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Aggression between siblings: Associations with the home environment and peer bullying

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Abstract

Sibling aggression is a common form of intra-familial aggression, yet has been largely neglected by research. Using an inclusive measure of sibling aggression, this study investigated, firstly, prevalence of sibling aggression and associations with family and household characteristics, and secondly, the relationship between sibling aggression and peer bullying. Participants were 4,237 adolescents from Wave 1 of Understanding Society. Four types of sibling aggression were measured: physical, verbal, stealing and teasing, and combined into composite measures of victimization and perpetration. Regression analysis identified associations with demographic characteristics, family and sibling composition, parent-child relationships and socioeconomic status and explored the link between sibling aggression and involvement in peer bullying. Using a broad definition, sibling aggression was found to be widespread, with 46% of all participants being victimized and 36% perpetrating aggression. Household and family characteristics, including a large family size, male siblings, and financial difficulties were associated with greater rates of sibling aggression. Parenting behavior showed the strongest relationship: harsh parenting increased the risk of sibling aggression while positive parenting protected against it. Sibling aggression was also homotypically related to involvement in peer bullying. Victimization by siblings significantly increased the odds of being a victim of peer bullying, and perpetrators of sibling aggression were more likely to be both peer bullies and bully-victims. Considering the adverse effects of sibling aggression on physical and mental health, the study provides pointers for efforts to reduce the risk of sibling aggression. Furthermore, the link with peer bullying suggests that school anti-bullying efforts should also take account of children's sibling relationships.

Introduction

Sibling relationships uniquely contribute to children's social, cognitive and emotional development (Vespo, Pedersen, & Hay, 1995). Positive relationships, characterized by warmth and affection, can foster social adjustment, enhance self-esteem, improve friendship quality, and reduce the likelihood of adolescent delinquency or substance abuse (Sapouna & Wolke, 2013; Sherman, Lansford, & Volling, 2006; Yeh & Lempers, 2004). In contrast, negative relationships, where there are high levels of physical aggression or hostility between siblings, have been linked with behavioral and mental health problems in adolescence and adulthood, including anxiety, problematic peer relationships, and anti-social or delinquent behavior (Bank, Patterson, & Reid, 1996; Dunn et al., 1994; Pike, Coldwell, & Dunn, 2005; Snyder, Bank, & Burraston, 2005).

Aggression between siblings is one of the most commonly occurring forms of aggression within families (Khan & Cooke, 2013; Straus, Gelles, & Steinmetz, 1980, p. 83) but is often viewed as harmless or as a normal part of family life (Eriksen & Jensen, 2009; Skinner & Kowalski, 2013). In comparison to the study of peer aggression, sibling aggression has received less research attention (Eriksen & Jensen, 2009; Skinner & Kowalski, 2013); however, recently there appears to be a renewed interest in the subject, marked by attempts to more clearly define and document the extent of aggression among siblings (e.g. Khan & Cooke, 2013; Tucker, Finkelhor, Shattuck, et al., 2013; Wolke & Skew, 2012).

Definition and prevalence

A major barrier to research on sibling aggression has been the lack of an accepted definition (Krienert & Walsh, 2011; Tucker, Finkelhor, Shattuck, et al., 2013), and as yet, there is still no clear consensus over how sibling aggression should be defined or measured. The use of differing terminology, such as aggression, violence, abuse, bullying, or rivalry, to describe

aggressive sibling interactions illustrates the lack of agreement between researchers (Eriksen & Jensen, 2009; Krienert & Walsh, 2011). Furthermore, there are ongoing debates concerning key definitional and operational features, such as the need to incorporate concepts of intent or repetition into the definition (Khan & Cooke, 2013), and whether behavior should be categorized according to severity to distinguish between mild and more severe forms of sibling aggression (Eriksen & Jensen, 2009; Khan & Cooke, 2013). These issues are still some way from being resolved, and at present there appears to be no standard definition or means of measuring aggression between siblings; therefore studies differ notably in the types of behavior they consider to constitute sibling aggression.

Using an inclusive approach, which considers a wide range of aggressive interactions, sibling aggression can incorporate acts of physical or verbal aggression, such as hitting, kicking, and name calling (DeKeseredy, 1997; Hardy, 2001; Mackey, Fromuth, & Kelly, 2010), but also psychological abuse, including teasing, threatening, or exclusion (Button & Gealt, 2010; Caffaro, 2013), and property-based aggression, such as stealing or damaging belongings (Tucker, Finkelhor, Shattuck, et al., 2013). Recent estimates suggest that between one third to one half of children report involvement in any form of sibling aggression, as either victims or perpetrators (Tucker, Finkelhor, Shattuck, et al., 2013; Wolke & Skew, 2012). Prevalence rates appear to differ according to type of aggression. Studies which assess multiple forms of aggression have found that victims most often report being physically or verbally victimized by their siblings; fewer experience teasing or psychological forms of aggression (Button & Gealt, 2010; Duncan, 1999; Skinner & Kowalski, 2013; Wolke & Samara, 2004). Using a child and adolescent sample, Tucker, Finkelhor, Shattuck, et al. (2013) found that 32% had experienced physical victimization in the last year, while significantly fewer reported property-based (10%) or psychological victimization (3%). Although physical and verbal victimization appear to be more common, all forms of sibling aggression have been linked

with greater mental health distress (Radford et al., 2013; Tucker, Finkelhor, Turner, et al., 2013), and the effects appear to be cumulative, so that children who experience more than one type of sibling aggression will suffer greater mental health distress (Tucker, Finkelhor, Turner, et al., 2013). Thus, it is important to determine the range of aggressive behavior that children experience at the hands of their siblings.

