

Differentiating typical from atypical perpetration of sibling-directed aggression during the preschool years

Melanie A. Dirks,¹ Holly E. Recchia,² Ryne Estabrook,³ Nina Howe,² Amelie Petitclerc,³ James L. Burns,³ Margaret J. Briggs-Gowan,⁴ and Lauren S. Wakschlag³

¹Department of Psychology, McGill University, Montréal, QC; ²Department of Education, Concordia University, Montréal, QC, Canada; ³Department of Medical Social Sciences, Institute for Innovations in Developmental Sciences, Institute for Policy Research, Northwestern University, Chicago, IL; ⁴University of Connecticut, Farmington, CT, USA

Background: Sibling aggression is common and often viewed as benign. Although sibling aggression can be harmful for the victims, it may also be a marker of clinical risk for the aggressor. We differentiated typical from atypical levels of perpetration of sibling-directed aggression among preschoolers, a developmental period in which aggression is a normative misbehavior, by (a) identifying how frequently aggressive behaviors targeted at a sibling must occur to be psychometrically atypical; (b) mapping the dimensional spectrum of sibling-directed aggression from typical, more commonly occurring behaviors to rarer, more atypical, actions; and (c) comparing the psychometric atypicality and typical-to-atypical spectrum of sibling-directed aggression and peer-directed aggression. **Methods:** Parents ($N = 1,524$) of 3- (39.2%), 4-(36.7%), and 5-(24.1%) year-olds (51.9% girls, 41.1% African-American, 31.9% Hispanic; 44.0% below the federal poverty line) completed the MAP-DB, which assesses how often children engage in aggressive behaviors. We used item-response theory (IRT) to address our objectives. **Results:** Most aggressive behaviors toward siblings were psychometrically atypical when they occurred ‘most days’ or more; in contrast, most behaviors targeted at peers were atypical when they occurred ‘some days’ or more. With siblings, relational aggression was more atypical than verbal aggression, whereas with peers, both relational and physical aggression were more atypical than verbal aggression. In both relationships, the most typical behavior was a verbally aggressive action. Results were broadly replicated in a second, independent sample. **Conclusions:** These findings are a first step toward specifying features of sibling aggression that are markers of clinical risk and belie the notion that sibling aggression is inherently normative. **Keywords:** Siblings; aggression; preschool.

Introduction

In North America, 75% of children have a sibling (Statistics Canada, 2011). Children spend more time with their brothers and sisters than anyone else (Buist, Deković, & Prinzie, 2013), making sibling relationships a critical developmental context. Sibling interactions can be characterized by intense conflict (Dirks, Persram, Recchia, & Howe, 2015), with 50% of children being targeted violently by a sibling at least once during a year (Finkelhor, Turner, & Ormrod, 2006; Finkelhor, Turner, Shattuck, & Hamby, 2015). Sibling-directed aggression is very prevalent among younger children (Tucker, Finkelhor, Turner, & Shattuck, 2013); for example, preschoolers have been observed to fight with their siblings as often as once every 10 minutes (Perlman & Ross, 2005).

Although there is heterogeneity between families, sibling aggression is so common that it is often judged of little concern for either the victim or perpetrator (Tucker, Finkelhor, Turner et al., 2013). It is clear, however, that sibling aggression can be associated with psychological harm for the recipient, even for young children (Finkelhor et al., 2006; Tucker, Finkelhor, Turner et al., 2013). Aggression toward

siblings may also be a marker of clinical risk for the perpetrator. Given that sibling-directed aggression occurs so frequently, for some children, it will be part of a typical developmental trajectory. For others, however, these actions may be a marker of socioemotional dysfunction that will escalate with time (Garcia, Shaw, Winslow, & Yaggi, 2000). Indeed, research has shown that young adults’ retrospective report of perpetration of aggression against a sibling is associated with subsequent violent behavior in other relationships (Mangold & Koski, 1990; Noland, Liller, McDermott, Coulter, & Seraphine, 2004). Thus, it is critical to differentiate developmentally expectable sibling-directed aggression that is a normative misbehavior from clinically concerning sibling-directed aggression (Wakschlag, Tolan, & Leventhal, 2010), particularly during the preschool years, when sibling relationships are especially influential (Howe, Ross, & Recchia, 2011), and interventions can yield significant improvements in disruptive behaviors (Comer, Chow, Chan, Cooper-Vince, & Wilson, 2013).

In some instances, qualitative features may mark aggressive actions as severe (Wakschlag et al., 2010). For example, few preschoolers engage in aggression intended to purposefully hurt another (Wakschlag et al., 2014). This behavior may be considered pathognomonic by definition (Wakschlag

Conflict of interest statement: No conflicts declared.

et al., 2010), and is cause for concern even when it occurs rarely. However, more common misbehaviors, such as teasing a sibling (Tucker, Finkelhor, Turner et al., 2013), may also be a marker of risk for the aggressor when exhibited very frequently. Determining empirically based frequency parameters at which aggression that is a normative misbehavior becomes atypical may help clinicians identify children who would benefit from early intervention. In the United States, approximately 60% of 3-year-olds and 30% of 4-year-olds do not attend preschool (Chaudry & Rupa Datta, 2017), limiting opportunities to observe young children's aggression toward peers. However, parents are well-positioned to report on behavior with siblings. Moreover, sibling aggression is a common concern for parents (Feinberg, Sakuma, Hostetler, & McHale, 2013), and thus may be a topic about which they would like guidance from health-care professionals.

