a = age in years; MP = mother toward partner; PM = partner towards mother

Psychological wellbeing as outcomes of sibling bullying victimisation

Table 4.17. Linear Regression Analysis of Sibling Bullying Victimisation and the Psychological Wellbeing of children

	Sibling Bullying Victimisation at 12.5 years of age				
Outcome Variables	<i>B</i>	<i>SE B</i>	β	<i>R</i>²	<i>F</i>-Ratio
Depression at 13.5 ^a	.17	.02	-.17***	.01	<i>F</i> (1, 2289)=68.69, <i>p</i> <.001
Depression at 16.5 ^a	.18	.03	.14***	.02	<i>F</i> (1, 1983)=41.16, <i>p</i> <.001
Self-Esteem at 17.5 ^a	-.14	.03	-.11	.01	<i>F</i> (1, 1645)=19.97, <i>p</i> <.001
Emotional Problems at 16.5 ^a	.03	.01	.07**	.01	<i>F</i> (1, 2149)=11.23, <i>p</i> =.001
Conduct Problems at 16.5 ^a	.03	.01	.10***	.01	<i>F</i> (1, 2151)=20.78, <i>p</i> <.001
Hyperactivity Problems at 16.5 ^a	.03	.01	.09***	.01	<i>F</i> (1, 2154)=15.97, <i>p</i> <.001
Peer Problems at 16.5 ^a	.02	.01	.08***	.01	<i>F</i> (1, 2149)=14.12, <i>p</i> <.001
Peer Bullying Perpetration at 17.5 ^a	.01	.003	.07**	.004	<i>F</i> (1, 1490)=6.88, <i>p</i> =.009
Peer Bullying Victimization at 17.5 ^a	.01	.004	.08**	.01	<i>F</i> (1, 1490)=9.82, <i>p</i> =.002

* *p* < .05; ** *p* < .01; *** *p* < .001; ^a=age in years

A linear regression analysis was conducted to assess the behavioural outcomes of sibling bullying victimisation at 12.5 years of age. It was found that all except self-esteem at 16 years of age were significant outcomes (Table 4.17).

In order to assess the relationship between sibling victimisation at age 12.5 years and peer bullying perpetration and victimisation at age 17.5 a bit further, two hierarchical regressions were conducted. These examined whether sibling bullying victimisation at 12.5 years was still a significant predictor of peer bullying perpetration at 17.5 years, while controlling for internalising and externalising behaviour problems. The first hierarchical regression controlled for internalising behaviour problems (Table 4.18). It was found that sibling bullying perpetration at 12.5 years was not a unique predictor of peer bullying perpetration at 17.5 years. In the second step of the regression, depression at 16 years ($\beta=.10$, *p*=.013) was the only significant predictor of

peer bullying perpetration at 17.5 years.

Then the second hierarchical regression analysis assessed whether sibling bullying victimisation when children were 12.5 years old was a unique predictor of peer bullying perpetration, taking into consideration externalising behaviour problems when children were 16.5 years old (Table 4.19). It was found that sibling bullying victimisation at 12.5 years of age was not a unique predictor of peer bullying perpetration. In the second step of the regression peer problems at 16.5 ($\beta=.06, p=.037$) years of age was a significant predictor of peer bullying perpetration at 17.5 years of age.

Table 4.18. Hierarchical Regression Analysis Sibling Bullying Victimization as predictor of Peer Bullying Perpetration while controlling for internalising behaviour problem

Variables	Perpetrator of Peer Bullying at 17.5 years of age					
	B	SE B	B	B	SE B	β
Depression at 13.5 ^a	.01	.004	.06	.01	.004	.06
Depression at 16.5 ^a	.01	.004	.10**	.01	.004	.09*
Emotional Problems at 16.5 ^a	-.01	.01	-.04	-.01	.01	-.04
Sibling Bullying Victim at 12.5 ^a				.01	.004	.05
R²	.01**			.01**		
F	F(3, 964)=5.14, p=.002			F(4, 963)=4.751 p=.001		
R² Change	.003					

* $p < .05$; ** $p < .01$; *** $p < .001$; *m= $p=.05-.06$; ^a= age in years

Table 4.19. Hierarchical Regression Analysis Sibling Bullying Victimization as predictor of Peer Bullying Perpetration while controlling for externalising behaviour problem

Variables	Perpetrator of Peer Bullying at 17.5 years of age					
	B	SE B	B	B	SE B	B
Conduct Problems at 16.5 ^a	-.01	.02	-.03	-.01	.02	-.03
Hyperactivity Problems at 16.5 ^a	.02	.01	.06	.02	.01	.06
Peer Problems at 16.5 ^a	.03	.01	.06*	.03	.01	.06*
Sibling Bullying Victim at 12.5 ^a				.01	.004	.04
R²	.01			.01		
F	F(3, 1201)=3.07, p=.027			F(4, 1200)=2.75, p=.027		
R² Change	.001					

* $p < .05$; ** $p < .01$; *** $p < .001$; *m= $p=.05-.06$; ^a= age in years

Next to be assessed was whether sibling bullying victimisation at 12.5 years was a unique predictor of peer bullying victimisation when children were 17.5 years old, taking account of internalising behaviour problems and externalising behaviour problems when children were 16.5 years old (Table 4.20). First the hierarchical regression was run where internalising behaviour problems were inserted in the first model and then in the second model sibling bullying victimisation was inserted, with peer bullying victimisation as the dependent variable. It was found that sibling bullying victimisation was not a unique predictor of peer bullying victimisation. However, depression at 13.5 ($\beta=.07, p=.05$), depression at 16.5 ($\beta=.15, p<.001$) and emotional problems at 16.5 ($\beta=.07, p=.055$) all (marginally) significantly predicted peer bullying victimisation.

Then sibling bullying victimisation was assessed as a unique predictor of peer bullying victimisation when controlling for externalising behaviour problems (Table 4.21). It was indeed found that sibling bullying victimisation ($\beta=.07, p=.020$) when children were 12.5 year old was a unique predictor of peer bullying victimisation when children were 17.5 years old above and beyond externalising behaviour problems when children were 16.5 years old.

Table 4.20. Hierarchical Regression Analysis Sibling Bullying Victimisation as predictor of Peer Bullying Victimisation while controlling for internalising behaviour problem

Variables	Victim of Peer Bullying at 17.5 years of age					
	B	SE B	B	B	SE B	β
Depression at 13.5 ^a	.01	.01	.08*	.01	.01	.07* ^m
Depression at 16.5 ^a	.02	.01	.15***	.02	.01	.15***
Emotional Problems at 16.5 ^a	.03	.02	.07* ^m	.03	.02	.07* ^m
Sibling Bullying Victim at 12.5 ^a				.01	.01	.04
R²	.05***			.05***		
F	F(3, 964)=17.73, p<.001			F(4, 963)=13.77 p<.001		
R² Change	.002					

* $p < .05$; ** $p < .01$; *** $p < .001$; *_m = $p = .05-.06$; ^a = age in years

Table 4.21. Hierarchical Regression Analysis Sibling Bullying Victimization as predictor of Peer Bullying Victimization while controlling for externalising behaviour problem

Variables	Victim of Peer Bullying at 17.5 years of age					
	B	SE B	B	B	SE B	B
Conduct Problems at 16.5 ^a	.001	.02	.002	-.002	.02	-.003
Hyperactivity Problems at 16.5 ^a	-.01	.01	-.02	-.01	.01	-.02
Peer Problems at 16.5 ^a	.09	.02	.14***	.08	.02	.14***
Sibling Bullying Victim at 12.5 ^a				.01	.01	.07*
R²	.02			.02		
F	F(3, 1201)=8.10, p<.001			F(4, 1200)=7.45, p<.001		
R² Change	.004*					

* $p < .05$; ** $p < .01$; *** $p < .001$; *m= $p=.05-.06$; ^a= age in years

4.4.3. Aim 3: Explore distal precursors and long-term outcomes of the specific roles of bullying: sibling pure bully, sibling pure victim and sibling bully-victim

Table 4.22. One-way ANOVA: Outcomes of Sibling Pure Bullies, Sibling Pure Victims and Sibling Bully-Victims

Outcome Variable	Sibling Bully Type	Mean (SD)	N	F-Statistic
Depression at 13.5 ¹	Neutral ^a	21.25 (4.88)d	275	F(3, 1031)=3.72, p=.011
	Pure Bully ^b	21.96 (4.88)	117	
	Pure Victim ^c	22.03 (5.11)	251	
	Bully-Victim ^d	22.89 (5.21)a	392	
Depression at 16.5 ¹	Neutral ^a	23.88 (5.81)	275	F(3,1031)=1.30, p=.273
	Pure Bully ^b	24.07 (6.26)	117	
	Pure Victim ^c	25.27 (5.92)	251	
	Bully-Victim ^d	24.80 (6.21)	392	
Emotional Problems at 16.5 ¹	Neutral ^a	1.39 (1.89)	275	F(3, 1031)=.47, p=.703
	Pure Bully ^b	1.39 (1.88)	117	
	Pure Victim ^c	1.52 (1.75)	251	
	Bully-Victim ^d	1.53 (1.90)	392	
Self-Esteem at 17.5 ¹	Neutral ^a	38.43 (6.04)	275	F(3, 1031)=.96, p=.409
	Pure Bully ^b	38.15 (6.73)	117	
	Pure Victim ^c	38.05 (6.57)	251	
	Bully-Victim ^d	38.29 (6.92)	392	

* $p < .05$; ** $p < .01$; *** $p < .001$; ¹=age in years; ^{abcd} indicates significant differences between groups; F_w =F-Statistic according to Welch-test, due to homogeneity of variance not being met, in which cases the Games-Howell post hoc test was chosen

Table 4.22. One-way ANOVA: Outcomes of Sibling Pure Bullies, Sibling Pure Victims and Sibling Bully-Victims continued

Outcome Variable	Sibling Bully Type	Mean (SD)	N	F-Statistic
Conduct Problems at 16.5 ¹	Neutral ^a	.84 (1.15)b	275	<i>F</i> _w (3, 404.75)=5.32, <i>p</i> =.001
	Pure Bully ^b	1.35 (1.57) ac	117	
	Pure Victim ^c	.76 (1.19) b	251	
	Bully-Victim ^d	1.00 (1.33)	392	
Hyperactivity Problems at 16.5 ¹	Neutral ^a	1.96 (1.81)b	275	<i>F</i> (3, 1031)=10.38, <i>p</i> <.001
	Pure Bully ^b	3.15 (2.20)acd	117	
	Pure Victim ^c	2.22 (1.96) b	251	
	Bully-Victim ^d	2.29 (2.14)b	392	
Peer Problems at 16.5 ¹	Neutral ^a	.98 (1.26)	275	<i>F</i> _w (3, 405.76)=1.59, <i>p</i> =.192
	Pure Bully ^b	1.26 (1.66)	117	
	Pure Victim ^c	1.20 (1.61)	251	
	Bully-Victim ^d	1.15 (1.50)	392	
Peer Bully at 17.5 ¹	Neutral ^a	3.21 (.55)	275	<i>F</i> _w (3, 412.24)=4.20, <i>p</i> =.006
	Pure Bully ^b	3.29 (.72)	117	
	Pure Victim ^c	3.16 (.47)d	251	
	Bully-Victim ^d	3.32 (.76)c	392	
Peer Bullying Victim at 17.5 ¹	Neutral ^a	3.40 (.76)	275	<i>F</i> _w (3, 419)=1.04, <i>p</i> =.377
	Pure Bully ^b	3.47 (.88)	117	
	Pure Victim ^c	3.47 (.85)	251	
	Bully-Victim ^d	3.52 (.98)	392	

* *p* < .05; ** *p* < .01; *** *p* < .001; ¹=age in years; ^{abcd} indicates significant differences between groups; *F*_w=*F*-Statistic according to Welch-test, due to homogeneity of variance not being met, in which cases the Games-Howell post hoc test was chosen

The one-way ANOVA showed the outcomes for neutrals, sibling pure bullies, sibling pure victims and sibling bully-victims (Table 4.22). Results indicated that in terms of internalising behaviour problems, sibling bully-victims had the highest rates of symptoms of depression at the age of 13.5 years, followed by sibling victims, then sibling bullies and then neutrals. There was a significant difference in terms of symptoms of depression when children were 13.5 years old between neutrals and sibling bully-victims. However, when children were 16.5 years there was no significant difference in the rate of symptoms of depression between neutrals, sibling pure bullies, sibling pure victims and sibling bully-victims. There was no significant difference in

the rate of emotional problems when children were 16.5 years old and in the rate of self-esteem when children were 17.5 years old (between neutrals, sibling pure bullies, sibling pure victims and sibling bully-victims).

