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**The Association between Sibling Warmth and Conflict and Adolescent Aggressive
Behavior, Moderated by Gender**

Master's thesis

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Master's program in Clinical Child, Family, and Education Studies

P.J.M. Heijmans (8087725)

UU-ser #23-2184

First assessor: Kirsten Buist

Second assessor: Ellen Reitz

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Foreword

I proudly present my master's thesis, 'The Relationship between Sibling Warmth and Conflict and Adolescent Aggressive Behavior, Moderated by Gender'. This thesis is a part of the master's program in Clinical Childs, Family, and Education Studies at Utrecht University. From September 2023 to February 2024, I have been researching and writing my thesis. When deciding on the topic for my thesis, this issue immediately caught my attention. I was very excited to research the qualities of siblings because I am likely to encounter this topic often in my work. The literature review sparked my interest in investigating the relationship between sibling warmth, sibling conflict, and aggressive adolescent behavior, and whether gender may moderate this relationship.

I want to express my gratitude to my thesis supervisor, Kirsten Buist. Her expertise, flexibility, prompt email responses, and motivational feedback have been valuable. These elements have played a crucial role in improving my academic skills and shaping my research. I would also like to thank Ellen Reitz for her time and effort. With satisfaction, I can look back on the process of my master's thesis. Over the past few years, I have learned much about children and family dynamics. I look forward to putting this knowledge into practice in the future.

Philippa Heijmans

Utrecht, January 2024

Abstract

Aim The current study aimed to examine whether the relationship between sibling warmth and sibling conflict is associated with aggressive behavior in adolescents and whether this relationship is moderated by gender. **Method** The study contains data from a cross-sectional study. Questionnaires data was collected from 521 adolescents ($M= 14.6$ years) who identified themselves as a boy (48%) or girl (50.3%), with at least one sibling ($M=15.2$ years). The age difference between adolescents and siblings was 0.6 years. The sample consisted of brother-brother (27.8%), sister-sister (22.3%), and mixed-gender (51%) pairs. Students from Utrecht University recruited schools through their network. After consent, students completed the questionnaires during mentoring hours, under the guidance of UU students. A Pearson correlation analysis and a PROCESS analysis were conducted to answer the research questions. **Results** The analysis revealed that sibling conflict corresponds significantly with aggressive behavior. Robust effects are found in the relationship between sibling warmth and aggressive behavior in adolescents. The results of a moderation analysis show that the interaction effect is not significant. **Conclusion** In summary, higher levels of sibling conflict are significantly associated with higher levels of aggressive behavior in adolescents. There is a literature gap, emphasizing the need for additional (longitudinal) studies. Implementing (preventive) interventions within families and among siblings, to reduce sibling conflict could serve as a protective factor against the development of aggressive behavior in adolescents. Gender may not necessarily need to be considered when implementing the interventions.

Keywords: sibling conflict, sibling warmth, aggressive behavior, adolescents, and gender.

The Relationship between Sibling Warmth and Conflict and Adolescent Aggressive Behavior, Moderated by Gender.

Sibling relationships can be an integral part of child and adolescent family life and are unique in several ways (McHale et al., 2012; Waid et al., 2020). First, in 2011, 90% of Western people had a sibling (e.g., biological, step), highlighting the widespread prevalence of this type of relationship (Milevsky, 2011). Moreover, these relationships often last a lifetime, resulting in a lifelong nature of sibling bonds (Feinberg et al., 2012; Zemp et al., 2021). Furthermore, siblings engage in daily interactions where they learn through observation. They apply these lessons in their interactions with others, leading to improved psychosocial functioning (Noller, 2005; Van der Kaap-Deeder et al., 2017). Finally, these relationships provide emotional and instrumental support, wherein adolescents' interpersonal development is fostered through both positive and negative interactions (Defoe et al., 2013; Feinberg et al., 2012). All these characteristics contribute to the sibling relationship and make research into this relationship relevant.

Sibling Relationships Quality and Aggressive Behavior in Adolescents

Various qualities, including conflict and warmth, characterize sibling relationship quality (SRQ). Sibling conflict is commonly defined as arguing, negativity, hostility, and fighting between siblings, while sibling warmth encompasses intimacy, closeness, support, and companionship (Buist et al., 2013; Buist & Vermande, 2014). The emotional nature of these relationships, combined with the significant amount of time siblings spend together and their deep familiarity creates ample opportunity for them to exhibit hostility, aggression, and warmth toward each other (Tucker et al., 2012). Together, these essential qualities shape the dynamics of sibling relationships and influence sibling experiences and behaviors (Whiteman et al., 2011). A comprehensive understanding of the dynamics of SRQ and its potential association with aggression is especially critical during adolescence, a developmental stage characterized by sensation-seeking and experimental behaviors (Del Carmen Pérez Fuentes et al., 2016).