In this study, we used IRT (Reise & Waller, 2009) to identify the frequency cut-off points at which sibling aggression becomes atypical, and to define the typical-to-atypical continuum of forms of aggressive behavior toward siblings, scaled from mild, more commonly occurring behaviors to rarer, more extreme, types of actions. In an IRT framework, aggression is characterized as a latent dimension indicated by reports about children's behavior. Children are given a score along this dimension, with higher scores indicating greater aggression. We asked parents to report how often their children engaged in specific aggressive behaviors using precise frequency anchors (e.g., rarely, some days in the week). We then used IRT to estimate category thresholds between anchors; that is, the score on the underlying dimension at which the probability exceeds 50% that a parent will choose the next higher frequency category. Thus, the category thresholds indicate the score at which children engage in the behavior that frequently or more often. In samples expected to reflect the full distribution of scores on the underlying dimension in the population, threshold scores exceeding the 95th percentile mark the frequencies at which the behavior is considered to be psychometrically atypical (Wakschlag et al., 2014). For example, if the threshold score for the response category 'hits sibling most days' exceeded the 95th percentile, then engaging in that behavior that frequently would be atypical; only the most aggressive children are hitting their siblings most days or more often than that. IRT also allows mapping of the relative atypicality of different behaviors by comparing the average threshold, or location, for each item; higher average thresholds indicate more atypical behaviors (i.e., fewer children engage in it frequently). In sum, IRT can be used to identify the frequency at which behaviors become atypical, as well as which behaviors are the most extreme.

We also compared the frequency and atypicality of sibling aggression to the same behaviors targeted at

peers. Preschoolers are more likely to be victimized by siblings than by peers (Finkelhor et al., 2006; Tucker, Finkelhor, Turner, & Shattuck, 2014). We extend this work by directly comparing the frequencies with which preschool children are reported to perpetrate the same aggressive behaviors with siblings and peers. Little work is available to inform our understanding of the frequencies at which sibling- and peer-directed aggression becomes atypical during the preschool years, and whether these norms are different across the two interpersonal contexts. This information is crucial for parents and educators, who must decide whether children's behavior requires more sustained intervention. We hypothesized that the frequencies at which sibling-directed aggression becomes atypical would be higher than those demarcating atypical aggression toward peers. We also examined whether the typical-to-atypical continuum of different types of aggressive behaviors with siblings was similar to peer-directed aggression. Preschoolers target verbal aggression at peers more often than relational and physical aggression (Ostrov & Keating, 2004); in contrast, physical aggression may be more common between preschool-aged siblings than is verbal aggression such as name-calling (Martin & Ross, 2005; Tucker, Finkelhor, Shattuck, & Turner, 2013). Thus, it is possible that physical aggression will be closer to the typical end of the spectrum in the sibling context than with peers.

Finally, we tested whether the thresholds demarcating typical from atypical sibling aggression varied as a function of gender, ethnicity, family poverty, and whether the child was the oldest sibling. (Invariance in the thresholds for peer aggression has already been established, Wakschlag et al., 2014.) We then examined whether these factors were associated with differences in the mean frequencies of sibling- and peer-directed aggression. Observational studies suggest that sibling-directed aggression may be more common for preschool-aged boys than girls, for first-born preschoolers than those with an older sibling, and for younger preschoolers than older children (Martin & Ross, 1995, 2005). Previous studies have not documented a consistent link between family SES and sibling aggression (Tucker, Finkelhor, Shattuck et al., 2013); however, research with a nationally representative sample suggests that non-Hispanic white children may engage in the highest-levels of sibling-directed aggression (Tucker, Finkelhor, Shattuck et al., 2013).

Methods

Participants

Data were drawn from the Multidimensional Assessment of Preschoolers Study (MAPS), which comprises two independent, socio-demographically stratified samples of families recruited from five pediatric clinics in the Chicago area (Wakschlag et al., 2012). We conducted our primary analyses in the MAPS sample with the most information about sibling relationships.

In this sample, 2,285 parents were eligible, 2010 consented to participate, and 1,857 completed surveys (81.2% of those eligible). We restricted the sample to parents of children with a sibling ($N = 1,524$). The sample was composed primarily of biological mothers (92.8%). Parents reported on approximately equal numbers of boys and girls (51.9% girls), and 3- (39.2%), 4- (36.7%), and 5-year-olds (24.1%). Forty-eight percent of children were first-borns. The sample was distributed fairly evenly on ethnicity (41.1% African-American, 31.9% Hispanic, 25.5% non-Hispanic White), and poverty status (44.0% below the federal poverty line, 17.0% nearly poor, and 38.1% not poor). We replicated our analyses in the other MAPS sample (see Appendix S1).

Measures and procedures

Parents answered questions about their child's disruptive behavior using the MAP-DB (Wakschlag et al., 2014). Of interest were the eight items assessing children's physical, verbal, and relational aggression toward their siblings and the identical items assessing the same behaviors directed at peers. Ratings employed a 6-point scale (0 = never in the past month; 1 = rarely [less than once per week]; 2 = some [1–3] days of the week; 3 = most [4–6] days of the week; 4 = every day of the week; 5 = many times each day). The MAP-DB has demonstrated strong test-retest reliability and internal consistency in two large community samples (Wakschlag et al., 2014, 2015, 2018). In the current study, internal consistency was excellent for both the sibling and peer items (both α s = .89). Parents completed the survey, which included the MAP-DB and demographic information, in either English or Spanish. The Spanish version was created via certified translation and back-translation. Parents received a \$20 incentive for completing the survey, with a \$10 bonus for completing the questionnaire at the clinic.

Ethical considerations

All procedures were approved by an IRB. Informed parental consent was obtained.

Data analysis

To map overall differences in aggressive behavior, we conducted paired samples *t*-tests comparing the mean frequency of each behavior when it was targeted at siblings versus peers. Then, we used CFA, conducted in MPlus 7.0 using the robust MLR estimator, to determine whether a two-factor structure, with sibling and peer items loading on separate factors, adequately characterized the data. Correlations between the residuals of each pair of matched sibling and peer items were modeled. CFIs greater than .90 and RMSEA values less than .08 were considered an acceptable fit (Hu & Bentler, 1999).