Correlates and risk factors

Little research has explored the antecedents of sibling aggression (Skinner & Kowalski, 2013), yet understanding the context in which sibling aggression occurs can identify potential causes, and inform the development of intervention programs, similar to those used for school aggression (Hong & Espelage, 2012). As with many forms of aggression, age and sex show some effect. Males more often perpetrate acts of sibling aggression (Duncan, 1999; Eriksen & Jensen, 2006, 2009; Graham-Bermann et al., 1994), although both sexes are equally likely to be victimized (Button & Gealt, 2010; Felson, 1983; Tucker, Finkelhor, Shattuck, et al., 2013). Sibling aggression is also more prevalent among younger age groups, with rates of physical aggression towards siblings highest in early childhood, which coincides with younger children's inability to regulate their use of aggression (Tremblay et al., 2004). Adolescents report substantially less victimization and perpetration of sibling aggression than younger children (Eriksen & Jensen, 2006; Finkelhor, Turner, & Ormrod, 2006; Radford et al., 2013). The interaction between age and sex appears to be important, with greatest rates of sibling aggression found in older male – younger female sibling dyads (Graham-Bermann et al., 1994; Menesini, Camodeca, & Nocentini, 2010).

As the primary environment in which sibling aggression occurs, household characteristics, such as family relationships or socioeconomic conditions, may also be linked with rates of sibling aggression. Children who either witness or experience domestic violence are more

likely to behave aggressively towards siblings (Eriksen & Jensen, 2006; Green, 1984; Radford et al., 2013), and the use of physical punishment by parents predicts greater sibling physical aggression (Eriksen & Jensen, 2009; Patterson, Dishion, & Bank, 1984). Differential treatment of siblings by parents is particularly associated with aggressive sibling relationships (Brody, 1998; Noller, 2005; Volling, Youngblade, & Belsky, 1997), and real or perceived parental favoritism between siblings may be one of the key underlying causes for sibling aggression. In contrast, warm and positive parenting has been linked to supportive, positive sibling relationships with lower rates of conflict observed in families who rate their relationships as being affectionate and close (Brody, Stoneman, & McCoy, 1994).

Very few studies have examined sibling aggression in relation to socioeconomic characteristics (Hoffman, Kiecolt, & Edwards, 2005); however, both financial difficulties and a lack of economic resources have been linked with greater physical aggression between siblings (Eriksen & Jensen, 2009; Hardy, 2001). Financial problems can act as significant stressors upon families, and Conger et al. (1992, 1993) suggest that economic pressures negatively impact upon parenting skills, causing greater conflict between the parent and child, which can potentially lead to more aggressive sibling relationships. In contrast, aggression or bullying have both been considered as tactics for gaining access to resources (Elgar et al., 2009; Hawley, 1999; Olthof et al., 2011), yet in impoverished families there are few resources to be gained by using aggression. Sibling aggression may thus be more likely to occur in families with greater wealth or resources, where the use of aggression may lead to higher rewards. The findings show some evidence that individual and household characteristics are linked with rates of sibling aggression, yet research on these antecedents is limited at present.

Sibling aggression and peer bullying

Despite the large volume of research on peer aggression or bullying, few studies have examined links between sibling and peer forms of aggression. At first glance, it might be expected that children's behavior with their siblings will closely resemble how they interact with their peers. Aggressive behavior learnt from parents or siblings can influence children's exchanges with peers (Ensor et al., 2010; Patterson et al., 1984), suggesting that those who have aggressive relationships with siblings are likely to be aggressive with their peers, and therefore will be more often involved in school bullying. Alternatively, peer relationships may be more positive than sibling relationships, as children are given the option to choose those peers with whom they form relationships. Peer relationships involve children from different families who may have different temperamental characteristics, interests, and talents, and who have differing experiences of social relationships and how to behave within them (Stocker & Dunn, 1990). As such, when children interact with their peers, they may behave differently than they do with siblings, and there is some evidence to suggest that children who do experience aggressive sibling relationships are able to form positive relationships with their peers (Volling et al., 1997).