Sibling Conflict and Aggressive Behavior in Adolescents

In the context of family relationships, sibling conflict is most frequently observed and is often characterized by its intensity (Kennedy & Kramer, 2008). As children transition from childhood to adolescence, the frequency of these conflicts may decrease, but the emotional intensity remains significant (Bailen et al., 2018; Dirks et al., 2015). These conflicts are often

marked by destructive interaction patterns that can lead to negative outcomes (Dirks et al., 2015). Adolescents encounter various conflict themes during this stage, including disputes over the fairness of household resource distribution (e.g., computer use) and boundary intrusion into a personal domain (e.g., teasing and interacting with friends) (Campione-Barr & Smetana, 2010).

The social learning theory, proposed by Bandura (1978), provides insights into how sibling interactions influence problem behavior. According to this theory, adolescents may learn negative behavior by observing the hostile behavior of fighting with their siblings and generalize these negative behaviors to other contexts (Button & Gealt, 2009). Moreover, sibling relationships are described as a training ground for aggressive interactions, increasing the risk of externalizing problem behavior (Slomkowski et al., 2001).

A meta-analysis by Buist et al. (2013) examined the association between SRQ and externalizing problems, including aggressive behavior. This comprehensive analysis, containing both longitudinal and cross-sectional studies, revealed a significant association between higher levels of sibling conflict and higher levels of externalizing problems, such as aggressive behavior. Similarly, a two-wave longitudinal study involving 390 sibling pairs, suggested that aversive behavioral interactions between siblings may contribute to the development of generalized externalizing problems (Natsuaki et al., 2009). These findings show a positive association between sibling conflict and aggressive behavior in adolescents.

Sibling Warmth and Aggressive Behavior in Adolescents

Sibling relationships are also characterized by positive qualities such as warmth, affection, and support, especially during adolescence (Campione-Barr & Killoren, 2010). Sibling warmth is considered a key predictor of how siblings interact, and it remains relatively stable from middle childhood through adolescence (Campione-Barr & Killoren, 2010; Tucker et al., 2012). To better understand the association between sibling warmth and its possible influence on aggressive behavior in adolescents, the attachment theory can be considered (Bowlby, 1979). According to this theory, adolescents with insecure attachment to siblings are more likely to view themselves as unworthy of love, possibly leading to depression, anxiety, and a perception of the world as untrustworthy (Fraley & Tancredy, 2012). These emotional outcomes can, in turn, contribute to delinquent and aggressive behaviors (Bowlby, 1979; Buist et al., 2013).

Previous studies have provided mixed findings regarding the association between sibling warmth and aggressive behavior in adolescents. The previously mentioned meta-analysis by Buist et al. (2013) found a significant association between higher levels of sibling warmth and lower levels of externalizing problem behavior, including aggression. This is consistent with the longitudinal study of Updegraff et al. (2005), which found that lower levels of warmth among siblings were associated with a higher frequency of relational aggression between siblings. In addition, Buist et al. (2014) examined patterns of SRQ and their associations with externalizing problem behaviors in childhood. Although this research has a specific focus on children, it remains relevant to this study. The results show that children with sibling warmth reported lower levels of aggression and higher social competence than children with conflictual sibling relationships (Buist et al., 2014). Together, these studies suggest that higher levels of sibling warmth are associated with less aggressive behavior in adolescents.

Gender as Moderator

To further explore the dynamics of sibling relationships and their influence on adolescent aggressive behavior, it seems fruitful to examine gender as a moderator because there is evidence of gender differences in SRQ and in aggressive behavior. First, this study looks at gender differences in SRQ. A study by Kim et al. (2006) found adolescent females report more intimate relationships with siblings than males. These gender differences are explained by the fact that women have more vital needs for interpersonal closeness and intimacy and are more focused on social relationships in general (Buist et al., 2014). Conversely, boys experience more conflict with their siblings and are more likely to use destructive strategies to resolve conflicts, such as physical aggression (Borairi et al., 2022).