We used IRT analyses, conducted in IRTPRO (IRTPRO, 2011), to estimate the thresholds at which sibling aggression becomes atypical, and to compare these thresholds with those marking extreme peer aggression. We fit a model in which sibling and peer items loaded on two separate factors, each with the mean and variance constrained to 0 and 1; all thresholds were estimated freely. To determine whether the thresholds differed for sibling- and peer-directed aggression, we fit a second model in which the thresholds for each sibling item were constrained to equal those for the matching peer item. In this model, the mean of the peer factor was constrained to 0 and the variance was constrained to 1; the mean and variance of the sibling factor were estimated freely. We used the likelihood ratio test to determine whether the constrained model provided a worse fit to the data, which indicates that thresholds vary across groups. Given that this test is sensitive when sample size is large (Cheung & Rensvold,

2002), we also compared the RMSEAs across the two models (IRTPRO does not calculate the CFI).

Next, we examined whether the thresholds for the sibling items varied as a function of gender, age (i.e., 3, 4, or 5 years), ethnicity (i.e., non-Hispanic white, African-American, Hispanic), sibling position (i.e., oldest child or has at least one older sibling), and poverty status (i.e., not poor, nearly poor, poor). We fit a model in which all sibling items loaded on one factor, thresholds were estimated freely in each group (e.g., for boys and for girls), and the factor mean and variance were constrained to 0 and 1 in all groups. We compared this model to one in which the thresholds were constrained to be equal across the groups, and the factor mean and variance were constrained to 0 and 1 in one group and estimated freely in the others. We used the likelihood ratio test and change in RMSEA to index invariance. Finally, we conducted ANOVAs to examine differences in the mean frequency of each of sibling- and peer-directed aggressive behavior as a function of these sociodemographic factors.

Results

For every behavior, the mean frequency was significantly higher when the action was directed toward siblings than peers (see Table 1, Figure 1). CFA indicated that a two-factor model fit the data, CFI = .99, RMSEA = .042 (90% CI = .037–.047). All standardized factor loadings exceeded .60 (see Table S1). The correlation between sibling and peer aggression factors was .75, $p < .001$; however, a model in which all items loaded on one factor did not adequately characterize the data; CFI = .89 and RMSEA = .158 (90% CI = .153–.163).

IRT results with the thresholds of peer and sibling items estimated freely are presented in Table 2. Constraining the thresholds of the sibling items to equal that of the matching peer item resulted in a significantly worse model fit as indexed by the likelihood ratio test, $\chi^2(46) = 448.07$, $p < .001$ and an increase in the RMSEA from .02 to .03. The threshold score for each peer aggression item exceeded the 95th percentile when the behavior occurred some days per week or more; that is, only the most aggressive children engaged in these actions as often as 'some days'. Moreover, the thresholds for five of the eight peer-aggression items exceeded the 75th percentile when they were endorsed 'rarely'. In contrast, sibling aggression had to occur 'most days' or more to be atypical (teasing or taunting was atypical when it occurred every day or more); thresholds for four of the sibling aggression items were below the 50th percentile when parents reported that they happened 'rarely'. That is, more than half the sample was reported to engage in these behaviors at least sometimes. In addition, the location exceeded the 95th percentile for all peer-aggression items, indicating that all of these behaviors are atypical (i.e., they occur in <5% of the population) (Wakschlag et al., 2014). In contrast, the locations of three sibling items – acts aggressively, teases and taunts, does or says things that are not nice – were below the 95% threshold, although they did exceed the 75th percentile. With both siblings and peers, the relationally aggressive

Table 1 Results of paired-sample *t*-tests comparing frequency of aggressive behavior directed toward siblings versus peers

	Mean (<i>SE</i>)		
	Toward siblings	Toward peers	
Hit, shove, or kick [child]	0.76 (0.03)	0.38 (0.02)	<i>t</i> (1,504) = 14.48
Refuse to let [child] play with him/her	0.98 (0.03)	0.53 (0.02)	<i>t</i> (1,501) = 17.74
Say or do mean things to [child] behind his/her back	0.80 (0.03)	0.49 (0.02)	<i>t</i> (1,503) = 12.49
Tease or taunt [child]	0.96 (0.03)	0.31 (0.02)	<i>t</i> (1,502) = 25.48
Call [child] names	0.72 (0.03)	0.61 (0.03)	<i>t</i> (1,499) = 3.90
Do or say things that were not nice or mean to [child]	0.82 (0.03)	0.37 (0.02)	<i>t</i> (1,507) = 18.39
Act aggressively toward [child]	0.86 (0.03)	0.35 (0.02)	<i>t</i> (1,502) = 21.12
Talk about wanting to hurt or upset [child]	0.57 (0.03)	0.15 (0.01)	<i>t</i> (1,501) = 17.06

For items asking about aggression toward a sibling, [child] was replaced with ‘a brother or sister.’ For items asking about aggression toward peers, [child] was replaced with ‘other children (not including a brother or sister.)’ Mean values could range from 0 to 5. All *t*-tests were significant, $p < .001$. Differences in degrees of freedom are due to some participants having missing data for some responses.

behaviors ‘refuse to let [child] play with him/her’ and ‘say or do mean things to [child] behind his/her back’ were more extreme than the verbally aggressive behaviors ‘calls names’ and ‘teases and taunts.’ With peers, the physically aggressive behavior ‘hits, kicks, and shoves’ was also more atypical than these verbally aggressive actions; with siblings, ‘calls names’ was more atypical than ‘hits, kicks, shoves,’ and both of these behaviors were more extreme than ‘teases and taunts.’ In both relationships, the most extreme item was ‘talk about wanting to hurt him/her.’