In terms of externalising behaviour problems, sibling pure bullies scored highest on conduct problems when children were 16.5 years old, which was followed by sibling bully-victims, then neutrals and then sibling pure victims. Sibling pure bullies scored significantly highest on the hyperactivity scale, compared to neutrals, pure sibling victims. Pure bullies scored significantly higher on the hyperactivity scale when they were 16.5 years old, compared to neutrals, sibling pure victims and sibling bully-victims. There was no significant difference between neutrals, sibling pure bullies, sibling pure victims and sibling bully-victims, in their rates of peer problems when children were 16.5 years old or in being a victim of peer bullying when children were 17.5 years old. However, in terms of peer bullying perpetration when children were 17.5 years old, sibling bully-victims scored highest, followed by pure bullies, neutrals and then sibling pure victims. There was a significant difference in peer bullying perpetration scores at the age of 17.5 years between sibling bully-victims and sibling pure victims.

4.4.4. Aim 4: Explore the cross-over effects from sibling bullying to peer bullying

4.4.4.1. Sibling Pure Bullies

The cross-over effects of sibling bullying to peer bullying were assessed through a cross-tabulation analysis. The analysis showed that out of all sibling pure bullies when children were 12.5 years of age, 27.6% were less likely to become peer pure bullies at 17.5 years of age, compared to those who became peer neutrals at 17.5 years of age (29.7%) (i.e., weaker carry-over effect). Further, the cross-over effect was

not significant ($\chi^2(1, N = 440) = .06, p=.499$) (Figure 4.3). The odds ratio analysis indicated that when children are sibling pure bullies, the odds that they will become peer neutrals when they are 17.5 years old are 1.11 higher (OR=1.11 [.39-2.10]), than the sibling pure bullies who became peer pure bullies.

Further, out of all sibling pure bullies when children were 12.5 years old, 32.1% were more likely to become peer pure victims when children were 17.5 years old, compared to those who became peer neutrals at 17.5 years old (29.7%) (i.e., stronger carry-over effect). However, the carry-over effect was not significant ($\chi^2(1, N=495)=.20, p=.372$) (Figure 4.3). The odds ratio analysis indicated that when children are sibling pure bullies, the odds that they will become peer pure victims when they are 17.5 years old are 1.12 higher (OR=1.12 [.68-1.86]), than the sibling pure bullies who became peer neutrals.

Out of all sibling pure bullies when children were 12.5 years old, 41.9% were significantly more likely to become peer bully-victims when they were 17.5 years old, compared to those who became peer neutrals when they were 17.5 years old (29.7%) (i.e., stronger carry-over effect) ($\chi^2(1, N=497)=4.86, p=.02$) (Figure 4.3). The odds ratio analysis indicated that when children are sibling pure bullies, the odds that they will become peer bully-victims when they are 17.5 years old are 1.71 higher (OR=1.71 [1.06-2.75]), than the sibling pure bullies who became peer neutrals.

4.4.4.2. Sibling Pure Victims

The analysis showed that out of all sibling pure victims when children were 12.5 years old, 47.5% were less likely to become peer pure bullies when they were 17.5 year old, compared to those who became peer neutrals when they were 17.5 years old (48.9%) (i.e., weaker carry-over effect). However, the carry-over effect was not significant ($\chi^2(1, N=606)=.03, p=.495$) (Figure 4.4). The odds ratio analysis indicated

that when children are sibling pure victims, the odds that they will become peer pure bullies when they are 17.5 years old are 1.06 lower (OR=1.06 [.50-1.79]), than the sibling pure victims who became peer neutrals.

Out of all sibling pure victims at 12.5 years of age 56.20% were more likely to become peer pure victims at 17.5 years, compared to those who became peer neutrals when they were 17.5 years old (48.9%) (i.e., stronger carry-over effect). However, the carry-over effect was not significant ($\chi^2(1, N=696)=2.20, p=.083$) (Figure 4.4). The odds ratio analysis indicated that when children are sibling pure victims, the odds that they will become peer pure victims when they are 17.5 years old are 1.34 higher (OR=1.34 [.91-1.96]), than the sibling pure victims who became peer neutrals.

Out of all sibling pure victims at 12.5 years of age 51.9% were more likely to become peer pure victims at 17.5 years, compared to those who became peer neutrals when they were 17.5 years old (48.9%) (i.e., stronger carry-over effect). However, the carry-over effect was not significant ($\chi^2(1, N=660)=.31, p=.325$) (Figure 4.4). The odds ratio analysis indicated that when children are sibling pure victims, the odds that they will become peer bully-victims when they are 17.5 years old are 1.13 higher (OR=1.13 [.74-1.71]), than the sibling pure victims who became peer neutrals.

4.4.4.3. Sibling Bully-Victims

Out of all sibling bully-victims when children were 12.5 years old, 65.6% were more likely to become peer pure bullies when children were 17.5 years old, compared to those who became peer neutrals when they were 17.5 years old (59.2%) (i.e., stronger carry-over effect). However, the carry-over effect was not significant ($\chi^2(1, N=770)=.94, p=.203$) (Figure 4.5). The odds ratio analysis indicated that when children are sibling bully-victims, the odds that they will become peer pure bullies when they

are 17.5 years old are 2.75 higher (OR=1.31 [.76-2.27]), than the sibling bully-victim who became peer neutrals.

Further, the analysis showed that out of all sibling bully-victims when children were 12.5 years old, 63.5% were more likely to become peer pure victims when they were 17.5 years old, compared to those who became peer neutrals when they were 17.5 years old (59.2%) (i.e., stronger carry-over effect). However, the carry-over effect was not significant ($\chi^2(1, N=865)=.95, p=.188$) (Figure 4.5). The odds ratio analysis indicated that when children are sibling bully-victims, the odds that they will become peer pure victims when they are 17.5 years old are 1.20 higher (OR=1.20 [.84-1.71]), than the sibling bully-victims who became peer neutrals.

Out of all sibling bully-victims when children were 12.5 years old, 69.7% were significantly more likely to become peer bully-victims when they were 17.5 years old, compared to those who became peer neutrals when they were 17.5 years old (59.2%) (i.e., stronger carry-over effect) ($\chi^2(1, N=874)=6.17, p=.008$) (Figure 4.5). The odds ratio analysis indicated that when children are sibling bully-victims, the odds that they will become peer bully-victims when they are 17.5 years old are 1.58 higher (OR=1.58 [1.10-2.2]), than the sibling bully-victims who became peer neutrals.

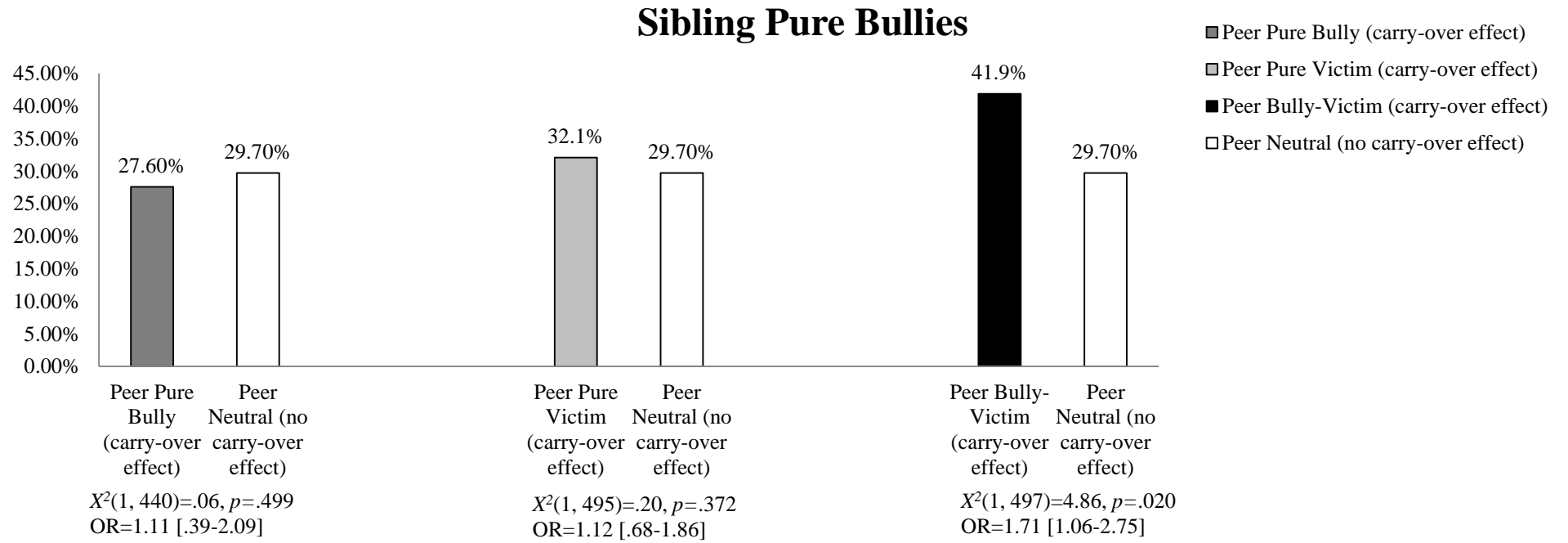


Figure 4.3. Cross-over effects of sibling pure bullies to peer pure bullies, peer pure victims and peer bully-victims

Sibling Pure Victims

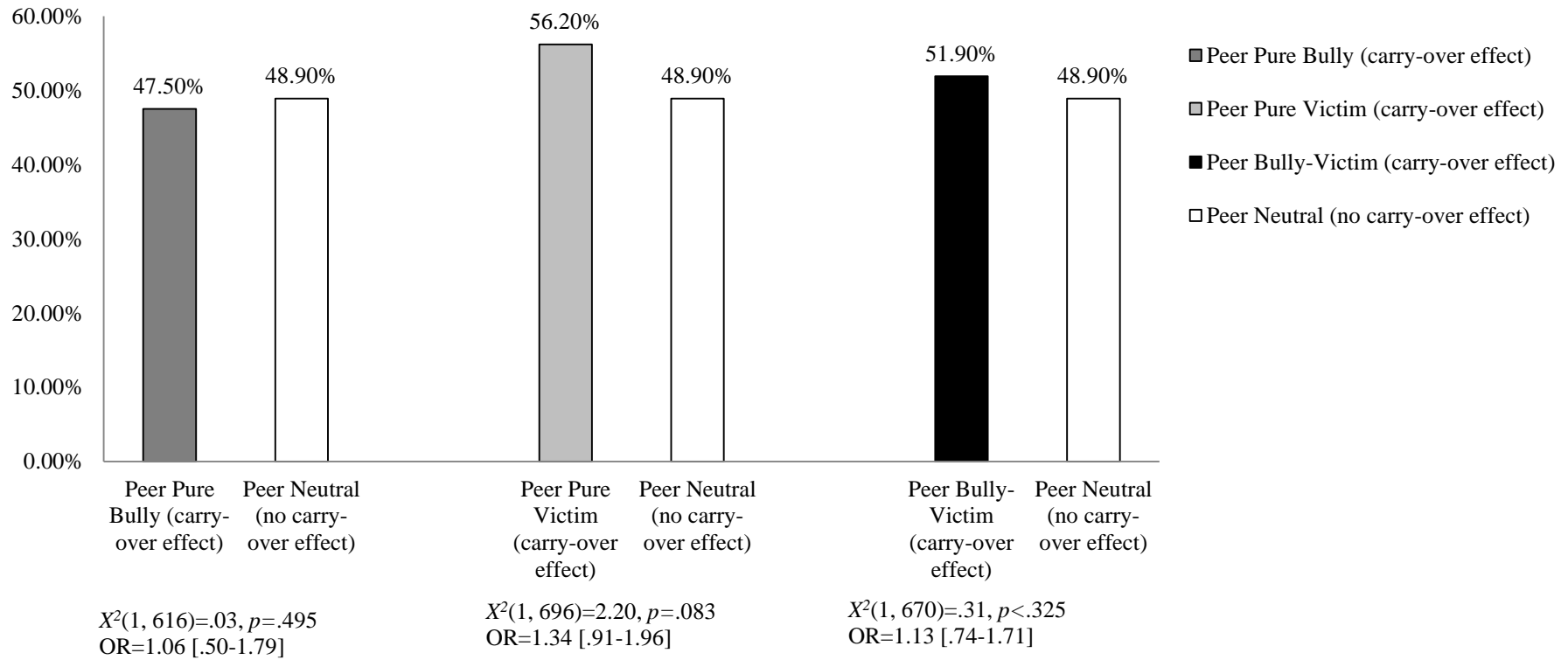


Figure 4.4. Cross-over effects of sibling pure victims to peer pure bullies, peer pure victims and peer bully-victims