Although based on a handful of studies, findings suggest that sibling and peer forms of aggression are closely related (Wolke & Skew, 2012). Children who are victimized by their siblings are more likely to be victims or bully-victims at school (Duncan, 1999; Menesini et al., 2010; Wolke & Samara, 2004; Wolke & Skew, 2012). Similarly, children who perpetrate aggression towards their siblings more often report being peer bullies or bully-victims (Duncan, 1999; Menesini et al., 2010). Although much of this research is cross-sectional, an experimental study among young children found that aggression towards siblings is predictive of bullying of peers one year later within a laboratory setting (Ensor et al., 2010).

Aims

At present there is a clear lack of research on sibling aggression, and as yet, little is known about its nature, extent, correlates, or consequences. Definitional and methodological issues, including the appropriate terminology to use, which behavior constitutes sibling aggression, and concepts such as intent, chronicity, and severity, have hindered much of this research progress and are yet to be resolved. The present study is based on data drawn from a large scale longitudinal study of the social and economic conditions of UK households: thus the measures used were limited, and were not designed to establish more accurate definitions or means of measuring sibling aggression. Rather, this study uses a wide, inclusive measure comprising physical aggression, verbal aggression, teasing (psychological aggression), stealing (property-based aggression), to examine the overall prevalence and correlates of sibling aggression among a nationally representative sample of UK adolescents. The aims of the study are twofold. Firstly, associations between sibling aggression and a range of individual and household characteristics, including demographic characteristics, family and sibling composition, parent-child relationships and socioeconomic status, will be examined. Identifying how sibling aggression relates to these characteristics may assist in explaining its causes and contribute towards the development of intervention strategies. Secondly, little research has identified the link between sibling and peer forms of aggression. The study will therefore investigate whether sibling aggression shows a homotypic (same behavior, i.e. sibling aggressor is most likely a school bully) or heterotypic (different roles) relationship to peer aggression (bullying).

Methods

Sample

This study used data from Wave 1 of the UK Household Longitudinal Study (UKHLS), which is a longitudinal household panel survey conducted annually in the United Kingdom. Detailed descriptions of the methodology can be found elsewhere (Buck & McFall, 2012). Wave 1 data was collected over a period of two years, between January 2009 and December 2010, using multiple instruments. One member of the household completed a household interview and enumeration grid; every household member aged 16 or above completed an individual adult interview and self-completion questionnaire, and all youths aged between 10 and 15 living in the household were asked to complete a youth self-completion questionnaire. All participants provided informed consent, and ethical approval for the study was granted by the University of Essex.

In total, 30,169 households responded to the survey, including 3,656 households with youths eligible to answer the youth questionnaire. Seventy-four percent of 10 to 15 year olds completed the youth questionnaire to give a total sample of 4,899 respondents. Youths who did not have any siblings (N=662, 13.5%) were excluded from the analysis, giving a final sample size of 4,237 10 to 15 year old participants (Mean age = 12.52, 49.3% male).

Measures

Sibling Aggression

Sibling aggression was measured using a series of questions which identified the types of aggression children had been involved in, as perpetrator and victim, over the last six months. Four types of sibling aggression were considered: physical aggression, stealing, verbal abuse and teasing. To identify victims of sibling aggression, children were asked “How often do any of your brothers or sisters do any of the following to you at home?” with the options “hit, kick, or push you” (physical), “take your belongings” (stealing), “call you nasty names” (verbal) and “make fun of you” (teasing). Four response categories determined the frequency

of each option: never; not much (1-3 times in last 6 months); quite a lot (more than 4 times in the last 6 months); a lot (a few times every week). To identify perpetrators of sibling aggression, children were asked “How often do you do any of the following to your brothers or sisters at home?” with the same options and response categories as mentioned above. Composite measures of sibling aggression were constructed by combining items into two scales, which measured the severity of youth’s involvement. Individual scores for the four items on victimization (coded from 0-3) were summed to create a scale ranging from 0 (no sibling victimization) to 12 (most severe sibling victimization (Cronbach’s $\alpha = 0.81$), and then standardized through conversion to z-scores (Mean: 0; SD; 1). Similarly, items for sibling perpetration were totaled (Cronbach’s $\alpha = 0.81$), and converted to z-scores. Finally, both scales were totaled to provide an overall measure of severity of sibling aggression (Cronbach’s $\alpha = 0.86$).

Demographic, Family and Socioeconomic Factors

To identify factors associated with sibling aggression, victimization and perpetration scales were compared across a range of personal and family characteristics including age, sex, sibling and household composition, parent-child relationships, and socioeconomic background.