Constraining thresholds to be equal across boys and girls yielded an insignificant likelihood ratio test, $\chi^2(46) = 56.72$, $p > .05$, and the RMSEA was identical (.02) for both the constrained and unconstrained models. Constraining thresholds to be equal across (a) birth order; (b) age; (c) poverty status; and (d) ethnicity yielded significant likelihood ratio tests, (a) $\chi^2(46) = 154.75$, (b) $\chi^2(92) = 195.03$, (c) $\chi^2(92) = 233.56$; and (d) $\chi^2(92) = 174.31$; all $ps < .001$; in all cases, the RMSEA was .02 for both the constrained and unconstrained models. All findings were largely replicated in the other, independent sample (see Appendix S1 and Tables S2–S5).

Mean frequencies of aggression as a function of sociodemographic factors are presented in Table 3. For sibling-directed aggression, ANOVAs indicated parents reported more aggression for boys than for girls, $F(1, 1,457) = 3.99$, $p < .05$. There was also a main effect of ethnicity, $F(2, 1,457) = 12.18$, $p < .01$. Scheffé post hoc tests indicated that non-Hispanic white children were reported to be more aggressive than both African-American and Hispanic children, $ps < .01$. For peer-directed aggression, parents reported boys engaged in more aggression than girls, $F(1, 1,459) = 6.30$, $p < .05$. There were also main effects of ethnicity, $F(2, 1,459) = 10.59$, $p < .01$, and poverty, $F(2, 1,459) = 11.92$, $p < .01$. Scheffé post-hoc tests indicated that African-American preschoolers were reported to engage in aggression more frequently than preschoolers of other ethnicities, $ps < .01$, and children not living in poverty were engaging in less frequent aggression than those

living near, $p < .05$, or below, $p < .01$, the poverty line. In summary, parents reported more aggressive behavior, with both siblings and peers, for boys than girls. Associations between ethnicity and poverty status and frequency of aggression varied across relational contexts. No differences as a function of age or birth order were observed.

Discussion

Our goals were to (a) identify how frequently aggressive behaviors targeted at a sibling must occur to be psychometrically atypical; (b) map the spectrum of sibling-directed aggression from more commonly occurring behaviors to rarer, more atypical, actions; and (c) compare the psychometric atypicality and typical-to-atypical spectrum of sibling-directed aggression and peer-directed aggression. Parental report of preschoolers’ aggression toward siblings and peers reflected two domains, a pattern consistent with research documenting the relative independence of children’s observed behavior with siblings versus other children (see Howe et al., 2011). This highlights the importance of measuring sibling and peer aggression separately, as aggression in these two contexts may be linked to different predictors and outcomes. For example, we found peer-directed aggression was associated with family poverty, whereas sibling-directed aggression was not. Nevertheless, sibling- and peer-aggression factors were highly correlated, indicating that children who behaved aggressively in one relationship also behaved aggressively in the other. This association may have been inflated by shared method variance; however, studies using multimethod approaches also document that sibling aggression is linked to peer-directed aggression (Ensor, Marks, Jacobs, & Hughes, 2010; MacKinnon-Lewis, Starne, Volling, & Johnson, 1997) and may precede it (Stauffacher & DeHart, 2006). These findings suggest that interventions targeting aggressive behavior with siblings may help to reduce aggressive behavior toward peers.