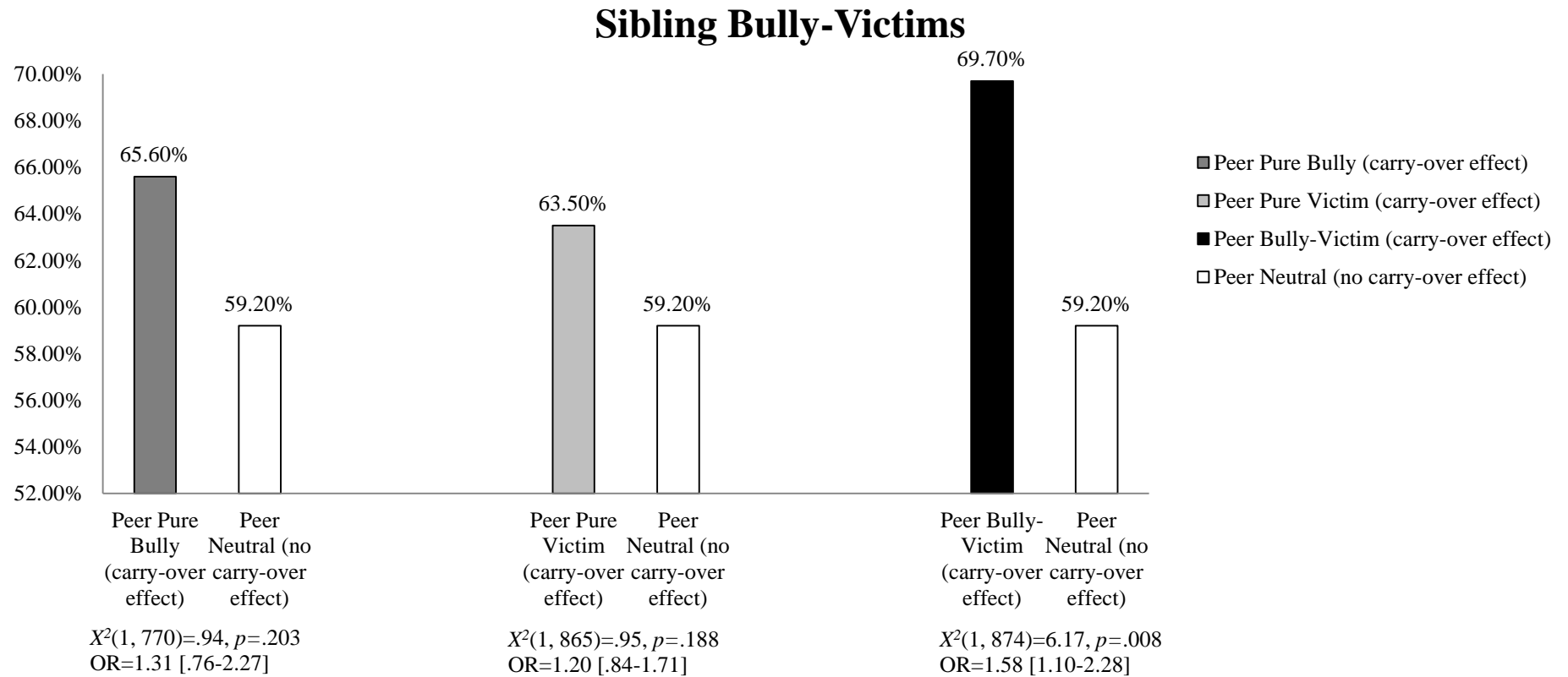


Figure 4.5. Cross-over effects of sibling bully-victims to peer pure bullies, peer pure victims and peer bully-victims.

4.4.5. Missing data analysis

The same analysis procedure was repeated with the imputed missing data (Appendix E). As before, five imputations were conducted, and where possible the respectively pooled results were reported. Due to the substantial amount of data missing, there was usually one of five imputations that produced results that deviated from the other four imputations; this influenced the pooled imputation results. This resulted in the pooled multiple imputation Pearson correlation indicating that only maternal somaticism, maternal self-esteem, mother-to-partner physical violence and partner-to-mother verbal violence correlated with sibling bullying perpetration and only sibling relationship quality and maternal depression correlated with sibling bullying victimisation. As imputations 1, 2, 3 and 5 indicated significant correlations very similar to the original correlation analyses, the regressions that followed the correlation analyses were run anyway under the missing data constraint, even if the pooled multiple imputation correlation indicated no correlation between respective variables.

Overall, the missing data analysis showed fewer significant predictors and outcomes of sibling bullying. In terms of the maternal mental health factors as predictors of sibling bullying perpetration, maternal anxieties when children were 5.08 years of age were significant, rather than maternal somaticism, which was a significant predictor with the original data (Table 3, Appendix E). Further, none of the mother-partner relationship quality factors (mother-partner bond and mother-partner domestic violence factors) were significant, despite the overall model being significant (Table 4, Appendix E). In the hierarchical regression analysis in which mother-to partner and partner-to-mother factors were entered at separate steps of the regression, mother-to-partner physical violence when children were 8.08 years old appeared to be a significant predictor of sibling bullying perpetration at the age of 12.5 years, instead of mother-partner bond and mother-to-partner verbal violence, which was a significant

predictor in the analysis of the original data (Table 5-Table 6, Appendix E).

Furthermore, in terms of the outcomes of sibling bullying perpetration, only conduct problems and hyperactivity problems at the age of 16.5 resulted as significant (Table 8, Appendix E), compared to all externalising and internalising behaviour problems being significant outcomes (as was the case in the analysis of the original data). Then in the assessment of whether sibling bullying perpetration at the age of 12.5 years was a unique predictor of peer bullying perpetration, while considering internalising and externalising behaviour problems, peer problems at the age of 16.5 years was the only significant predictor of sibling bullying perpetration at the age of 17.5 (Table 10, Appendix E). Again, this is different from the results in the analysis with the original data: there it was found that symptoms of depression at 16.5 years was a significant outcome of sibling bullying perpetration when children were 12.5 years old.

In the analysis of maternal mental health problems and mother-partner relationship problems as predictors of sibling bullying victimisation, none of the variables resulted as significant.

In terms of internalising and externalising behaviour problems and peer bullying involvement as outcomes of sibling bullying victimisation, higher depression at the age of 13.5, higher depression at 16.5, lower self-esteem at 17.5 and higher peer bullying victimisation at the age of 17.5 were significant outcomes of having been victimised by a sibling at the age of 12.5 years (Table 15, Appendix E). Then in the assessment of whether sibling bullying perpetration at the age of 12.5 years was a unique predictor of peer bullying perpetration and peer bullying victimisation, while considering internalising and externalising behaviour problems, sibling bullying victimisation was not a unique predictor of either peer bullying perpetration or peer bullying victimisation. However, symptoms of depression and peer problems at 16.5

years of age were significant predictors of peer bullying perpetration and victimisation at 17.5 years. In the analysis with the original data symptoms of depression at the age of 16.5 years was a unique outcome of sibling bullying perpetration and victimisation. Further, peer problems at 16.5 years was an outcome of sibling bullying perpetration and victimisation at 12.5 years. Further, sibling bullying victimisation at the age of 12.5 years was also a significant predictor of peer bullying perpetration when children were 17.5 years old.

4.5. Discussion

This study had four aims. The first aim was to assess distal factors as predictors of sibling bullying perpetration and its long-term outcomes. The second goal was to examine distal factors as predictors of sibling victimisation and its long-term consequences. The third goal was to explore the distal precursors and long term outcomes of the specific roles of sibling bullying (pure bully, pure victim, bully-victim, neutral), and the fourth goal was to assess the cross-over effects of sibling bullying perpetration and sibling victimisation and peer bullying perpetration and peer victimisation. To our knowledge this was the first study to examine distal factors as precursors of sibling bullying longitudinally and to examine externalising behaviour problems as outcomes of sibling bullying and to examine the long term relationship between sibling bullying and peer bullying.

The findings showed that distal factors were not strongly related to sibling bullying when children were 12 years old. Based on the Bronfenbrenner's Ecological Systems Model, this is not a surprising result (Bronfenbrenner, 1979) (Figure 2.1), as inherently distal factors (as the name of these factors indicates) are more distantly related to a child's development, compared to proximal factors (Chapter Three).

Nevertheless, some associations between maternal mental health factors and mother-partner relationship quality in relation to sibling bullying perpetration were found. Results showed that higher levels of maternal somaticism when children were five years and one month old was associated with more sibling bullying perpetration when children were 12.5 years old. As somatic symptoms are often associated with depression and anxieties, a case of collinearity could have caused the other maternal health factors (depression and anxiety symptoms and self-esteem) to not be significant predictors of sibling bullying perpetration. However a regression was run without maternal somaticism as a predictor of sibling bullying perpetration, and none of the other maternal mental health factors were significant (depression, anxiety or self-esteem). This is contrary to the cross-sectional studies' findings on maternal mental health in relation to sibling bullying; these did find a relationship between maternal depression and sibling bullying (Compton et al., 2003; Defoe et al., 2013; Keeton et al., 2015). It could have been a case of mothers being more willing to be open about somatic symptoms, rather than depression or anxieties, as the questionnaire included items about feelings of dizziness, sleep patterns, tingly feeling in their limbs etc. (Supplementary Table S62). Often, some of the underlying causes of somatic symptoms are bouts of depressions and anxieties, which the mother may not have been necessarily aware of (Escobar, Burnam, Karno, Forsythe, & Golding, 1987). The lack of awareness may stem from psychologically suppressing symptoms of depression or anxiety, which are therefore revealed physiologically, through somatic symptoms, such as dizziness or tingling in limbs (Escobar, Golding, Hough, Karno, Burnam, & Wells, 1987). Hence, symptoms of depression could have been present although psychologically suppressed by the mother, and therefore somatic symptoms prevailed as the significant predictor of sibling bullying perpetration. Strangely, however, none of the maternal mental health factors were associated with sibling bullying victimisation. It could be the case that

maternal mental health is more likely to lead children to act out and therefore bully their sibling, rather than to become victims. In spite of not having found substantial relatedness between maternal mental health factors and sibling bullying, in the future it should be explored how paternal mental health factors affect sibling bullying, as the results of the meta-analysis in Chapter Two showed that previous literature found that poor parental mental health has a detrimental effect on sibling relationships. In terms of mother-partner relationship quality factors, the mother-partner bond when children were 6 years and one month old seemed to significantly lower rates of sibling bullying perpetration at the age of 12.5. Interestingly, partner-to-mother verbal violence when children were eight years and one month seemed to significantly increase sibling bullying victimisation. Both of these results show that the mother-partner relationship quality affects sibling bullying. Although not explicitly about sibling bullying (but about sibling conflict and rivalry) Stocker and Youngblade (1999) supported this finding. Their results showed that marital conflict was associated with less warmth and more conflict and rivalry between siblings. These findings have implications for research on divorce. It has been found that children's psychological wellbeing is protected when high conflict marriages are resolved in divorce, compared to when children are consistently confronted with conflict between parents (Morrison & Coiro, 1999). It could be the case that the conflict between parents affects the children as individuals negatively, which then in turn nurtures bullying victimisation or that children learn vicariously through the conflict that they witness between their parents (Bandura, 1973). This should be investigated further, particularly whether sibling bullying victimisation is a mediator between parental conflict and children's psychological wellbeing. These findings could have implications on how parental conflict might be handled by counsellors and practitioners. Considering the repercussions of parental conflict with a holistic approach might prevent sibling

bullying and other negative consequences of marital conflict.