Measures of sibling and household composition included the number (one or more siblings), and sex (brothers, sisters or both) of participant’s siblings, birth order (eldest, middle/twin or youngest child), and the number of natural parents youths lived with at home (one or both natural parents). Parent-child relationships were measured using both youth and parent reports. Two scales in the youth questionnaire assessed positive parent relationships (3 items: whether youths talked to their mother about things that mattered, whether they spoke to their father about things that mattered, and whether they felt supported by their family, Cronbach’s

$\alpha = 0.55$), and negative parent relationships (2 items: how often youths quarreled with their mother, and how often they quarreled with their father; Cronbach's $\alpha = 0.62$). For youths who lived with both parents, the mean of both parent's scores was used, while in single parent families, children provided data for just one parent. Parent report scales measured positive parenting behavior (how often praise child, how often hug child, how often talk about important matters with child, frequency of leisure with child; Cronbach's $\alpha = 0.79$), and harsh parenting behavior (how often shout at child, how often quarrel with child, how often spank or slap child; Cronbach's $\alpha = 0.81$). Major caretaker scores (usually the mother, 90.0%) on parenting behavior were used in the analysis. Parent's highest level of qualification was defined as the highest level of education achieved by either the mother or father within the household (University degree, A-level or similar [completed further education: 13 years of schooling], GCSE or equivalent: 11 years of schooling [completed high school education], and no qualifications). Measures of the household economic situation included income in quintiles (derived from the gross household income in the month prior to the survey, see Table 3 for distribution), income poverty (adjusted income below 60% of the gross monthly income median), and financial stress (sum of three items identifying whether households were behind with their rent/mortgage, council tax, or bills) (Berthoud, 2011). Two measures of deprivation were included: The Child Material Deprivation Index (CMDI) which used nine questions to identify the level of deprivation experienced by youths (Willitts, 2006), and ownership of consumer items, calculated using the total sum of thirteen key consumer items owned by a household (e.g. television, washing machine), dichotomized as less than/more than the mean ($M = 10.4$ items owned).

School Bullying

Six items in the youth questionnaire assessed involvement in school bullying, a measure which is widely used to describe aggression among school children (Smith, 2011). Three

questions identified whether youths were bullied by their peers; two of these were adapted from the Peer and Friendship Interview (Schreier et al., 2009), and measured physical bullying (How often do you get physically bullied at school, for example getting pushed around, hit or threatened, or having belongings stolen?), and relational bullying (How often do you get bullied in other ways at school such as getting called names, getting left out of games, or having nasty stories spread about you on purpose?). The third item was incorporated as part of the Strengths and Difficulties Questionnaire (SDQ: Goodman, Patel, & Leon, 2008), and asked participants whether other children or young people picked on or bullied them. The two questions on physical and relational bullying were measured using a four point scale of 0 'Never', 1 'Not much (1-3 times in last 6 months)', 2 'Quite a lot (more than 4 times in last 6 months)' and 3 'A lot (a few times every week)', while the SDQ question used a three point scale of 0 'Not true', 1 'Somewhat true', and 2 'Certainly true'. The three items showed good internal consistency (Cronbach's $\alpha = 0.79$) and were combined into a single dichotomous measure representing bullying by peers at school. Children who reported being either physically or relationally bullied 'quite a lot' or 'a lot', or who had responded 'certainly true' to the SDQ question were classified as victims of bullying (coded as 1); all other children were classed as non-victims (coded 0). Bullying perpetration was measured similarly, using two questions on physical or relational bullying from the Peer and Friendship Interview, and one question from the SDQ which asked whether "they fought a lot, and could make people do as they wanted". The three items showed satisfactory internal consistency (Cronbach's $\alpha = 0.65$), and were combined into a single measure of bullying perpetration. Bullies (coded as 1) were identified as children who reported physically or relationally bullying others 'quite a lot' or 'a lot', or who had responded 'certainly true' to the SDQ question. All other children were classified as non-bullies (coded 0). The two dichotomous measures of school victimization and bullying perpetration were used to define

four distinct roles in school bullying: non-involved (were neither bullies or victims), victim (were victims only), bully (were bullies only), and bully-victim (were both bullies and victims), after Wolke and Samara (2004).

Statistical Analysis

All analyses were conducted using IBM SPSS Statistics version 19. Chi-squared tests measured age and sex differences in the prevalence of sibling aggression (as victim and perpetrator) according to type (physical, stealing, verbal and teasing) (Table 1). Pearson correlation coefficients were used to assess associations between types of victimization and perpetration of sibling aggression (Table 2). Linear regression models identified the association between sibling aggression (using standardized victimization and perpetration scores) and family and household factors (divided into four domains: demographic characteristics, family and sibling composition, parent-child relationships, and socioeconomic status: Table 3). Effect sizes which describe the relationship between each domain and sibling aggression are reported using the R^2 statistic. Additional linear regression models were used to show associations between family and household characteristics and overall severity of sibling aggression (the sum of sibling victimization and perpetration scales). The relationship between peer and sibling aggression was assessed using logistic regression models (Table 4), which compared standardized sibling victimization and perpetration scores across role in school bullying (victim, bully or bully-victim vs non-involved). Additionally a sibling victim by sibling perpetrator interaction term was included. Each of these models controlled for demographic characteristics, family/sibling composition, parent-child relationships and socioeconomic status.

Results

Overall, 45.8% of youths had been victims of sibling aggression (N = 1,856), while 35.6% (N = 1,440) had perpetrated aggressive behavior towards their siblings over the last 6 months.