Second, gender differences in aggressive behavior during adolescence are examined. Although girls exhibit externalizing behavior, their aggression may be less overt compared to boys (Ara, 2016). A study by Aguilar et al. (2001) found that boys exhibit more aggressive behavior in sibling relationships, this is due to higher vulnerability, exposure to risk, and social encouragement to resist dependency (Buist et al., 2014; Ribeaud & Eisner, 2010).

Little research has examined gender as a moderator in the association between SRQ and aggressive behavior in adolescents. A meta-analysis conducted by Buist et al. (2013) showed that gender does not moderate the association between SRQ and externalizing problem behavior. However, it is important to point out the limitations of this analysis in finding

gender differences. This is because the findings were based on study-level gender differences, suggesting no gender differences, but they did not test them statistically (Buist et al., 2013).

Current Research

In summary, more research is needed to examine whether the association between SRQ and aggression in adolescents is the same for boys and girls. Sibling relationships have received less attention in the literature than other relationships (e.g., peer relationships) (Dirks et al., 2015). As a result, the main purpose of this study is to investigate whether sibling warmth and sibling conflict are associated with aggressive behavior among adolescents and if this relationship is moderated by gender.

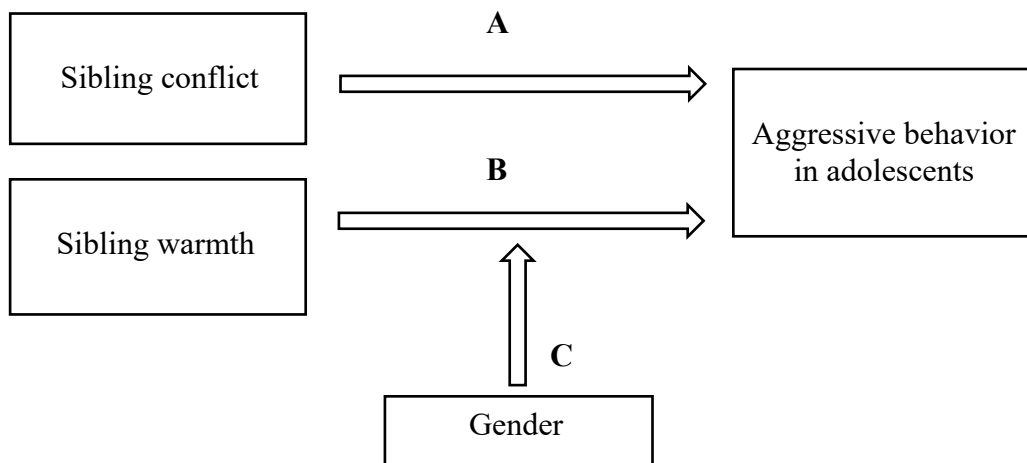
Based on earlier work, we expect that sibling conflict is positively associated with aggressive behavior in adolescents (Buist et al., 2013; Button & Gealt, 2009; Natsuaki et al., 2009) (path A in Figure 1). Furthermore, sibling warmth is expected to be negatively associated with aggressive behavior in adolescents (Bowlby, 1979; Buist et al., 2013; Buist et al., 2014; Updegraff et al., 2005) (path B in Figure 1).

Given the inconsistent findings in the existing literature and the lack of research on gender as a moderator in the association between sibling conflict and aggressive behavior in adolescents, this study approaches this hypothesis exploratively (Aguilar et al., 2001; Ara, 2016; Borairi et al., 2022; Buist et al., 2013). Additionally, this study will explore the hypothesis about gender as a moderator in the association between sibling warmth and aggressive behavior in adolescents also exploratively (Buist et al., 2013; Buist et al., 2014; Kim et al., 2006) (path C in Figure 1). The conceptual model of the current study is shown in Figure 1.

Understanding the association between siblings and aggressive behavior in adolescents, considering gender dynamics, has scientific value for increasing knowledge and practical implications for families, educators, and therapists. These findings may contribute to tailored interventions (e.g., focused on gender), potentially making them more effective in addressing aggressive behavior in adolescents.