In terms of the outcomes of sibling bullying, sibling bullying perpetration was associated with symptoms of depression at 13 and at 16.5 years, externalising behaviour problems, inclusive of conduct, hyperactivity and peer problems at 16.5 years, and peer bullying perpetration at 17.5 years. Although this is the first study to longitudinally assess externalising behaviour problems in relation to sibling bullying, cross-sectional studies do support these findings (Button & Gealt, 2010; Wolke & Samara, 2004; Wolke & Skew, 2012a). Also examined was whether sibling bullying perpetration was a unique predictor of peer bullying perpetration when children were 17.5 years old; this did not seem to be the case. Depression at 16.5 years was the only significant predictor of peer bullying at 17.5, above sibling bullying perpetration. These findings should be further investigated through structural equation modelling, as sibling bullying perpetration at 12.5 years predicted depression at 13 and 16.5 years and peer bullying perpetration and depression at 16.5 years predicted peer bullying perpetration. Structural equation modelling would indicate any moderation between these associations. In terms of the outcomes of sibling bullying victimisation, Bowes et al. (2014) findings were supported in that depression was an outcome of sibling bullying victimisation at 13 and 16.5 years. Furthermore, emotional problems, conduct problems, hyperactivity problems and peer problems at 16.5 years were outcomes of sibling bullying victimisation. Cross-sectional studies that assessed internalising behaviour problems and externalising behaviour problems in relation to sibling bullying victimisation are supported (Wolke & Samara, 2004; Wolke & Skew, 2012a; Yu & Gamble, 2008). This study adds to the conclusions that the cross sectional studies have established in that it indicates direction of causality, so that sibling bullying victimisation at 12.5 years predicted these respective internalising and externalising behaviour problems. Additionally, peer bullying perpetration and peer bullying

victimisation when children were 17.5 years old were also outcomes of sibling bullying victimisation when children were 12.5 years old (Stauffer & DeHart, 2006; Tippet & Wolke, 2015; Wolke & Samara, 2004). When assessing whether sibling bullying victimisation was a unique predictor of peer bullying perpetration, while controlling for internalising and externalising behaviour problems, it was found that symptoms of depression at 16.5 years predicted peer bullying at 17.5 years above sibling bullying victimisation. Further, when assessing whether sibling bullying victimisation was a unique predictor of peer bullying victimisation, while controlling for internalising behaviour problems, it was found that depression at 13 and 16.5 years predicted peer bullying victimisation over sibling bullying victimisation. However, sibling bullying victimisation at 12.5 years of age predicted peer bullying victimisation when children were 17.5 years old over externalising behaviour problems. Again, structural equation models should be run with this data in order to produce a path analysis that would clearly indicate mediations between these associations. Interestingly, to our knowledge no other study has investigated sibling bullying in relation to self-esteem. In this study, self-esteem was assessed as an outcome of sibling bullying, when children were 17.5 years old. Self-esteem did not appear to be a significant outcome of sibling bullying in the long run (after five years). This is in contrast with Chapter Three, there it was found that lower self-esteem was a significant outcome in the short-run (two years later). These findings indicate that sibling bullying affects self-esteem in the short run (after two years, mid adolescence, when children are 13.5-14.5 years old), however, not in the long run (after five years, at the end of adolescence, when children are 17.5 years old). Overall, sibling bullying victims seemed to have more consequences in terms of psychological wellbeing compared to sibling bullying perpetrators.

Sibling bullying was broken down into four mutually exclusive roles (neutral, sibling pure bully, sibling pure victim and sibling bully-victim) and the outcomes of

having been in these respective roles were assessed. Overall, the biggest differences found between these four roles were found in rates of hyperactivity. It was found that sibling pure bullies had significantly the highest rate of hyperactive behaviour problems compared to, neutrals, sibling pure victims and sibling bully-victims. The fact that not many significant effects were found in this ANOVA analysis could relate to the substantial amount of missing data overall. Additionally, the groups varied widely in their sample sizes, which consequently could have been the cause for substantial unequal variances.

The cross-over effects from sibling bullying to peer bullying were assessed as well. Similarly to the findings of Chapter Three, overall it was found children who were involved in sibling bullying were more likely to be involved in peer bullying five and half years later. However, only the cross-over effects from sibling pure bullies at 12.5 years of age to peer bully-victims at 17.5 years of age was significant, so that almost half of children who were peer bully-victims at 17.5 years were previously sibling pure bullies. The other significant cross-over effect was from sibling bully-victims to peer bully-victims, so that more than half of the children, who were peer bully-victims at 17.5 years, were sibling bully-victims at 12 years of age. Overall, the cross-over effects were not as strong after five years, compared to the findings in the Chapter Three, which looked at the cross-over effects after one and two years.

4.5.1. Limitations

The benefit of using a longitudinal design is that it was possible to assess the precursors and outcomes associated with sibling bullying perpetration and victimisation. Further, this data was based on a population study, which ensured a large sample size. However, these same two factors are also limitations of the study as, in absolute terms, they produce a high dropout rate. The missing data analysis that was

run had to generate over 10,000 cases. These cases are generated based on the cases that have actual data. Using multiple imputation is currently becoming an acceptable method of dealing with missing data, however, the results that the multiple imputation analyses generate should be interpreted with caution (Spratt et al., 2010; Sterne et al., 2009). Particularly when data is missing not at random (MNAR), the results of the missing data analyses can be biased (as generated data is based on the existing data) (Sterne et al., 2009). In the case of this study, the dataset is so large that SPSS could not determine whether missing data was random (MCAR; MAR) or not (MNAR). Due to the extensiveness of the original data and it being a population study it is difficult to determine why there may be data missing at random or not at random. For some variables it may plausibly for them to not be missing at random, however, for the entire dataset overall it is more likely that data was missing at random (particularly for the participants that opted out of the study at earlier years of the study). Furthermore, caution should be adopted when interpreting multiple imputation analyse when predictor and outcome variables contain missing cases, which occurred here (Spratt et al., 2010). Considering the literature on multiple imputation, it is not surprising that the results from the missing data analysis differed from the results of the analyses conducted with the original dataset. Overall, with the substantial amount of data missing it is not clear whether the missing data analysis actually reduced bias or not. Considering this, the reported results that are discussed here are exclusively based on the analyses conducted with the full data. In the future, such missing data analyses should be conducted with the statistical program STATA, as it is not as restrictive as is SPSS (i.e. pooled adjusted beta coefficients).

Further, similar to Chapter Three, a limitation of this study was that sibling bullying was assessed at the age of 12. This study found that sibling bullying influences peer bullying behaviours, however, it is important to assess the outcomes of sibling

bullying, while controlling for previous experiences with peer bullying. This would indicate to what extent the outcomes are affected by sibling bullying, rather than by peer bullying. Furthermore, it should be investigated to what extent sibling bullying at preschool ages influence peer bullying when children are at school.

4.5.2. Conclusion

In conclusion this study found that distal factors are associated with sibling bullying, in particular maternal somaticism and mother-partner bond are associated with sibling bullying perpetration and partner-to-mother verbal violence are associated with sibling bullying victimisation. The relatively weak associations between distal factors and sibling bullying is not surprising due to distal factors being further away in the chain of influence on the individual (Bronfenbrenner, 1973). Furthermore, sibling bullying perpetration and victimisation is associated with depression, a number of externalising behaviour problems and peer bullying involvement. However, sibling bullying at the age of 12.5 years is not necessarily a unique predictor of peer bullying at the age of 17.5 years. On the other hand, sibling bullying victimisation seemed to be a predictor of peer bullying victimisation five years later.

5. Chapter 5 –Discussion and Conclusion

5.1. Discussion

5.1.1. Summary of Aims and Methodology

This thesis aimed to identify the most significant precursors and outcomes of sibling bullying. This was achieved through three studies: the first one was a meta-analysis, investigating proximal and distal factors associated with sibling conflicts. Sibling conflicts, rather than sibling bullying, was purposefully chosen as the focus in the meta-analysis, since in the literature to date sibling bullying has been referred to with different terms for the same or similar accounts. In order to get a good picture of the research on factors related to sibling bullying, the more general term ‘sibling conflicts’ was chosen. The purpose of the meta-analysis was to get an empirically informed indication of the factors to be focused on in the following two longitudinal studies. The second study was a four-year-long longitudinal population study (data from Edinburgh, Scotland) that assessed the precursors and outcomes of sibling bullying at the beginning of adolescence (the study began when children were 11.5-12.5 years old and lasted until children were 14.5-15.5 years old). Sibling bullying was assessed at the age of 12.5 years (second data collection point). Hence the precursors (one year prior sibling bullying data was collected) and the immediate outcomes (one and two years after sibling bullying was collected) of sibling bullying were examined. This second study focused on the proximal precursors of sibling bullying and the short-term outcomes of sibling bullying. The third and final study was another longitudinal study, this time based on the Avon Longitudinal Study of Parents and Children (ALSPAC). The data that was included from the ALSPAC study ranges from when the target children were four years and nine months old until the age of 17.5 years. In the

ALSPAC data, sibling bullying was also assessed when the target children were 12.5 years old. In this study distal precursors of sibling bullying were assessed, particularly parental mental health and parental marital quality. The long-term consequences of sibling bullying were also assessed (i.e., until the end of adolescence). This thesis attained its goal of providing an all-encompassing examination of the precursors and outcomes of sibling bullying: first by providing a foundational schema of the factors associated with sibling conflicts; secondly, by examining the proximal precursors of sibling bullying and its short-term outcomes; thirdly, by examining the distal precursors of sibling bullying and the long-term outcomes.