Table 1 illustrates the frequency of victimization and perpetration according to type of sibling aggression. Physical aggression, verbal aggression and teasing were the most commonly reported forms of victimization and perpetration; fewer reported stealing their sibling's belongings. No significant sex differences were found for overall victimization; however, females were more often victims of stealing than males. In contrast, overall perpetration of sibling aggression were greater among males (51.7% of males compared to 48.3% of females, $\chi^2 = 4.824$, $p < 0.05$), and males more often engaged in physical aggression, verbal abuse, and teasing, but less often stole belongings. According to age group, younger children were more often victimized by siblings overall (52.5% of 10-12 year olds versus 47.5% of 13-15 year olds, $\chi^2 = 12.17$, $p < 0.001$), but also experienced more physical aggression. No differences were found for perpetration of aggression (48.8% versus 51.2%), however younger children were more likely to perpetrate physical aggression, while older children more often teased or stole sibling's belongings.

Table 2 shows the relationship between perpetration of aggression towards siblings, and victimization by siblings. All four types of sibling victimization were moderately related, and similarly all four forms of aggression perpetration showed a moderate positive relationship. For each type of aggression, perpetration was strongly associated to its corresponding method of victimization. The strongest relationships were reported between physical victimization and aggression, and verbal victimization and aggression.

Table 3 identifies associations between composite measures of sibling aggression and household and family characteristics. Victimization by siblings was associated with being the eldest child in the family, having two or more siblings, and living in families who experienced poverty or financial stress. Victimization was also linked to higher levels of

harsh parenting and poorer relationships with parents. In contrast, positive parenting reduced the likelihood of sibling victimization. Perpetration of sibling aggression was also associated with being the eldest child, and was more common in families with three or more children. In addition, greater perpetration was observed among children with moderately or highly educated parents, and among those who experienced harsher parenting and reported poor relationships with their parents.

Table 4 depicts the relationship between standardized measures of sibling aggression and children's roles in school bullying. Involvement in sibling aggression was strongly associated with victim, bully and bully-victims roles at school. With each increase of one standard deviation on the sibling victimization scale, the odds of being a victim of bullying at school increased by 69% (OR = 1.69, 95% CI = 1.38-2.07). For the sibling perpetration scale, a rise of one standard deviation increased the odds of being a bully at school by 163% (OR = 2.63, 95% CI = 1.69-4.09), and of being a bully-victim by 244% (OR = 3.44, 95% CI = 1.27-9.29).

Discussion

Firstly, this study shows that aggression among siblings is widespread, with over one third of youths regularly being victimized or perpetrating aggression towards their siblings. The findings are consistent with prevalence rates found in other large studies (Button & Gealt, 2010; Finkelhor et al., 2006; Radford et al., 2013; Wolke & Skew, 2012), and illustrate the range of aggressive interactions that occur between siblings, all of which can have a harmful impact (Tucker, Finkelhor, Turner, et al., 2013). Secondly, this study used multiple measures of demographic, family and socioeconomic characteristics to identify potential correlates of sibling aggression. Of these, parenting showed a moderate association with sibling aggression: however, demographic or socioeconomic characteristics were only weakly

related. Thirdly, the findings indicate a moderate to strong homotypic relationship between sibling aggression and peer bullying. Victimization by siblings was linked to being bullied by peers, and children who perpetrated aggression towards siblings more often bullied others at school (as bully and bully-victim). The findings add support to the small number of studies which have previously shown links between sibling aggression and school bullying (Duncan, 1999; Menesini et al., 2010; Wolke & Samara, 2004).

Many children experienced sibling aggression: almost one half were victimized, and over one third perpetrated aggressive behavior towards their siblings. Consistent with previous research, physical and verbal aggression were most often reported (Button & Gealt, 2010; Duncan, 1999; Wolke & Samara, 2004); fewer experienced property-based aggression such as stealing belongings (Tucker, Finkelhor, Shattuck, et al., 2013). Perpetration and victimization through sibling aggression were strongly related, indicating an almost reciprocal dimension to sibling aggression, whereby many children both ‘give’ and ‘receive’ acts of aggression. The strong correlation between victimization and perpetration has been reported in studies of child peer aggression (Card et al., 2008), delinquency and adult aggression (Archer, Ireland, & Power, 2007; Jennings, Piquero, & Reingle, 2012). The amount of time siblings spend together allows them to form a highly intimate understanding of each other, enabling them to provide support (Sapouna & Wolke, 2013), but also to exploit weaknesses in times of conflict (Dunn, 1988). Because of this, each sibling possesses a degree of power over the other, creating a bi-directional power dynamic which offers the potential for siblings to be both victims and perpetrators. Despite this, the non-perfect correlation between being victimized and perpetration indicates that some children are only victims and others just perpetrators of aggression towards siblings. Future research needs to determine whether the “pure victims” of sibling aggression may be at the highest risk for adverse outcomes.