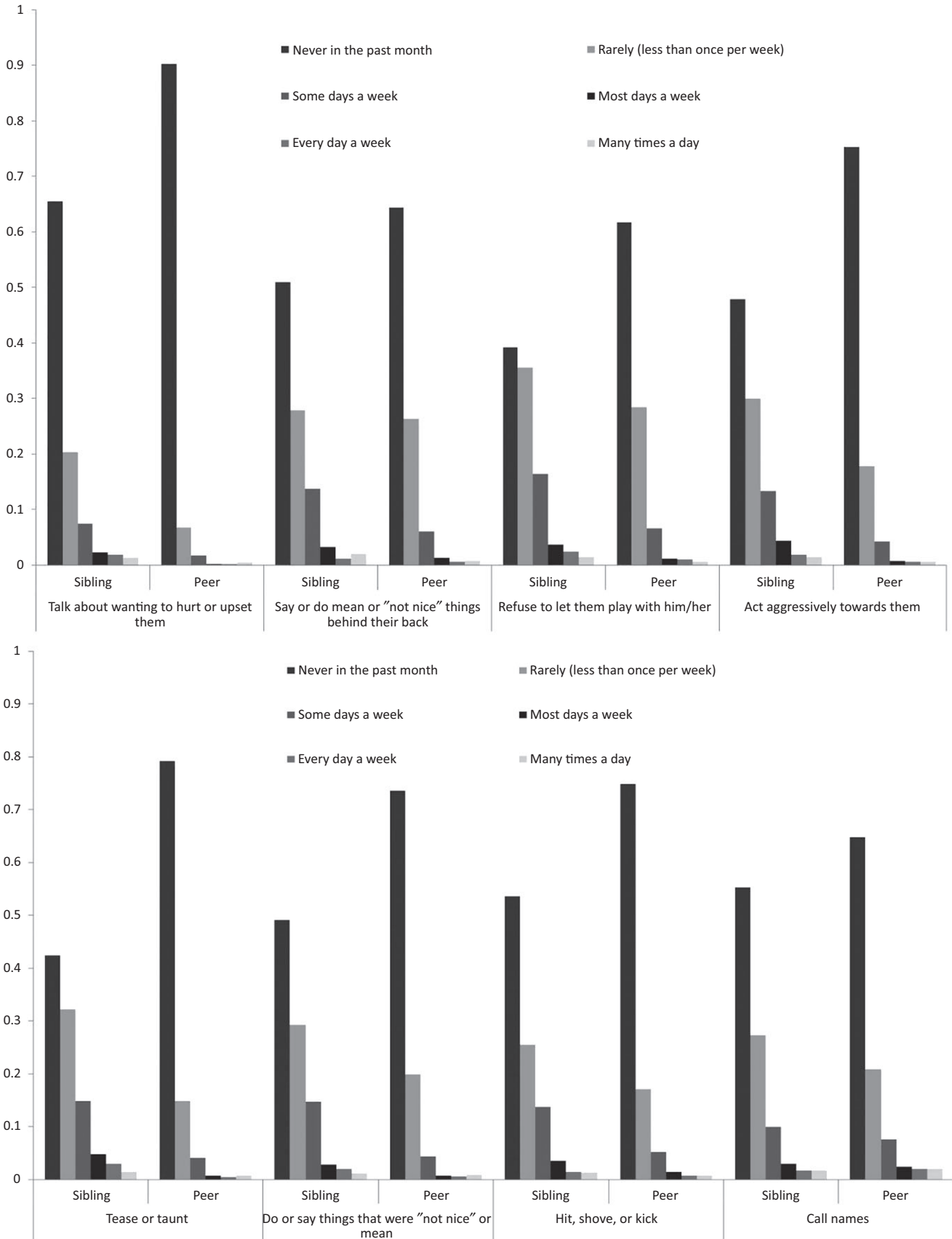


Figure 1 Frequency of preschoolers' aggressive behavior directed toward a sibling or another peer. Y-axis represents the proportion of parents endorsing each response option on the Multidimensional Assessment of Preschoolers – Disruptive Behavior

To identify preschoolers who will benefit from such interventions, it is necessary to disentangle clinically concerning aggression toward siblings from typical

levels of conflict. As a first step toward this goal, we generated empirical parameters demarcating the frequency at which aggression toward a sibling becomes

Table 2 Item locations and category thresholds for aggression toward siblings and peers

Item	Toward Siblings (50th percentile score = 0.01; 75th percentile score = 0.58; 95th percentile score = 1.58)					Toward Peers (50th percentile score = -0.07; 75th percentile score = 0.59; 95th percentile score = 1.53)						
	Item Location Mean (b)	Rarely or Higher (b1)	Some Days or Higher (b2)	Most Days or Higher (b3)	Every Day or Higher (b4)	Many Times a Day or Higher (b5)	Item Location Mean (b)	Rarely or Higher (b1)	Some Days or Higher (b2)	Most Days or Higher (b3)	Every Day or Higher (b4)	Many Times a Day or Higher (b5)
Talk about wanting to hurt or upset [child]	2.01	0.56	1.51	2.19	2.60	3.23	2.60	1.48	2.24	2.86	3.08	3.43
Say or do mean things to [child] behind his/her back	1.72	0.04	1.07	2.03	2.56	2.91	2.20	0.46	1.70	2.48	2.96	3.39
Refuse to let [child] play with him/her	1.79	-0.39	1.00	2.12	2.70	3.50	2.35	0.41	1.77	2.66	3.08	3.84
Act aggressively toward [child]	1.43	-0.04	0.86	1.58	2.12	2.61	2.06	0.73	1.64	2.26	2.58	3.11
Tease or taunt [child]	1.34	-0.19	0.77	1.49	1.97	2.67	2.16	0.87	1.72	2.40	2.72	3.09
Do or say things that were not nice or mean to [child]	1.51	-0.01	0.87	1.74	2.16	2.78	2.00	0.67	1.64	2.28	2.54	2.86
Hit, shove, or kick [child]	1.58	0.12	0.93	1.75	2.31	2.81	2.32	0.83	1.78	2.56	2.96	3.49
Call [child] names	1.66	0.18	1.15	1.86	2.32	2.79	2.02	0.55	1.55	2.24	2.62	3.15

For items asking about aggression toward siblings, [child] was replaced with 'a brother or sister.' For items asking about aggression toward peers, [child] was replaced with 'other children (not including a brother or sister.)' Data are derived from an IRT-graded response model. Numbers in boldface type indicate category thresholds exceeding the 95th percentile score on the underlying dimension.

Table 3 Mean (standard error) frequencies of sibling- and peer-directed aggression as a function of sociodemographic factors

	Sibling-directed aggression	Peer-directed aggression
Gender		
Male	0.86 (0.03)	0.44 (0.02)
Female	0.76 (0.02)	0.36 (0.02)
Age		
3 years	0.76 (0.03)	0.39 (0.02)
4 years	0.82 (0.03)	0.40 (0.03)
5 years	0.85 (0.04)	0.40 (0.03)
Sibling position		
Has an older sibling	0.79 (0.03)	0.41 (0.02)
Oldest child	0.84 (0.03)	0.39 (0.02)
Ethnicity		
Non-Hispanic White	0.98 (0.04)	0.35 (0.03)
African-American	0.77 (0.03)	0.50 (0.03)
Hispanic	0.72 (0.03)	0.31 (0.02)
Poverty status		
Not poor	0.83 (0.03)	0.29 (0.02)
Nearly poor	0.78 (0.05)	0.40 (0.04)
Poor	0.81 (0.04)	0.49 (0.03)

psychometrically atypical. Parents reported that children targeted aggressive actions at siblings more often than at peers. Furthermore, the frequencies at which aggressive behaviors became psychometrically atypical were higher for sibling- than for peer-directed aggression. Specifically, most aggressive behaviors targeted at brothers and sisters were extreme when parents reported that they occurred most days; the same behaviors directed at peers were extreme when they occurred on only some days. Similarly, the threshold for five of the eight peer-aggression items exceeded the 75th percentile when parents said the behavior occurred 'rarely.' That is, only children scoring in the top quarter on the latent aggression dimension were reported as engaging in these behaviors at all. In contrast, the thresholds for sibling aggression indicated that for half of the items, children who scored below the 50th percentile were reported as rarely engaging in the behavior. In other words, more than half of the sample was reported to be aggressing against a sibling at least occasionally in the last month. Taken together, our results indicate that the normative frequency of aggressive behaviors, as reported by parents, are different in sibling and peer relationships. These findings suggest that sibling aggression must be reported to occur with greater frequency than comparable behaviors targeted at peers to be a marker of clinical risk.