The aims of this thesis were justified because research on sibling bullying has included only one other longitudinal study (also conducted with the ALSPAC data; Bowes et al., 2014). The results of that study showed a positive linear trend between symptoms of depression, anxiety and self-harming when children were 18 years old, as outcomes of sibling bullying victimisation when children were 12 years old (Bowes et al., 2014). The rest of the sibling bullying literature is cross-sectional. Overall, it has been found that several, proximal factors and distal factors are associated with sibling bullying. Proximal factors include parenting aspects, such as maternal psychological control, which has been related to relational and overt aggression (Yu & Gamble, 2008), child maltreatment and harsh parenting, which has been related to direct sibling bullying (Button & Gealt, 2010; Tippett & Wolke, 2015). Further, positive parenting aspects in lowering sibling bullying have also been identified, such as parental warmth (Crouter et al., 1999; Updegraff et al., 2005), parental involvement (Wolke & Skew, 2012a) and perceived similar treatment of children by parents (Jenkins et al., 2012; Updegraff et al., 2005). Also, the relationship quality between children and their parents affects the quality of relationship that siblings have with each other, so that parents having a better relationship with each other is associated with less sibling

bullying (Tippett & Wolke, 2015). Other proximal factors include children's emotional and behavioural aspects. Depression, unhappiness and feelings of loneliness have been related to sibling bullying victimisation and bully-victims (Wolke & Skew, 2012a), more sibling bullying involvement (Duncan, 1999; Yabko et al., 2008) and more overall negativity between siblings (McHale et al., 2007). Specifically, relational aggression between siblings was also associated with more symptoms of depression (Campione-Barr et al., 2014; Yu & Gamble, 2008) and anxiety (Campione-Barr et al., 2014). Behaviour problems, inclusive of peer, conduct and hyperactivity problems (Wolke & Skew, 2012a), total behavioural difficulties (based on the SDQ) (Wolke & Samara, 2004) and risk behaviours (McHale et al., 2007) were associated with negativity between siblings overall and sibling bullying. Furthermore, specifically, verbal and physical sibling bullying perpetration was related to delinquent behaviours (Button & Gealt, 2010). Distal factors related to sibling bullying that have been identified through cross-sectional research include lack of family cohesion, negative family climate (Yu & Gamble, 2008) and stressful family changes (Hardy, 2001). More specific and severe family climate factors are children witnessing domestic violence (Bowes et al., 2014; Button & Gealt, 2010). Other distal factors are maternal mental health problems, such as maternal depression (Bowes et al., 2014; Jenkins et al., 2012; Miller et al., 2012). Also, low SES, such as lack of a higher education of parents (Tucker et al., 2013) and financial stress experienced by a family (Tucker et al., 2014) were related to more bullying between siblings. Furthermore, despite of differences in the nature of sibling relationships and peer relationships, sibling bullying has been related to peer bullying (Menesini et al., 2010; Stauffacher & DeHart, 2006; Tippett & Wolke, 2015; Wolke & Samara, 2004). This is a particular important revelation, as peer bullying is related to several severe (sometimes long lasting) internalizing (Austin & Josph, 1996; Olweus, 1994; Smokowski & Holland Kopasz, 2005; Wolke & Sapouna,

2008) and externalising (Wolke et al., 2000; Wolke & Samara, 2004) behavioural consequences. These findings indicate the vast realm of factors related to sibling bullying. However, as these studies are all cross-sectional it was not possible to identify a direction of causality or how long lasting and severe the potential outcomes (should these have been outcomes) of sibling bullying may be. As a result the aims and methods of this thesis were justified.

5.1.2. Summary and Discussion of Findings

5.1.2.1. Summary of Findings of Chapter 2 –The Effects of Parenting Styles and Familial Factors on Sibling Conflicts: A Meta-Analysis

The first study of this thesis was, to our knowledge, the first meta-analysis to explore proximal and distal factors associated with sibling conflict. This study aimed to answer the first research question: Due to the vast amount of literature on this topic, the searches for studies related to this topic were broken down into subtopics. After reviewing the search results, 60 studies were eligible to be included for analysis. Then after coding the variables from these studies, a thorough analyses of positive and negative proximal and distal factors in relation to sibling conflicts was conducted.

5.1.2.1.1. Parenting styles and family factors

The main findings of the meta-analysis were that the factors most likely to increase sibling conflicts were neglectful parenting and abusive parenting. The factors most likely to protect from sibling conflicts were warm and affectionate parenting and positive family climate. The Attachment Theory by Bowlby (1973) (refer to section 1.2.2.3) could explain why neglectful parenting had such a strong impact on sibling conflicts. Neglectful parenting was defined as not necessarily intentional harm-doing, however, having neglectful parenting styles, which may have negative effects on the

child. This included variables such as ineffective parenting, inconsistent/harsh parenting, hostility, dislike the mess that the child makes; rejection and anxious rearing (Table 2.3); thereby implying inconsistency in the child rearing process. Based on the Attachment Theory this may cause an insecure-disorganised attachment style in children, which in turn may have detrimental effects on the child's ability to form other social relations and regulating negative emotions (Benoit, 2004). This explains why neglectful parenting was the strongest predictor of conflicts between siblings. Similarly, the Attachment Theory (Bowlby, 1973) can also explain why warm and affectionate and authoritative parenting had significant impacts in lowering sibling conflicts. Warm and affectionate and authoritative parenting suggests a sensitive and guided parenting style, which allows children to develop a secure attachment style towards their primary caregivers. Children use the type of relationship they have with their primary caregivers as schemas for other social relationships, hence a secure attachment style to parents allows children to develop adaptive and nurturing relationships with other people (i.e. siblings). Furthermore, the Social Learning Theory (Bandura, 1973) (refer to section 1.2.2.2.) also explains why warm and affectionate parenting had one of the strongest effect sizes in relation to sibling conflicts. Positive and supportive family environments can nurture security and positivity in children (Stocker, Dunn, & Plomin, 1989), which implies that warm and affectionate parenting provides protection from sibling negativity. Interestingly, warm and affectionate parenting was more impactful than authoritative parenting. Harlow's Theory of Affection and Love (Harlow, 1958) is supported with this finding as this indicates that parental affection and warmth are two of the fundamental needs of a child in order to develop positive social behaviours.

Interestingly, a meta-analysis on parenting and peer bullying also found that warm and affectionate parenting had one of the strongest effect sizes in relation to peer

bullying (Lereya et al., 2013). Further, they also found that maladaptive parenting, which had a definition very similar to neglectful parenting in this meta-analysis, was one of the strongest factors associated with peer bullying. The fact that the same parenting factors are strongly associated with sibling conflicts and peer bullying supports the associations found between sibling and peer bullying (Menesini et al., 2010; Stauffacher & DeHart, 2006; Tippett & Wolke, 2015; Wolke & Samara, 2004). This is also supported by the two longitudinal studies in this thesis (elaborated below) as they indeed found that peer bullying involvement was a consequence of sibling bullying involvement. Together, this has strong implications for bullying intervention programs. Three aspects should be respected when creating bullying intervention programs. First, intervention programs that aim to prevent and/or end existing bullying behaviours should be implemented at a much younger age (Smith et al., 2003). As sibling bullying seems to be a precursor for peer bullying, attempting to tackle bullying behaviours within the household might prevent peer bullying behaviours from occurring at school. Second, as sibling and peer bullying stem from similar problem factors within family dynamics, therefore family members should play a much bigger and more integrated role in intervention programs, particularly in school bullying intervention programs (Smith et al., 2003; Smith et al., 2012). Third, as family climate factors seem to affect sibling bullying and therefore possibly peer bullying, consequently nurturing positivity with families and strengthening family ties should be a crucial factor in bullying intervention programs. Bryant and Conger (2002) broke down the mediums through which family factors influence individuals: observation (Bandura & Walters, 1963), socialisation (Maccoby & Martin, 1983) and behavioural consistency (Caspi, 1993). Conger, Cui, Bryant and Elder (2000) found that positivity within the family (and particularly between parents) led to adolescents achieving warm and affectionate relationships with romantic partners. Their findings support the idea

that nurturing positivity within families and siblings would have a domino effect on peer relationships also. Hence bullying intervention studies should systematically involve families and focus on fostering positivity within the family. A study from 2007, which examined various factors, including family relationship factors in relation to peer bullying, concluded that future peer bullying interventions should include parent communication and parent involvement (Spriggs, Iannotti, Nansel, & Haynie, 2007). Their findings further substantiate the ones of this meta-analysis and the suggestion that parenting and family factors should play a key factor in reducing bullying behaviours. Due to the link between sibling and peer bullying behaviours, nurturing warmth and reducing hostility within families might have huge impacts on the social behaviours of children within the family environment and outside of it.

5.1.2.1.2. Negativity and Positivity

Additionally, it was found that overall negative factors had stronger effects sizes in relation to sibling conflicts, compared to overall positive factors. This supports the negative effect theory (Baumeister et al., 2001). It suggests that even when of equal intensity, negativity will have a stronger effect than positivity. Interventions programs should be designed so that in addition to lowering negativity within a family the nurturance of positivity (e.g., warmth and affection) should be stressed as well. Whiteman, Solmeyer and McHale (2015) also found that sibling negativity had stronger impacts on depression than sibling positivity, which supports the negativity theory. Positive sibling relationships (while controlling for parent-child relationships) have been associated with more prosocial behaviour outcomes (Pike, Coldwell, & Dunn, 2005) and less internalising and externalising behaviour outcomes (Branje, van Lieshout, van Aken, & Haselager, 2004; Padilla-Walker, Harper & Jensen, 2010). This is crucial in that, through nurturing positivity and warmth and affection, children develop their social skills in a positive environment, which is more likely to lead to

more prosocial behaviours. Based on the Social Learning Theory (Bandura, 1973), this kind of positive behaviour will then also be modelled and applied to different social environments (i.e. schools). Nurturing positivity (and warmth and affection), in addition to lowering negativity will allow children to develop social skills in a positive environment. Strengthening positivity is an important factor for conflict intervention programs. However, seeing that negativity has a strong effect on sibling conflicts; lowering negativity will have a strong effect on lowering conflicts. When considering the creation of intervention programs that aim to decrease sibling conflicts, it is important to focus on lowering negativity, particularly focusing on eliminating neglectful and abusive parenting, as well as decreasing adverse family atmosphere and conflicts between parents. This approach is somewhat supported by the finding that whole-school bullying intervention methods are usually more effective than small scale class-room bullying interventions or social and behavioural bullying interventions (Vreeman & Carroll, 2007). This parallel should be considered with caution, as the effectiveness of school bullying interventions and how the effectiveness is measured varies extensively (Samara & Smith, 2008; Smith, Ananiadou, & Cowie, 2003). However, one aspect that can be adopted from school interventions is that bullying needs to be perceived as a group dynamic, rather than as a problem behaviour of an individual (Smith, 2003). Whole-school bullying interventions usually adopt multidisciplinary approaches that aim to change the whole student body's attitude by creating an environment of acceptance. This builds on the point made earlier (section 5.1.2.1.1.) that the whole family should play an integrated and active part in bullying intervention programs. The findings of the meta-analysis show that clinical and educational interventions that need to be implemented to reduce sibling conflicts, should aim to lower negative factors and nurture positivity and warmth and affection.

5.1.2.1.3. Proximal and Distal Factors

Overall proximal factors had stronger effects on sibling conflicts compared to overall distal factors. This supports the Bronfenbrenner Ecological Systems Theory (Bronfenbrenner, 1986), as by definition proximal factors have stronger effects on an individual due to the fact that they directly involve the individual, whereas distal factors only indirectly involve the individual. Yet the fact that both proximal and distal factors are significantly related to sibling bullying gives an indication that sibling bullying is an intricate behaviour problem, as (based on the previously-mentioned findings of cross-sectional studies), many of these factors are inter-related. The following longitudinal studies in this thesis aimed to unravel these intricacies, by examining the proximal and distal factors that are associated with sibling bullying.

5.1.2.2. Summary of Findings of Chapter 3 –The Proximal Precursors and Short-Term Outcomes of Sibling Bullying and the Cross-Over Effects from Sibling Bullying to Peer Bullying

The second study of this thesis was a four-year longitudinal study that focused on three aspects. The first was on proximal precursors of sibling bullying perpetration and victimisation at 12 years of age. The second focus was to examine the consequences of sibling bullying perpetration and victimisation when children were 13 and 14 years old (one and two years after the sibling bullying behaviour was measured). The third focus was embedded in the second, to examine how sibling bullying is related to peer bullying one and two years later. Overall, the findings largely supported findings from the cross-sectional studies discussed above. It was confirmed that parenting factors were crucial to sibling bullying. Parental involvement, parent-child conflict and parent-child leisure time were precursors and outcomes of sibling bullying, so that more parental involvement and parent-child leisure time were

associated with less sibling bullying perpetration and victimisation, while parent-child conflict was associated with more sibling bullying perpetration and victimisation.