After combining measures into a composite scale of sibling aggression, associations were found with a range of individual and household factors. Consistent with previous findings, both age and sex were linked to greater rates of sibling aggression (Button & Gealt, 2010; Eriksen & Jensen, 2006; Tucker, Finkelhor, Shattuck, et al., 2013). Males were more often perpetrators of sibling aggression, while younger adolescents were more often involved in physical aggression, as victims and perpetrators. Structural household characteristics, including number and sex of siblings, as well as birth order were also linked with greater rates of sibling aggression. Having more than one sibling and having male siblings increased the risk of victimization. Additionally, eldest children were more often engaged in sibling aggression, as victim and perpetrator. The oldest sibling will often have a physical or mental advantage which enables them to dominate their younger siblings, and in older-younger sibling dyads, older children have been found to initiate more aggressive interactions (Abramovitch et al., 1986). However, eldest siblings are also victims of sibling aggression. Elder children are perceived as being closer to their parents and having greater access to resources by their younger siblings (Rohde et al., 2003; Saroglou & Fiasse, 2003); jealousy, and the desire to covet their older sibling's resources may lead younger children to behave more aggressively.

Of all the factors considered, parenting characteristics were most strongly linked with sibling aggression. Poor relationships with parents and harsh parenting behavior predicted greater sibling aggression, while positive parenting and good relationships were associated with reduced levels of aggression. Negative parenting characteristics, including the use of harsh discipline, insecure attachment, and high levels of conflict have all been linked with greater physical aggression or hostility between siblings (Hoffman et al., 2005; Updegraff et al., 2005; Volling & Belsky, 1992), while in contrast, positive parenting, characterized by facilitative and affectionate behavior, can increase sibling affectivity and prosocial behavior

(Brody, 1998; Volling & Belsky, 1992). The association between sibling aggression and socioeconomic status was less clear. Sibling aggression was not related to poverty, and was more likely to occur among middle-to-higher income families. Despite this, greater rates of sibling aggression were found in households that experienced financial difficulties. While overall economic level may not play an important role, financial stress does appear to contribute towards the likelihood of sibling aggression. Conger et al. (1992), suggest that financial pressure can have an indirect influence on rates of sibling aggression by negatively impacting parenting behavior. Both the present study, as well as Eriksen and Jensen (2006) found that measures of family disorganization such as physical aggression and harsh discipline predicted sibling aggression more strongly than economic characteristics; thus parenting behavior may moderate the association between financial stress and sibling aggression. Among all correlates considered, parenting characteristics were by far the most strongly associated with rates of sibling aggression, indicating that changing parenting behavior may be the most effective route for tackling sibling aggression.

After controlling for a large range of potential confounding factors, sibling aggression showed a moderate to strong association with involvement in school bullying. Increasing scores on sibling victimization significantly increased the odds of peer victimization, while perpetrators at home were more likely to report bullying peers, or to be school bully-victims. This suggests homotypic stability of victim and aggressor roles, whereby behavior is carried over between the home and school environment. The findings are consistent with previous research (Duncan, 1999; Menesini et al., 2010; Wolke & Samara, 2004), suggesting similarities between sibling aggression and bullying at school. In support of this, children who have positive sibling relationships have been found to be better adjusted at school (Stormshak, Bellanti, & Bierman, 1996), while children who show high levels of conflict with siblings are more likely to behave aggressively towards their peers (MacKinnon-Lewis

et al., 1994; McCoy, Brody, & Stoneman, 1994). The findings indicate an association rather than a causal relationship: however, experimental research has found that sibling aggression among young children is predictive of bullying peers in a laboratory setting a year later (Ensor et al., 2010). This indicates that patterns learned at home transfer to relationships in the peer setting. A key implication of this finding is that school-based anti-bullying programs may need to take account of the home environment, and sibling relationships in particular, if they are to be effective.

This study has a number of strengths, including its large sample size, the use of validated measures, and the range of correlates considered. Despite this, there are a number of limitations. Firstly, the study uses an inclusive definition of sibling aggression, which considers a wide variety of behavior, but does not take into account concepts such as severity or intention. There is continuing debate over how sibling aggression should be defined and operationalized (Naylor, Petch, & Williams, 2011), and thus perceptions of what sibling aggression is, and the behavior it involves, can differ greatly. As part of a broadly focused longitudinal study, financial and space restrictions limited the amount of data that could be obtained on sibling aggression. As such, the findings are not intended to resolve major definitional and operational issues; rather they provide an indication of the range of aggressive interactions that occur between siblings, and offer an insight into how household characteristics and peer relationships relate to more general forms of sibling aggression. Secondly, when considering correlates of sibling aggression, it is important to recognize that the data are cross-sectional, and do not indicate causal relationships, either for family or household characteristics, or for the relationship with peer bullying. This will be resolved over future waves of data collection (Kraemer et al., 2001). Thirdly, scales relating to peer bullying perpetration and negative relationships with parents showed low internal consistency. Although 0.7 is seen as the traditional cutoff point, alpha scores of around 0.6

are generally acceptable (Moss et al., 1998). The low alpha values obtained in this study are likely to result from the small number of items used in each scale. Finally, although a range of potential confounds were controlled, there is always the possibility that differences in sibling aggression were due to residual confounds not included in the analysis.