The primary difference between reported sibling aggression as compared to aggression directed at peers was frequency, as the dimensional spectrum of the typicality of these behaviors was similar across the two relationships. For example, in both contexts, the relationally aggressive behaviors 'refuses to let [child] play with him/her' and 'says or does mean things behind [child's] back' were more extreme than the verbally aggressive actions 'calls names' and 'teases and taunts,' a pattern consistent with reports that preschoolers engage in verbal aggression more

frequently than relational aggression (e.g., Ostrov & Keating, 2004). Moreover, the most extreme behavior, whether directed at a sibling or a peer, was 'talks about wanting to hurt him/her.' This behavior reflects deliberate intention to harm, which may be a particularly salient indicator of clinically concerning aggression in young children (Wakschlag et al., 2014). Previous studies suggest that with peers, verbal aggression may be more typical than physical aggression (Ostrov & Keating, 2004), whereas with siblings, physical aggression may be more typical than verbal aggression (Martin & Ross, 2005; Tucker, Finkelhor, Shattuck et al., 2013). Our results were not fully consistent with this pattern. We did find that, with peers, the physically aggressive item 'hits, kicks, shoves' was more atypical than each of the verbally aggressive behaviors. With siblings, physical aggression was more typical than 'calls names', but less typical than 'teases and taunts.' Thus, we did not find unequivocal evidence that physical aggression was more typical in the sibling relationship than verbal aggression. Our results may have differed from previous studies due to differences in measurement (i.e., parent-report vs. observation, Martin & Ross, 2005), or the specific behaviors assessed. In general, differences in the relative ranking of behaviors across the sibling and peer relationship were not pronounced and would appear to be less clinically relevant than the higher frequencies that characterize atypical aggression toward siblings, compared to peers.

A number of features of the sibling relationship may contribute to the greater frequency of aggressive behaviors occurring in this context. The sibling relationship is often characterized by intense negative affect, such as jealousy and anger (Howe et al., 2011). Moreover, siblings often have to negotiate situations that may be especially likely to elicit aggressive behaviors, such as competing for shared resources (Volling, 2003). Preschoolers may also target more aggression at siblings than at peers because they spend more time with them. In addition, preschoolers' interactions with siblings may be occurring in less structured settings that afford more opportunity for aggression than do interactions with peers, which are likely to occur at preschool or child-care settings. If preschoolers aggress more against siblings than peers due to the opportunities presented by frequent, unstructured contact, then this pattern of results may not generalize to later developmental stages, when children have greater opportunities to interact with peers, often out of sight of adults. In fact, adolescents report more victimization by peers than siblings (Finkelhor et al., 2015; Tucker et al., 2014). Future investigations should examine and compare the thresholds demarcating typical from atypical sibling and peer aggression in older samples. The spectrum of typicality of aggressive behaviors during later developmental stages should also be investigated, as the relative ordering

of the behaviors may change as children become increasingly able to use more complex aggressive strategies.

Measurement invariance analyses indicated that the thresholds identified for sibling aggression were broadly comparable across gender, birth order, age, poverty status, and ethnicity. Mean levels of aggressive behavior did vary as a function of sociodemographic characteristics. Consistent with previous studies (e.g., Martin & Ross, 2005; Ostrov & Keating, 2004), parents reported that boys engaged in more frequent aggression toward both siblings and peers than did girls. Sibling-directed aggression was more frequent among non-Hispanic white preschoolers, a pattern also documented by Tucker, Finkelhor, Shattuck et al. (2013). It remains unclear why this difference is occurring, although it is notable that in our study, non-Hispanic white parents did not report the greatest amount of aggression more broadly; African-American parents reported the highest levels of aggression toward peers. We found no difference in sibling-directed aggression as a function of poverty status, birth order, or age. In contrast with other forms of family violence, which have been robustly linked to lower SES (see Widom, Czaja, & Dutton, 2014), greater economic disadvantage may not be a risk factor for sibling aggression (Tucker, Finkelhor, Shattuck et al., 2013). More work is needed to understand the association between SES and this particular form of intrafamilial aggression. Some research indicates that older siblings are more likely to target their younger brothers and sisters (Martin & Ross, 1995). Our documented lack of an association between birth order and aggression may reflect that we assessed only whether children were first-born or not; later-born children may still have had younger siblings.

Our study had a number of limitations. We identified frequency cut-off points based on parent reports. Observations of preschool-aged siblings' interactions reveal that sibling aggression is very common (Martin & Ross, 1995); in contrast, a significant proportion of parents in our sample indicated that children 'never' engaged in sibling-directed aggression in the past month, suggesting that parental report may provide a conservative estimate. Moreover, parents typically have more exposure to their children's aggressive behavior with siblings than with peers. This differential access may contribute to parents underreporting peer aggression, relative to sibling aggression, although some observational studies have also documented that preschoolers engage in greater aggression with siblings than peers (Cutting & Dunn, 2006; Stauffacher & DeHart, 2005, 2006). Given the unique perspective that parents provide, the cut-off points identified in our study should not be generalized to estimates obtained using other measurement strategies. Nevertheless, parents are excellent informants of their children's behavior and it is rare to observe aggression in a brief observation, even in highly

disruptive children (Wakschlag et al., 2008). Moreover, parent-report instruments are feasible for use in many health-care settings, enhancing their clinical utility.

The current study examined the psychometric atypicality of sibling-directed aggression, which was defined by the rare occurrence of behavior. A vital next step will be to examine the associations between psychometric atypicality and clinical severity, by mapping the links between the frequency with which children engage in sibling-directed aggression and key clinical indicators, including clinical symptom patterns, impairment, and prognosis. Future studies should also examine the frequencies at which sibling-directed aggression compromises the well-being of the victims – these cut-offs may be lower than those that mark psychometric atypicality for the perpetrator – as well as to investigate the interplay between perpetration and receipt of sibling aggression, given that children who aggress against siblings are also often victimized by their brothers and sisters themselves (Tippett & Wolke, 2015).