5.1.2.2.1. Sibling and Peer Bullying

Overall, sibling bullying was related to peer bullying. In particular, sibling bullying perpetration was a precursor of peer bullying perpetration and peer bullying victimisation one and two years later. Further, sibling bullying victimisation was a precursor of peer bullying perpetration and victimisation one and two years later. It should be noted though that the strength of the association declined after two years. However, when assessing sibling bullying as precursor of peer bullying, while controlling for various factors at time 1 that significantly predicted sibling bullying (such as parent-child conflict, social alienation, violence perpetration and victimisation), it was revealed that sibling bullying was not a unique predictor of peer bullying. It appeared that being a victim of violence, impulsivity and violence perpetration at time 1 mediated the relationship between sibling bullying perpetration at time 2 and peer bullying perpetration at time 3, while parent-child conflict, self-esteem, social alienation, victim of violence and violence perpetration at time 1 mediated the relationship between sibling bullying perpetration at time 2 and peer bullying victimisation at time 3. Further, when the relationship between sibling bullying perpetration at time 2 and peer bullying perpetration at time 4 was controlled for by parent-child conflict at time 1 and time 3, impulsivity at time 1 and time 3, violence involvement at time 1 and risk-taking behaviour, public antisocial behaviour and peer bullying perpetration at time 3, sibling bullying perpetration at time 2 was no longer a significant predictor of peer bullying perpetration at time 4. Although sibling bullying perpetration was a significant predictor of peer bullying victimisation, this relationship was not further assessed, as the beta-coefficient was very low ($\beta=.05$), only parent-child leisure time at time 1 was lower ($\beta=.02$), hence it was assumed that sibling bullying

perpetration would be a significant predictor for peer bullying perpetration at time 3, when controlling for time 1 factors. Sibling bullying victimisation at time 2 was no longer a significant predictor of peer bullying perpetration at time 4, when we controlled for violence involvement and self-esteem at time 1, parent-child conflict at time 1 and time 3, peer bullying perpetration and victimisation, depression and risk-taking behaviour at time 3. In addition, sibling bullying victimisation at time 2 was no longer a significant predictor of peer bullying victimisation at time 4, when we controlled for violence involvement and self-esteem at time 1, parent-child conflict and social alienation at time 1 and time 3, peer bullying perpetration and victimisation at time 3 and depression at time 3. Although sibling bullying was not a unique predictor of peer bullying, these results show that sibling bullying is a contributing predictor of peer bullying in the short-term (one and two years later). The long-term effects of sibling bullying on peer bullying using the ALSPAC study will be discussed later. Thus, first the mediating factors in the relationship between sibling bullying and peer bullying will be discussed in more detail.

5.1.2.2.2. Impulsivity

Impulsive behaviour seems to be a crucial factor for developing various bullying and externalising behaviours. Impulsivity at time 1 predicted sibling bullying perpetration at time 2, risk-taking behaviour, public antisocial behaviour and peer bullying perpetration at time 3. This indicates that impulsivity plays a dominant role in predicting externalising behaviours, at least in the short-run. In the long-run this picture is not as clear, as impulsivity did not predict peer bullying perpetration at time 4. However, public antisocial behaviour and peer bullying perpetration at time 3 did predict peer bullying perpetration at time 4, which were both related to impulsivity at time 1 and time 3, so it could be assumed that impulsive behaviour does influence externalising behaviours including peer bullying even in the long-run. Therefore, the

magnitude of influence of impulsive behaviours should be further investigated. Additionally, it should be examined what causes impulsive behaviour at such a relatively young age (11.5-12.5 years). The finding that early signs of impulsive behaviours could lead to further detrimental developments later on in adolescence (i.e., public antisocial behaviours, risk-taking behaviours and peer bullying), goes in line with research on the relationship between impulsivity and psychiatric disorders. Impulsivity has been linked to disorders such as antisocial behaviour disorder, ADHD and substance dependence (Moeller, Barratt, Dougherty, Schmitz & Swann, 2001). Three factors that make up impulsivity have been identified: more physical activity, less attention and less planning (Patton, Stanford & Barrett, 1995). These three factors are comorbid with antisocial, risk-taking and bullying behaviours (Bosworth, Espelage, & Simon, 1999; Moeller et al., 2001). Therefore, it may well be that impulsivity is the underlying cause of these behaviours. Although the findings from this longitudinal study support this proposition, impulsivity as a predictor of sibling bullying and how it mediates further outcomes of sibling bullying should be investigated in more detail.

5.1.2.2.3. Social Alienation

Social alienation was another factor that seemed to play a big role in sibling bullying, particularly in sibling bullying victimisation. Further, social alienation was a stronger predictor of peer bullying victimisation at time 3 and time 4, compared to sibling bullying victimisation at time 2. Generally, it has been found that having fewer friends is associated with being more likely to be victimised by peers; in turn, children are less likely to have friends if they are victimised by peers. Boulton, Smith and Cowie (2010) found that lower scores on social acceptance predicted higher peer bullying victimisation five months later, concurrently, higher scores on peer bullying victimisation predicted lower social acceptance five months later. These findings do not indicate whether social isolation causes peer victimisation or whether peer

victimisation causes social isolation. However, together with the finding from the Edinburgh study that having been socially alienated and having been a victim of violence a year prior predicted sibling bullying victimisation, it is proposed that these factors have a transactional relationship, which contributes to these maladaptive behaviours. This is the first study that indicates these relationships with regards to victimisation by a sibling, rather than by a peer. This finding supports the fundamental idea of this project that sibling relationship qualities can tell us something about the social development of children. The finding that higher social alienation increased sibling bullying victimisation (and perpetration), which in turn was associated with peer victimisation, indicates that sibling bullying is a unique behaviour that has repercussion for children's social developments. Although these findings are important, future studies should aim to investigate whether lower social scores cause victimisation or whether victimisation cause lower social scores and how this relates to bullying victimisation by a sibling.

5.1.2.2.4. Internalising and Externalising Behaviours

In terms of precursors of sibling bullying, externalising behaviour factors (more impulsivity and more violence perpetration) were stronger predictors of sibling bullying perpetration than of sibling bullying victimisation one year later. On the other hand, internalising behaviour factors (lower self-esteem, more social alienation and more victim of violence) were stronger predictors of sibling bullying victimisation than sibling bullying perpetrations. Lower self-esteem was associated with being more victimised by a sibling one year later. The same was the case for outcomes of sibling bullying. After one year, all externalising behaviours (more impulsivity, more risk-taking behaviour, more public antisocial behaviour and more peer bullying perpetration) consistently showed stronger beta-coefficients in relation to sibling bullying perpetration, compared to sibling bullying victimisation. In addition, all

internalising behaviour problems (higher rates of symptoms of depression, more social alienation and more peer bullying victimisation) had consistently stronger beta-coefficients in relation to sibling bullying victimisation, compared to sibling bullying perpetration. Further, after two years, all externalising behaviour problems (more violation of school rules, more sibling violence and more peer bullying perpetration) showed consistently stronger beta-coefficients in relation to sibling bullying perpetration, compared to sibling bullying victimisation. On the other hand, all internalising behaviour problems (lower self-esteem and more peer bullying victimisation) consistently had stronger beta-coefficients in relation to sibling bullying victimisation, compared to sibling bullying perpetration. The finding that bullying perpetration is more related to externalising behaviours, compared to internalising behaviour and contrastingly, that sibling victimisation is more related to internalising behaviours compared to externalising behaviours, is supported in the literature on sibling bullying, which is mainly cross-sectional (Button & Gealt, 2010; Campione-Barr et al., 2014; Wolke & Skew, 2012a). The only other longitudinal study on sibling bullying victimisation also found that internalising behaviour problems (symptom of depression, anxiety and self-harming) were significant outcomes for sibling victimisation (Bowes et al., 2014). With the findings from the Edinburgh study, it could be said that externalising and internalising behaviours are both predictors and outcomes of sibling bullying perpetration and sibling bullying victimisation, respectively. This is the first study in the sibling bullying literature that has made this explicit statement. Future studies should focus on finding out the direction of causality of these relationships. However, findings from the literature on peer bullying suggest that people that tend to suffer from internalising behaviours tend to be more likely to be victimised by others and people that suffer from externalising behaviours tend to be more likely to bully others (Cook, Williams, Guerra, Kim, & Sadek, 2010; Stassen

Berger, 2007; Volk, Craig, Boyce & King, 2006). These findings are supported by the Diathesis-Stress-Model (Cicchetti & Toth, 1998; Lazarus, 1993). It suggests that due to a combination of specific behavioural predispositions and certain environmental stressors, stressful life events (being bullied or being a bully) leads to processing life events in a specific way, which leads to being more prone to specific type of outcome and in turn more likely to re-engage in a certain type of behaviour. This explains why bully perpetrators tend to suffer more from externalising behaviour problems and victims of bullying tend to suffer more from internalising behaviour problems. Due to this vicious cycle it is important to study externalising and internalising behaviour problems further in relation to sibling bullying. Particularly, these relationships should be examined in pre-school, in order to incorporate an examination of behaviour before children consistently interact with peers. This would give further indications on the direction of causality.

5.1.2.2.5. Cross-over Effects

As discussed above, overall, sibling bullying has effects on peer bullying. Although unique effects were not detected, it can be said that peer bullying is an outcome of sibling bullying and that sibling and peer bullying are extenuated by the same factors. This indicates that by reducing sibling bullying, the likelihood of peer bullying involvement will also be reduced. This supports the findings by Duncan (1999) that children that were involved in both sibling and peer bullying scored highest on psychopathology scales, whereas children that were involved in neither scored lowest. These additive effects were also found by Wolke & Samara (2004). The dispersion of behaviour problems as a function of accumulative bullying behaviours was not assessed in this study, however, the finding that similar factors that predicted sibling bullying also mediated the relationship between sibling and peer bullying,

suggests that the cumulative psychological consequences of sibling and peer bullying need to be examined on a longitudinal basis.

Bullying involvement was divided into four mutually exclusive sibling/peer bullying groups: neutral, pure bully, pure victim or bully-victim. The findings differed slightly to previous findings. There are only two cross-sectional studies that looked at the cross-over effects of sibling bullying to peer bullying based on the specific roles within bullying dynamics (i.e. neutral, pure bully, pure victim and bully-victim): Duncan (1999) and Wolke & Samara (2004). Both studies found strong links between intra- and extrafamilial bullying. Wolke and Samara (2004) found that 50.7% of children that were victimised by a sibling were involved in peer victimisation. Further, Duncan (1999) reported that 36.36% of peer victims and 29.03% of peer bullies were also victims of sibling bullying. In contrast, 60% of peer bully-victims were victims of sibling bullying. In terms of sibling bullying perpetration, 38.18% of peer victims, 56.45% of peer bullies and 76.67% of peer bully-victims were also perpetrators of sibling bullying. This shows that peer bully-victims were the ones that made up the biggest sibling bullying perpetration and victimisation groups. These findings were supported by the cross-over analysis in Chapter Three (Edinburgh Study). Striking was the findings that the strongest cross-over effect was for sibling bully-victims to peer bully-victims and peer neutrals one and two year later. More than half of all peer bully-victims one (51.5%) and two (53.8%) years later were sibling bully-victims before. Further, almost a third of all peer neutrals one (27.0%) and two (28.9%) years later were sibling bully-victims before. Involvement in bullying as a bully-victim seems to be particularly detrimental as the cross-over effects held true even five years after sibling bullying was assessed (ALSPAC study). In the fourth study of this thesis it was found that 69.7% of children who were peer bully-victims at 17.5 years had been sibling bully-victims five and half years before. Considering that it has been established

by Wolke and Skew (2012a) and Wolke and Lereya (2014) that bully-victims tend to suffer from more psychological consequences, compared to pure bullies and pure victims, this finding stresses the need for more research to be done on the behavioural consequences of sibling bullying, particularly as bully-victim. As with the findings from Duncan (1999) and Wolke and Samara (2004), it seems that bully-victims are the children most vulnerable to more bullying engagements in other settings (Duncan 1999) and other detrimental psychological wellbeing factors, such as externalising and internalising behaviour problems (Wolke and Samara, 2004). This is a very important finding for school counsellors, clinical practitioners, teachers and parents. These authorities need to be conscious of the issues related to multiple perpetration, at home and at school, as was found by Wolke and Samara (2004). More longitudinal research needs to be conducted that investigates the cumulative psychological effects of the outcomes of multiple bullying engagements.