Conclusions

Sibling aggression is a highly prevalent form of intra-familial aggression (Radford et al., 2013), which is manifested through a range of physical, verbal, and psychological behavior. Household and family characteristics show mostly weak links with sibling aggression, however, poor parenting and negative parent-child relationships are moderately associated, and may be the most effective route for family-based intervention strategies (Bowes et al., 2013; Sapouna & Wolke, 2013). Involvement in sibling aggression is also strongly linked with bullying at school, whereby aggressive behavior transfers between the home and school environment. The strength of this association indicates that intervention strategies, in either the home or school, must take account of both sibling and peer relationships. The serious adverse long term impacts of school bullying on health and adult adaptation (Copeland et al., 2013; Wolke, Copeland, et al., 2013; Wolke, Lereya, et al., 2013) are well known, and the cumulative experience of sibling aggression may further worsen outcomes for children and adolescents and thus requires future study. At present sibling aggression is poorly understood, but its strong association with school bullying, and the potentially debilitating effect it can have on children's mental and physical outcomes, indicates a clear need for further research which can help parents and their offspring reduce inter-sibling aggression.

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Table 1: Frequency of sibling aggression and distribution by age and sex

	Victims of sibling aggression			
	Physical	Stealing	Verbal	Teasing
Frequency N(%)	1,201 (28.1)	731 (17.1)	1,130 (26.5)	1,004 (23.5)
Sex N(%)				
Males	615 (51.2)	309 (42.3)	565 (50.0)	506 (50.4)
Females	586 (48.8)	422 (57.7)	565 (50.0)	498 (49.6)
<i>Sig (χ^2)</i>	<i>NS</i>	<i>0.001</i>	<i>NS</i>	<i>NS</i>
Age Range N(%)				
Aged 10-12	698 (58.1)	363 (49.7)	587 (51.9)	499 (49.7)
Aged 13-15	503 (41.9)	368 (50.3)	543 (48.1)	505 (50.3)
<i>Sig (χ^2)</i>	<i>0.001</i>	<i>NS</i>	<i>NS</i>	<i>NS</i>
	Perpetrators of sibling aggression			
	Physical	Stealing	Verbal	Teasing
Frequency N(%)	871 (20.4)	425 (9.9)	868 (20.3)	836 (19.6)
Sex N(%)				
Males	480 (55.1)	180 (42.4)	479 (55.2)	454 (54.3)
Females	391 (44.9)	245 (57.6)	389 (44.8)	382 (45.7)
<i>Sig (χ^2)</i>	<i>0.001</i>	<i>0.002</i>	<i>0.001</i>	<i>0.001</i>
Age Range N(%)				
Aged 10-12	478 (54.9)	191 (44.9)	431 (49.7)	369 (44.1)
Aged 13-15	393 (45.1)	234 (55.1)	437 (50.3)	467 (55.9)
<i>Sig (χ^2)</i>	<i>0.001</i>	<i>0.04</i>	<i>NS</i>	<i>0.001</i>

Table 2: Correlation coefficients for each type of sibling aggression victimization and perpetration (N = 4237)

	1	2	3	4	5	6	7
1) Physical victim	–						
2) Stealing victim	0.44*	–					
3) Verbal victim	0.62*	0.42*	–				
4) Teasing victim	0.51*	0.39*	0.67*	–			
5) Physical aggressor	0.72*	0.35*	0.52*	0.43*	–		
6) Stealing aggressor	0.32*	0.56*	0.34*	0.32*	0.39*	–	
7) Verbal aggressor	0.52*	0.36*	0.72*	0.55*	0.61*	0.41*	–
8) Teasing aggressor	0.44*	0.36*	0.53*	0.67*	0.53*	0.42*	0.67*

1) * indicates significant correlation at $p < 0.001$

Table 3: Demographic and family factors associated with sibling aggression (N=4237)

	Overall Sibling Aggression (victimization and perpetration)		Sibling Victims		Sibling Perpetrators	
	β (SE)	Beta	β (SE)	Beta	β (SE)	Beta
Household composition						
<u>Number of siblings</u>						
<i>One sibling</i> (N=2058)	<i>Reference</i>		<i>Reference</i>		<i>Reference</i>	
Two or more siblings (N=2179)	0.21 (0.050)	0.104**	0.24 (0.049)	0.116**	0.17 (0.049)	0.082**
<u>Gender of siblings</u>						
<i>Brothers</i> (N=1482)	<i>Reference</i>		<i>Reference</i>		<i>Reference</i>	
Sisters (N=1459)	-0.09 (0.039)	-0.046*	-0.11 (0.039)	-0.052*	-0.08 (0.039)	-0.038*
Both (N=1296)	-0.14 (0.060)	-0.055*	-0.17 (0.059)	-0.065*	-0.11 (0.060)	-0.045
<u>Position in family</u>						
<i>Youngest sibling</i> (N=1452)	<i>Reference</i>		<i>Reference</i>		<i>Reference</i>	
Middle/Twin sibling (N=1167)	0.02 (0.058)	0.007	-0.03 (0.057)	-0.009	0.06 (0.057)	0.024
Eldest sibling (N=1618)	0.11 (0.039)	0.055*	0.10 (0.039)	0.051*	0.10 (0.039)	0.049*