Finally, unfortunately detailed information about features of children's sibling relationships were unavailable in the MAPS study. It will be important to examine whether indicators of the severity of aggression vary as a function of structural features of sibling dyads, such as gender composition. Moreover, the clinical severity of sibling aggression must be considered within the context of other sibling relationship features, such as warmth, which may protect victims from the negative consequences of sibling aggression and be indicative of a more positive developmental trajectory for aggressors (see Buist & Vermande, 2014).

Conclusion

Young children target aggressive behaviors at siblings more frequently than at peers. Perhaps in part because it is so commonly occurring, sibling-directed aggression has often been considered to be normative; however, for some children, these behaviors will be a marker of clinically significant behavior problems. In a diverse community sample, sibling-directed aggressive behaviors were psychometrically atypical when parents reported that they occurred most days. It will be critical to further this psychometric validation via application to clinical prediction; nonetheless, these findings are a first step toward specifying features of sibling aggression that will improve identification of early disruptive behavior.

Supporting information

Additional Supporting Information may be found online in the Supporting Information section at the end of the article:

Appendix S1. Replication in second, independent sample.

Table S1. Standardized factor loadings for the two-factor model of aggression toward siblings and peers in the primary sample.

Table S2. Results of paired-sample *t*-tests comparing frequency of aggressive behavior directed toward siblings versus peers in secondary sample.

Table S3. Standardized factor loadings for the two-factor model of aggression toward siblings and peers in the secondary sample.

Table S4. Item locations and category thresholds for aggression toward siblings and peers in secondary sample.

Table S5. Mean (standard error) frequencies of sibling- and peer-directed aggression as a function of sociodemographic factors in secondary sample.

Acknowledgements

L.S.W., R.E., M.J.B-G., and A.P. were supported by National Institute of Mental Health grants R01MH082830, U01MH090301, and 2U01MH082830. The authors have declared that they have no competing or potential conflicts of interest.

Correspondence

Melanie A. Dirks, Department of Psychology, McGill University, 2001 McGill College Room 1409, Montréal, Quebec, H3A1G1, Canada; Email: melanie.dirks@mcgill.ca

Key points

- Sibling aggression can be harmful for victims; it may also be a marker of clinical risk for the aggressor.
- We used IRT to differentiate typical from atypical levels of perpetration of sibling-directed aggression.
- Most aggressive behaviors directed toward siblings were psychometrically atypical when they occurred most days; the same behaviors targeted at peers were atypical when they occurred some days.
- These findings are a first step toward specifying features of sibling aggression that may be markers of clinical risk.

References

- Buist, K.L., Deković, M., & Prinzie, P. (2013). Sibling relationship quality and psychopathology of children and adolescents: A meta-analysis. *Clinical Psychology Review, 33*, 97–106.
- Buist, K.L., & Vermande, M. (2014). Sibling relationship patterns and their associations with child competence and problem behavior. *Journal of Family Psychology, 28*, 529–537.
- Chaudry, A., & Rupa Datta, A. (2017). The current landscape for public pre-kindergarten programs. In D.A. Phillips, et al. (Eds.), *Puzzling it out: The current state of scientific knowledge on pre-kindergarten effects* (pp. 5–18). Brookings Institute and Duke Center for Child and Family Policy. Available from: https://www.brookings.edu/wp-content/uploads/2017/04/duke_prekstudy_final_4-4-17_hires.pdf
- Cheung, G.W., & Rensvold, R.B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling, 9*, 233–255.
- Comer, J.S., Chow, C., Chan, P.T., Cooper-Vince, C., & Wilson, L.A.S. (2013). Psychosocial treatment efficacy for disruptive behavior problems in very young children: A meta-analytic examination. *Journal of the American Academy of Child and Adolescent Psychiatry, 52*, 26–36.
- Cutting, A.L., & Dunn, J. (2006). Conversations with siblings and with friends: Links between relationship quality and social understanding. *British Journal of Developmental Psychology, 24*, 73–87.
- Dirks, M.A., Persram, R., Recchia, H.E., & Howe, N. (2015). Sibling relationships as sources of risk and resilience in the development and maintenance of internalizing and externalizing problems during childhood and adolescence. *Clinical Psychology Review, 42*, 145–155.
- Ensor, R., Marks, A., Jacobs, L., & Hughes, C. (2010). Trajectories of antisocial behaviour towards siblings predict antisocial behaviour towards peers. *Journal of Child Psychology and Psychiatry, 51*, 1208–1216.
- Feinberg, M.E., Sakuma, K.-L., Hostetler, M., & McHale, S.M. (2013). Enhancing sibling relationships to prevent adolescent problem behaviors: Theory, design and feasibility of Siblings Are Special. *Evaluation and Program Planning, 36*, 97–106.
- Finkelhor, D., Turner, H., & Ormrod, R. (2006). Kid's stuff: The nature and impact of peer and sibling violence on younger and older children. *Child Abuse and Neglect, 30*, 1401–1421.
- Finkelhor, D., Turner, H.A., Shattuck, A., & Hamby, S.L. (2015). Prevalence of childhood exposure to violence, crime, and abuse: Results from the National Survey of Children's Exposure to Violence. *JAMA Pediatrics, 169*, 746–754.
- Garcia, M.M., Shaw, D.S., Winslow, E.B., & Yaggi, K.E. (2000). Destructive sibling conflict and the development of conduct problems in young boys. *Developmental Psychology, 36*, 44–53.
- Howe, N., Ross, H.S., & Recchia, H. (2011). Sibling relations in early and middle childhood. In P.K. Smith & C.H. Hart (Eds.), *The Wiley-Blackwell Handbook of childhood social development* (2nd edn, pp. 356–372). Oxford, UK: Wiley Blackwell.
- Hu, L.T., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1–55.
- IRTPRO (2011). *Flexible, multidimensional, multiple categorical IRT modeling [computer program]*. Lincolnwood, IL: Scientific Software International.
- MacKinnon-Lewis, C., Starnes, R., Volling, B.L., & Johnson, S. (1997). Perceptions of parenting as predictors of boys' sibling and peer relations. *Developmental Psychology, 33*, 1024–1031.
- Mangold, W.D., & Koski, P.R. (1990). Gender comparisons in the relationships between parental and sibling violence and non-family violence. *Journal of Family Violence, 5*, 225–235.
- Martin, J.L., & Ross, H.S. (1995). The development of aggression within sibling conflict. *Early Education and Development, 6*, 335–358.
- Martin, J.L., & Ross, H. (2005). Sibling aggression: Sex differences and parents' reactions. *International Journal of Behavioral Development, 29*, 129–138.
- Noland, V.J., Liller, K.D., McDermott, R.J., Coulter, M.L., & Seraphine, A.E. (2004). Is adolescent sibling violence a precursor to college dating violence? *American Journal of Health Behavior, 28*(Supplement 1), S13–S23.