These findings are important stepping-stones for future research. This is the first study to look at these cross-over effects prospectively. It should be noted that the findings of Duncan (1999) and Wolke and Samara (2004) showed that, in terms of the absolute number of children, most children that were involved in sibling bullying were also involved in peer bullying. Their findings are in line with the congruence theory, which states that sibling and peer relationships tend to mirror each other (Duncan, 1999; Kramer & Gottman, 1992; Menesini et al., 2010; Reese-Weber & BartleHaring, 1998; Seginer, 1998; Updegraff, McHale, & Crouter, 2000, 2002; Wolke & Samara, 2004). However, the findings of this study showed that children who had been involved in sibling bullying were more likely to become peer bullies compared to peer neutrals. The findings of Duncan (1999) and Wolke and Samara (2004) in terms of absolute number of children in peer bullying that had been sibling bullies, was not replicated. This shows that more longitudinal research on the cross-over effects and on

the cumulative psychological consequences of multiple bullying engagement should be conducted. As to why this was found, it could be the case of children simply not engaging with as much peer bullying as they engage in sibling bullying. Sibling relationships are slightly different to peer relationships. As mentioned in Chapter One, despite both relationships being sources of social support and positivity, sibling relationships are often interwoven with competition, jealousy, and the desire to gain parental attention (Felson, 1983). Peer relationships are often more egalitarian and diplomatic. Based on the social-information processing theory, the perception of a situation influences one's behaviour (Crick & Dodge, 1994). Due to the differences in the natures of sibling and peer relationships, the respective social norms are different (Volling et al., 1997; Wolke & Skew, 2012). This shows that although sibling and peer relationships have similarities, children interpret behaviours differently, depending on whether the actor is a sibling or a peer, which will also have an effect on their own reactions to a respective situation. Recchia et al. (2015) found that children were more likely to interpret their sibling's behaviour as having hostile intent compared to their friend's behaviour. However, children were less likely to interpret their sibling's behaviour as having hostile intent compared to disliked peers. This shows that the analysis of cross-over effects is multi-layered and needs further examination. A possible replication of Recchia et al. (2015) with a focus on bullying, particularly the four roles within bullying, could reveal more on cross-over effects and about the reasons for these. Nevertheless, Duncan (1999), Wolke and Samara (2004) and this study show that sibling bullying has an effect on peer bullying, so that children are more likely to engage in peer bullying behaviours when they had been involved in sibling bullying. As mentioned earlier, there are factors, such as impulsivity and social alienation, that affect both sibling and peer bullying. Research needs to be done that

investigates these behaviours at preschool ages in order to find out more about the origins of bullying.

5.1.2.2.6. Limitations

A limitation of this study was that it was based on an existing dataset. Although this is what facilitated the examination of precursors and outcomes of sibling bullying in a longitudinal manner and allowed the exploration of an extensive variety of factors in relation to children's bullying behaviours, it was limiting in the way that it was not possible to make detailed alterations to specific variables. For example, parent-child communication could only be assessed as an outcome of sibling bullying and it was not possible to assess how parent-child communication might affect sibling bullying behaviours as a precursor. This should be explored in future studies, as Spriggs et al. (2007) found that parent-child communication lowered the possibility of children engaging in peer bullying and decreased conflict between siblings (Howe et al., 2007). However, this study did extensively assess other parenting aspects, from which it could be derived that parent-child communication would be present (such as parental involvement or parent-child leisure time).

Another example that stems from the same problem was the way in which the variable that explored the number of friends that children had was constructed. It appeared to be a problem as social alienation was consistently related to sibling bullying victimisation; however, number of friends was not significantly associated with either sibling bullying perpetration or sibling bullying victimisation. On the one hand one could say that the more friends one has, the less socially alienated one might be. On the other hand, one could say that social alienation is a self-reflecting construct, which is independent from the number of friends one might have. At any rate, number of friends has been associated with peer bullying, so that the more friends' children had the less likely they were to be victimised (Fox & Boulton, 2006; Wang, Iannotti &

Nansel, 2009). In this study the number of friends did not correlate with peer bullying perpetration or victimisation. The variable 'number of friends' was assessed only through one variable and it was not normally distributed. The answer options were number intervals. It could have been a case of the interval options being inappropriate, forcing participants into choosing one specific option or leading participants to skip the question all together.

Finally, this study assessed sibling bullying when children were 12 years old, at which point children would already have attended school for up to 6 years (in some countries even more), it is unclear whether sibling bullying may have been caused by peer bullying which was experienced prior to the age of 12. More longitudinal studies that focus on sibling bullying behaviours at earlier ages are needed in order to resolve this issue.

5.1.2.3. Summary of Findings of Chapter 4 –The Distal Precursors and Long-Term Outcomes of Sibling Bullying and the Cross-Over Effects from Sibling Bullying to Peer Bullying

The third study of the thesis assessed distal factors as precursors of sibling bullying and long term outcomes of sibling bullying. Sibling bullying data was collected when children were about 12 years old, externalising and internalising behaviour outcomes were assessed when children were 16 years old, and peer bullying was assessed when children were 17.5 years old. Based on the findings of the meta-analysis, it was decided to examine maternal mental health factors and parental relationship quality factors in relation to sibling bullying. To our knowledge this was the first study that assessed distal factors in relation to sibling bullying longitudinally and this relationship had also not been extensively researched in cross-sectional studies. Overall, the findings showed that distal factors were not strongly associated with sibling bullying. This was perhaps not surprising, as based on the Bronfenbrenner

Ecological Systems Model (1986) distal factors would be expected to have less of an impact on the individual compared to proximal factors. The findings of the meta-analysis also showed that proximal factors had stronger effects on sibling conflict compared to distal factors. Further, overall the long term outcomes were also not as strong in comparison to the findings of the Edinburgh study (short term outcomes).

5.1.2.3.1. Maternal Somaticism

Only maternal somaticism showed an effect on sibling bullying perpetration. Symptoms of depression, symptoms of anxiety and self-esteem did not have an effect on sibling bullying perpetration or victimisation. It was argued that collinearity could prevent the other factors from showing an influence on sibling bullying. However, a regression was run without maternal somaticism as a predictor of sibling bullying perpetration and none of the other maternal mental health factors (depression, anxiety or self-esteem) predicted sibling bullying. Previous cross-sectional studies on maternal mental health in relation to sibling bullying have found relationships between maternal depression and sibling bullying (Compton et al., 2003; Defoe et al., 2013; Keeton et al., 2015). Underlying causes of somatic symptoms often are bouts of depressions and anxieties, which the mother may not have been necessarily aware of (Escobar et al., 1987). Suppressing symptoms of depression or anxiety can lead to them being expressed in the form of somatic symptoms, such as dizziness or tingling in limbs (Escobar et al., 1987). Hence, symptoms of depression could have been present although psychologically suppressed by the mother, and therefore somatic symptoms prevailed as the significant predictor of sibling bullying perpetration. Additionally, no effects of maternal mental health factors were found on sibling bullying victimisation. So far there is no extensive research on the effects of maternal mental health on sibling bullying, specifically. Other research on the effects of maternal mental health on child development in general has produced mixed findings. Webster-Stratton and Hammond

(1988) did not find a significant difference in children's conduct behaviour problem score of clinically depressed mothers and non-depressed mothers. In contrast, other research has associated maternal depression with various problem behaviours in children, including lower self-esteem, more difficulties in school and lower social competency (Cummings, & Davis, 1994; Gotlib & Goodman, 1999; Gotlib & Lee, 1996). Maternal mental health problems might lead children to act out and therefore bully their sibling rather than to become victims. However, a crucial factor in the research on maternal mental health and its effects on children's behaviour in general, is how old the children were when the mother may have had an episode of depression or anxiety. In this study, maternal mental health was assessed when the child in focus was five years old. This is problematic, as it is not a given that mothers had difficulties with their mental health at that exact point in time, it could have been that maternal mental health issues arose when children were for example 7 years of age, which is inherently a methodological issue of this study. However, generally it gives an indication that early maternal mental health problems, specifically maternal somaticism, are risk factors for sibling bullying over time. Research has also shown that younger children are not as affected by their mother's mental health status as they may not have the maturity level to comprehend the difficulty the mother is experiencing (Compas, 1987; Sroufe & Rutter, 1984). Hence, older children may be more affected by the possible repercussions of a mother experiencing symptoms of depression or anxiety. In the above mentioned studies (Compton et al., 2003; Defoe et al., 2013; Keeton et al., 2015) children were above eight years old when the studies started. Thus, it could have been a case of children being mature enough to process the consequences of their mother's experiences and symptoms of depression. This shows that the age of children when maternal mental health factors are assessed is crucial in child development research.

This needs to be considered in future research that further examines maternal somaticism, depression and anxiety its effects on sibling bullying.

5.1.2.3.2. Divorce

Higher scores on mother-partner bond, when children were 6 years old, significantly lowered sibling bullying perpetration, when children were 12 years of age. Further, partner-to-mother verbal violence when children were 8 years old significantly increased sibling bullying victimisation at 12 years of age. Both of these results show that mother-partner relationship quality affects sibling bullying. These results are relevant for research on divorce. Stocker and Youngblade (1999) found that marital conflict was associated with less warmth, more conflict and rivalry between siblings. It has been found that children's psychological wellbeing is protected when high conflict marriages are resolved in divorce, compared to when children are consistently confronted with conflict between parents (Morrison & Coiro, 1999). It could be the case that the conflict between parents affects the children negatively as individuals, which then in turn nurtures bullying victimisation or that children learn vicariously through the conflict that they witness between their parents (Bandura, 1973). This should be investigated further, particularly whether sibling bullying victimisation is a mediator between parental conflict and children's psychological wellbeing, this could have implications in terms of how parental conflict might be handled by counsellors and practitioners. Considering the repercussions of parental conflict with a holistic approach might prevent sibling bullying and other negative consequences of marital conflict. This supports the suggestions made in earlier (section 5.1.2.1.1.) that families should play an integrated and active role in bullying intervention programs.

5.1.2.3.3. Sibling Bullying and Outcomes

Overall the long-term impacts of sibling bullying on the psychological wellbeing of children was not as strong as the short-term impacts that were found in the

second study of the thesis. This was the case for the effects of sibling bullying on internalising and externalising problems at 16 years and on peer bullying at 17.5 years. Cross-sectional studies that found associations between sibling bullying perpetration and externalising behaviour problems were overall supported (Button & Gealt, 2010; Wolke & Samara, 2004; Wolke & Skew, 2012a). Cross-sectional studies that assessed internalising and externalising behaviour problems in relation to sibling bullying victimisation were supported (Wolke & Samara, 2004; Wolke & skew, 2012a; Yu & Gamble, 2008). Additionally, Bowes et al. (2014) found that depression was a significant outcome of sibling bullying victimisation, which this study confirmed as well.

As in the second study of the thesis, sibling bullying perpetration and sibling bullying victimisation were not unique predictors of peer bullying. Depression at 16.5 was the only significant predictor of peer bullying perpetration and victimisation at 17.5. However, sibling bullying perpetration and victimisation predicted depression at 16.5. Therefore, the effects of sibling bullying and depression on peer bullying should be further investigated through structural equation modelling in future studies. When exploring how externalising behaviours affected the relationship between sibling bullying victimisation at 12.5 and peer bullying perpetration at 17.5, peer problems at 16.5 seemed to override any effects sibling bullying had on peer bullying. Strangely, none of the externalising behaviour problems at 16.5years predicted peer bullying perpetration at 17.5 years. This goes against the body of cross-sectional studies that has found associations between sibling bullying perpetration and externalising behaviour problems and the findings of the Edinburgh longitudinal study of this thesis (Cook et al., 2010; Stassen Berger, 2007; Volk et al., 2006). The p-p plots and scatterplots of regression standardised residuals and normal distribution histograms indicated mixed results in their assessment of the distributions of the SDQ-externalising behaviour

variables. As a result the variables were explored through SPSS and again mixed results transpired. After transforming the variables into z-scores and excluding any outliers, the variables were re-examined. The normalcy assessment was still inconsistent: normal q-q plots were overall acceptable and statistics did not show substantial differences in means after trimming 5%, which would indicate an approximately normal distribution. However, the histograms were still skewed and the boxplots detected some cases as outliers. After deleting these respective cases, normalcy assessments were still not uniform. These discrepancies could have caused these externalising behaviour variables to not predict peer bullying perpetration.