<u>Parents lived with</u>						
<i>Both natural parents (N=1808)</i>	<i>Reference</i>		<i>Reference</i>		<i>Reference</i>	
One natural parent (N=2429)	0.05 (0.036)	0.025	0.05 (0.035)	0.026	0.04 (0.035)	0.019
R²	0.012		0.014		0.009	
Parent-child relationships						
Positive relationship (child report)	-0.08 (0.007)	-0.175**	-0.08 (0.007)	-0.170**	-0.07 (0.007)	-0.157**
Negative relationship (child report)	0.12 (0.009)	0.210**	0.10 (0.009)	0.183**	0.119 (0.009)	0.215**
Positive parenting (adult report)	0.01 (0.009)	0.009	0.01 (0.009)	0.018	-0.01 (0.009)	-0.006
Harsh parenting (adult report)	0.09 (0.008)	0.177**	0.09 (0.008)	0.180**	0.08 (0.008)	0.154**
R²	0.132		0.117		0.118	
Socioeconomic Factors						
<u>Parent's qualifications</u>						
<i>No qualifications (N=487)</i>	<i>Reference</i>		<i>Reference</i>		<i>Reference</i>	
GCSE (N=1115)	0.14 (0.059)	0.061*	0.12 (0.058)	0.053*	0.13 (0.059)	0.056*
A-level (N=1442)	0.13 (0.058)	0.060*	0.11 (0.058)	0.050	0.12 (0.058)	0.056*
<i>Degree (N=1054)</i>	0.14 (0.063)	0.062*	0.10 (0.062)	0.045	0.14 (0.063)	0.062*

Household Income in quintiles*1 (<£1610) (N=768)**Reference**Reference**Reference**2 (£1610-2401) (N=850)**-0.14 (0.108) -0.054**-0.12 (0.107) -0.048**-0.17 (0.107) -0.066**3 (£2401-3395) (N=859)**-0.17 (0.121) -0.068**-0.16 (0.119) -0.062**-0.18 (0.120) -0.073**4 (£3395-4971) (N=869)**-0.22 (0.121) -0.090**-0.18 (0.120) -0.075****-0.25 (0.120) -0.100*****5 (>£4971) (N=891)**-0.13 (0.122) -0.054**-0.11 (0.121) -0.043**-0.165 (0.121) -0.068*Income Poverty*Poor (N=881)**Reference**Reference**Reference**Not Poor (N=3356)**0.20 (0.108) 0.080****0.22 (0.107) 0.088*****0.18 (0.107) 0.072*Material Deprivation*High deprivation (N=1786)**Reference**Reference**Reference**Low deprivation (N=2427)**0.03 (0.037) 0.013**0.02 (0.037) 0.009**0.03 (0.037) 0.015*Consumer Items owned*<11 consumer items (N=1891)**Reference**Reference**Reference**11+ consumer items (N=2329)****0.07 (0.036) 0.035*******0.07 (0.035) 0.034*****0.054 (0.035) 0.027*Financial Stress

<i>Any financial stress (N=1124)</i>	<i>Reference</i>		<i>Reference</i>		<i>Reference</i>	
No financial stress (N=3058)	-0.09 (0.040)	-0.037*	-0.08 (0.040)	-0.034	-0.09 (0.040)	-0.040*
R^2	0.007		0.007		0.005	

- 1) Bold indicates level of significance (** = $p < 0.001$; * = $p < 0.05$)
- 2) R^2 indicates effect size for each set of factors: Demographics, sibling/family composition, parent-adolescent relationships and socioeconomic factors. For small effects $R^2 = 0.02$; for medium effects $R^2 = 0.13$; for large effects $R^2 = 0.26$

Table 4: Association between sibling aggression and peer bullying (Odds Ratios and 95% Confidence Intervals)

	Sibling Aggression		
	Victimization	Perpetration	Interaction (Victimization x Perpetration)
Peer Bullying			
Victim	1.69 (1.38-2.07)	0.90 (0.68-1.19)	0.82 (0.60-1.13)
Bully	0.72 (0.39-1.35)	2.63 (1.69-4.09)	1.00 (0.55-1.82)
Bully-Victim	2.05 (0.72-5.80)	3.44 (1.27-9.29)	0.44 (0.13-1.44)

*Controlled for the following potential confounds: demographic characteristics, family and sibling composition, parent-child relationships and socioeconomic factors

¹ Bold indicates significant associations