- Ostrov, J.M., & Keating, C.F. (2004). Gender differences in preschool aggression during free play and structured interactions: An observational study. *Social Development, 13*, 255–277.
- Perlman, M., & Ross, H.S. (2005). If-then contingencies in children's sibling conflicts. *Merrill-Palmer Quarterly, 51*, 42–66.
- Reise, S., & Waller, N. (2009). Item response theory and clinical measurement. *Annual Review of Clinical Psychology, 5*, 25–46.
- Statistics Canada (2011). Census families by number of children at home, by province and territory. Census of Population and Statistics Canada. Available from: <http://www.statcan.gc.ca/tables-tableaux/sum-som/101/cst01/famil50a-eng.htm> [last accessed 26 September 2017].
- Stauffacher, K., & DeHart, G.B. (2005). Preschoolers' relational aggression with siblings and with friends. *Early Education and Development, 16*, 185–206.
- Stauffacher, K., & DeHart, G.B. (2006). Crossing social contexts: Relational aggression between siblings and friends during early and middle childhood. *Journal of Applied Developmental Psychology, 27*, 228–240.
- Tippett, N., & Wolke, D. (2015). Aggression between siblings: Associations with the home environment and peer bullying. *Aggressive Behavior, 41*, 14–24.
- Tucker, C.J., Finkelhor, D., Shattuck, A.M., & Turner, H. (2013). Prevalence and correlates of sibling victimization types. *Child Abuse and Neglect, 37*, 213–223.
- Tucker, C.J., Finkelhor, D., Turner, H., & Shattuck, A. (2013). Association of sibling aggression with child and adolescent mental health. *Pediatrics, 132*, 79–84.
- Tucker, C.J., Finkelhor, D., Turner, H., & Shattuck, A.M. (2014). Sibling and peer victimization in childhood and adolescence. *Child Abuse and Neglect, 38*, 1599–1606.
- Volling, B. (2003). Sibling relationships. In M.H. Bornstein, L. Davidson, C.L.M. Keyes & K.A. Moore (Eds.), *Well-being: Positive developments across the life course. Crosscurrents in contemporary psychology* (pp. 205–220). Mahwah, NJ: Erlbaum.
- Wakschlag, L.S., Briggs-Gowan, M.J., Choi, S.W., Nichols, S.R., Kestler, J., Burns, J.L., ... & Henry, D. (2014). Advancing a multidimensional, developmental spectrum approach to preschool disruptive behavior. *Journal of the American Academy of Child and Adolescent Psychiatry, 53*, 82–96. e83.
- Wakschlag, L.S., Briggs-Gowan, M.J., Hill, C., Danis, B., Leventhal, B.L., Keenan, K., ... & Carter, A.S. (2008). Observational assessment of preschool disruptive behavior, Part II: Validity of the Disruptive Behavior Diagnostic Observation Schedule (DB-DOS). *Journal of the American Academy of Child and Adolescent Psychiatry, 47*, 632–641.
- Wakschlag, L.S., Choi, S.W., Carter, A.S., Hullsiek, H., Burns, J., McCarthy, K., ... & Briggs-Gowan, M.J. (2012). Defining the developmental parameters of temper loss in early childhood: implications for developmental psychopathology. *Journal of Child Psychology and Psychiatry, 53*, 1099–1108.
- Wakschlag, L.S., Estabrook, R., Petitclerc, A., Henry, D., Burns, J., Perlman, S., ... & Briggs-Gowan, M. (2015). Clinical implications of a dimensional approach: The normal:abnormal spectrum of early irritability. *Journal of the American Academy of Child and Adolescent Psychiatry, 54*, 626–634.
- Wakschlag, L., Perlman, S., Blair, R., Leibenluft, E., Briggs-Gowan, M., & Pine, D. (2018). The neurodevelopmental basis of early childhood disruptive behavior: Irritable and callous phenotypes as exemplars. *American Journal of Psychiatry, 175*, 114–130.
- Wakschlag, L.S., Tolan, P.H., & Leventhal, B.L. (2010). Research Review: 'Ain't misbehavin': Towards a developmentally-specified nosology for preschool disruptive behavior. *Journal of Child Psychology and Psychiatry, 51*, 3–22.
- Widom, C.S., Czaja, S., & Dutton, M.A. (2014). Child abuse and neglect and intimate partner violence victimization and perpetration: A prospective investigation. *Child Abuse and Neglect, 38*, 414–424.

Accepted for publication: 14 May 2018

First published online: 2 July 2018