Overall, the strengths of the association between sibling bullying and its respective long-term outcomes were weaker compared to the strengths of associations between sibling bullying and its respective short-term outcomes. This could have occurred because the consequences of sibling bullying simply might not be so long-lasting. Another reason is that bullying on the whole declines as children get older. This is the case for sibling bullying and peer bullying. Kim, McHale, Osgood and Crouter, 2006; McHale, Kim and Whiteman (2006) found that conflict between siblings peaked in early adolescence and steadily declined after that. The intensity of sibling relationships seems to decline overall after early adolescence, so that sibling conflicts and sibling warmth decline. However, the general quality of sibling relationships seems to improve and become more egalitarian again in late adolescence. Although children tend to spend more time with their peers later in adolescence, peer bullying also declines after early adolescence (Due et al., 2005; Fitzpatrick, Dulin, Piko, & 2007). Although it is often assumed that the decline is due to less actual bullying perpetration, research has also found that the big drop in bullying is substantially caused by a drop in physical and direct bullying, while more subtle bullying, including relational and cyber bullying, may still be relatively prevalent (Archer & Cote, 2005; Espelage, Mehan, &

Swearer, 2004). Further, it could also be that children are less likely to report bullying as they get older. So the overall decline in strength of association between sibling and peer bullying over time should be considered with caution. Future research should investigate the different types of bullying (direct, relational and cyber) in relation to the stability of association between sibling and peer bullying over time. Additionally, as the peak of peer bullying is usually at the age of 12 (Eslea & Rees, 2001), as this is usually the transition period from primary to middle school, it could be that this also triggers a peak in sibling bullying. As both longitudinal studies in this thesis assessed sibling bullying at the mean age of 12, it is stressed that sibling bullying should be examined, while controlling for peer bullying.

5.1.2.3.4. Cross-over Effects

Similarly to the findings of Chapter Three, being a bully-victim is the most detrimental form of bullying. The only two significant cross-over effect outcomes were that 41.9% of children who were peer bully-victims at 17.5 years of age had been sibling pure bullies at 12 years of age, compared to 29.7% of peer neutrals at 17.5 years of age. Further, 69.7% of children who were peer bully-victims at 17.5 years of age had been sibling bully-victims at 12 years of age, compared to 59.2% of peer neutrals at 17.5 years of age. Astonishing is that even five years after sibling bullying data was collected, children were still more likely to be a peer bully-victim, compared to a peer neutral, when they had been a sibling bully-victim or a sibling pure bully. This shows that overall the greatest risk for a child is to be involved in bullying as a bully-victim in the long-run. This is particularly worrying, as research has shown that peer bully-victims are at greater risk for externalising and internalising behaviour problems, compared to peer pure bullies or peer pure victims (Wolke, Woods, Bloomfield, & Karstadt, 2001). Another reason why this is particularly worrying is that this is at the end of adolescence (17.5 years) a stage where personalities and characteristics become

increasingly fixed. Studies have shown that adults who have suffered from being a bully-victim have shown more behaviour problems compared to pure victims. This included behaviour problems, such as anxiety, depression, suicide attempts, generally worse health (Copeland, Wolke, Angold & Costello, 2013). Further problems involved lower academic qualifications, unstable careers and troubles keeping financial obligations (Wolke, Copeland, Angold, & Costello, 2013; Sigurdson, Wallander & Sund, 2014). Additionally, this finding underlines that although the impact of sibling bullying declines over time, it does have fundamental negative impacts over time.

However, different to Chapter Three was that there was no significant association between being a sibling pure bully and a peer pure bully, peer pure victim and/or peer bully-victim. Further, children were more likely to become peer neutrals than peer pure bullies or peer pure victims, when they had been sibling pure bullies. Moreover, in absolute numbers, out of sibling pure bullies, sibling pure victims or sibling bully-victims, the biggest group they made up were peer bully-victims, peer pure victims and then peer pure bullies. Although this finding is supported by Duncan (1999), who also found the biggest effects in relation to being a bully-victim, it is different to the one in Chapter Three. In Chapter Three, in terms of absolute numbers the biggest peer bullying group, regardless of whether children had been sibling pure bullies, sibling pure victims or sibling bully-victims, were peer pure bullies, followed by peer bully-victims and then peer pure victims. Further, in Chapter Four, when children were sibling pure victims, 20.90% of children turned into peer pure victims, compared to 16.30% peer bully-victims. Overall, the cross-over effects were not as strong after five years compared to the findings in the Chapter Three, which looked at the cross-over effects after one and two years. This decline could be explained through the points made earlier in section 5.1.2.3.3., so that it could be a case of children simply not being involved peer bullying at the age of 17.5 years. Or it could be the case that

children are more involved in more covert types of bullying, such as relational or cyber bullying, which was not assessed in this study. Given the rise in cyber activity in the forthcoming generations, the long-term cross-over effects and the long-term consequences of these types of bullying should be assessed further.

5.1.2.3.5. Limitations

One limitation of this study was the problem with the unevenly distributed externalising behaviour factors, which were discussed earlier (section 5.1.2.3.3.). Another limitation stems from an actual strength of the study, which was that it was a longitudinal population study. Unfortunately, these strengths lead to a high drop-out rate over time. Due to the extensiveness of this data, the missing data analysis that was run had to generate over 10,000 cases. Multiple imputation analyses were conducted and the entire study was re-run. The results are discussed in more detail in the conclusion of Chapter Four (section 4.5.1.). However, overall, the results of the multiple imputation analyses differed in several instances from the analyses conducted with the original data. Furthermore, caution had to be reserved when interpreting multiple imputation analyses when predictor and outcome variables have contained missing cases (Spratt et al., 2010), which was the case for this study. Considering the literature on multiple imputation, it is not surprising that the results from the missing data analysis differed from the results of the analyses conducted with the actual original dataset. With the substantial amount of data missing it is not clear whether the missing data analysis reduced bias or not. Considering this, the results discussed here were exclusively based on the analyses conducted with the full data. Although exploratory studies with these kinds of large datasets, such as this one are important, future studies should build on the findings of this study and be more fine-tuned, such as focus more explicitly on particular precursors (social alienation and impulsivity) of sibling bullying

and how age difference and gender constellations within sibling relationships play a role.

5.1.3. Limitations

A limitation of the overall thesis is partly due to the relative novelty of researching bullying between siblings. The ramifications of basing this thesis on a definition of sibling bullying that is adapted from the definition of peer bullying, need to be addressed. As discussed in section 1.2.3. and in section 1.2.4. bullying is considered to be a specific type of aggressive behaviour (Monks et al., 2009), which is defined as having three main components **a)** repeated exposure to **b)** aggressive behaviour that causes intentional harm, where there is **c)** an imbalance of power (perceived or real) (Olweus, 1994). Bullying is categorised into five forms: physical, verbal, relational, damage to property and cyber bullying (Eisenberg & Aalsma, 2005; Monks & Coyne, 2011; Williams & Guerra, 2007) (Figure 1.2), where it can be expressed in two different ways: indirectly and directly. As established in sections 1.2.3. and 1.2.4. this can be adapted to sibling relationships, however, it needs to be pointed out that sibling and peer relationships are inherently different. Three main factors distinguish these two relationships, 1) in most cases siblings share a certain degree of common genes (full sibling and half siblings); 2) sibling relationships commence at birth and end at death; 3) in comparison to sibling relationships there is a less restricted amount of choice in whom one chooses as their peers or with whom one chooses to spend more time with in terms of peer relationships. These differences mainly suggest that the motivation to bully a sibling or to bully a peer might differ and cause to question the validity of using the definition of peer bullying for sibling bullying. Research that is based on this definition (or using this definition even when

referred to with a different name) has been conducted, such as the recent review by Wolke et al. (2015). Therefore, this thesis based its research on this definition as well. Nevertheless, the differences between sibling and peer relationships should not be ignored. Research needs to be conducted investigating the use of this definition of sibling bullying. Given that sibling conflict is quite common (see section 1.1.) the consequences of sibling bullying might not be perceived as severe as bullying by a peer (or they might be perceived as more severe). It is important to assess to what extent sibling bullying might be mediated by previous confrontations with violence (either as a perpetrator or as a victim). One way of examining this is by studying the consequences of sibling bullying, while controlling for previous peer bullying or examining sibling bullying at preschool ages (this would limit the contact children would have had to peers). When conducting this kind of research with children before the age of 12 it is important to be mindful of children's limitation to comprehend complex social interactions and their ability to distinguish between aggressive behaviour and bullying. Smith and Monks (2008) have found that only as of the age of 12 years children were able to fully conceptualise the intricacies (power imbalance) that define bullying and therefore identify aggressive behaviour as such. Due to this, observation is one of the methods that can be utilized as a method to study bullying behaviours before the age of 12 years. Another approach would be conducting qualitative interviews asking children about their perceptions of the similarities and differences of their relationships with peers and siblings. This would help in formulating a definition of sibling bullying and finding the origins of bullying behaviours. Nonetheless, the findings of this study are important stepping stones to attain that goal.

5.1.4. Conclusions and Future Directions

This thesis is a thorough assessment of the precursors and outcomes of sibling bullying. Sibling bullying is a precursor of peer bullying, although not a unique predictor. Having been involved in sibling bullying increases the likelihood of involvement in peer bullying, in the short run and in the long-run. Sibling bullying increases the likelihood of being a peer bully-victim, which is particularly alarming, given the detrimental consequences of being a peer bully-victim. Further, sibling bullying perpetration is more related to externalising behaviour problems and sibling bullying victimisation is more related to internalising behaviour problems. Future studies examining these factors longitudinally should assess children's behaviours at pre-school ages to better identify how sibling bullying influences these behaviours and vice-versa. Additionally, studying sibling bullying at preschool ages would to a large extent control for the influences of peers (peer bullying). This would therefore more clearly indicate how sibling bullying affects peer bullying.

Similarities in the development of sibling pure bullies and bully-victims were identified. In particular, impulsivity and social alienation should be investigated further in relation to bullying behaviours through structural equation modelling. It seemed that impulsivity is a crucial characteristic that influences the development of several externalising behaviours, including bullying perpetration. The nature of social alienation should be assessed further, as it appeared to be an important factor in relation to internalising behaviour factors, including bullying victimisation. Additionally, maternal somaticism was a predictor of more sibling bullying perpetration. However, maternal mental health in relation to sibling bullying should be studied more thoroughly taking into account the age of the child in which the mother may have had the mental health problem. Children are likely to perceive a mother's mental health problems differently depending on the age of the child, for example, the older the child,

the more likely it is that the child will be affected by the mother's mental health. Given that factors such as maternal depression or anxiety could have detrimental impacts on a child's behaviour, it is important to study this in relation to sibling bullying further, while considering the age of a child.

Given that sibling relationships are important building blocks for children's development of psychological and social well-being (Buist et al., 2013; Dunn, 1983; Dunn, 1988; Feinberg et al., 2013), the findings of this thesis successfully contribute to the literature on sibling bullying. Furthermore, the findings are important for clinical practitioners, social workers, parents and schools. Based on these findings practitioners could tailor family and parenting intervention programs that prevent siblings from establishing conflictual relationships with one another. In particular bullying intervention programs should integrate three aspects: family members should play an integrated and active role in plans to reduce bullying and victimisation; bullying intervention and prevention studies should commence at preschool ages; positive family climate should be actively be nurtured, as well as lowering hostility. One intervention by Kennedy and Kramer (2008) that focused on promoting prosocial behaviours appeared to be effective in reducing conflicts between sibling and overall problem behaviours. The consequences of bullying are wide-ranging and well-documented, therefore being able to stop this behaviour from a young age is essential. Nurturing good fundamental relationships, such as with a sibling, is a key stepping-stone in lowering bullying behaviours overall.

6. References

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