Figure 1

Conceptual model moderation analysis



Method

Participants

The sample consisted of 560 high school students, ranging in age from 12 to 19 years, with a mean age of 14.6 years ($SD= 1.07$). We restricted the sample to adolescents with at least one sibling ($N = 521$). This sample's mean age was 14.6 years ($SD= 1.07$). Of them, 250 identified themselves as boys (48%), 262 as girls (50.3%), and 1.8% chose not to respond or indicated “other”. The mean age of the siblings was 15.2 years ($SD= 4.27$), with an average age difference of 0.6 years between the adolescents and their siblings. The sample included both younger ($N= 227$) and older siblings ($N= 293$) and consisted of various gender combinations, including brother-brother (27.8%), sister-sister (22.3%), and mixed gender (51%) sibling combinations. More details concerning the characteristics of the sample are provided in Table 1.

The data collection process was conducted across grades 1 through 6, encompassing a diverse representation of the secondary schools. This diverse inclusion includes nearly all levels of education within the sample (VMBO, HAVO, VWO, and Gymnasium), providing a comprehensive view of adolescent experiences across different educational stages. Furthermore, the sample mainly consisted of Dutch adolescents (82.7%), with smaller proportions of other ethnicities including Turks (6.5%), Surinamese (8.4%), Antilleans (4.4%), Moroccans (10.6%), and others (13.6%).

Table 1

Demographic Characteristics of the Sample (N=521)

Data	N	M (SD)
Age	520	14.62 (1.07)
Age siblings	518	15.21 (4.27)
Data	N	%
Gender		
Girl	262	50.3
Boy	250	48
No response/ other	9	1.8
Sibling		
Younger sisters	99	19.0
Older sisters	123	23.6
Younger brothers	128	24.6
Older brothers	170	32.6
Gender combination		
Brother – Brother	156	27.8
Brother – Sister	94	16.8
Sister – Brother	136	24.2
Sister – Sister	125	22.3
Grade		
1e	9	1.7
2e	134	25.7
3e	293	56.2
4e	45	8.6
5e	32	6.1
6e	8	1.5

Procedure

The research concerns a cross-sectional study, where quantitative data was collected through online questionnaires covering various aspects of psychosocial functioning and detailed their relationship with one sibling, their father, and their mother. This research

project was approved by the Faculty Ethics Committee of Utrecht University (FETC 20-517). Seven secondary schools providing education at all levels agreed to participate in this research project. Utrecht University students recruited schools through their network. The participating schools informed the adolescents who, in turn, could actively agree to take part in the study. In addition, the parents of the adolescent also received a letter with information about the study and could refuse the participation of their child by sending an email to the school. Administration of the questionnaires occurred mainly during mentoring hours, guided by UU students. Due to COVID-19 restrictions, some participants completed the questionnaires at home. Questionnaires were completed anonymously, and participants retained the right to withdraw from the study at any point.

Measuring Instruments

Relationship Qualities; Conflict and Warmth

To assess SRQ, the Sibling Relationship Questionnaire-Short version (SRQ-S; Buhrmester & Furman, 1990) was used. This instrument has two subscales: Conflict and Warmth/ Closeness. The Conflict scale consists of 6 items, an example item being “How often do you and this brother/sister disagree and argue?”. Furthermore, the Warmth/ Closeness scale includes 15 items, with a sample item being “How much do you and this brother/sister care about each other?”. These items were measured on a 5-point Likert scale, where students had to indicate whether they agreed with the statement 1=*barely*, 2=*not very much*, 3=*a little*, 4=*a lot*, or 5=*extremely much*. An overall scale score of warmth and conflict was created by averaging the appropriate items. Higher scores on the Warmth/Closeness scale indicate more sibling warmth, while higher scores on the Conflict scale indicate more conflict between siblings. The SRQ-S was found to be a reliable and valid measure of the quality of sibling relationships (Buhrmester & Furman, 1990; Derkman et al., 2010). In this study, the reliability of both subscales was sufficient (conflict $\alpha = .91$. and warmth $\alpha = .92$).

Aggressive Behavior

To gain insight into aggressive behavior, adolescents completed the Aggressive Behavior Scale of the Youth Self Report (YSR; Achenbach, 1991). The Aggressive Behavior scale includes 19 items, with sample items such as “I argue a lot”, “I fight a lot”, and “I have a quick temper”. Participants rated each item on a 3-point scale, where they could choose from 1=*not at all applicable*, 2=*somewhat*, or 3=*sometimes applicable, clearly, or often applicable*. A total scale score was created by averaging the nineteen items. Scores for each

response were averaged, with higher total scores indicating heightened aggressive behavior. The YSR has been established as a reliable measure for assessing adolescent behavior (Petot et al., 2022). In this study, the reliability of the aggressive behavior scale was sufficient ($\alpha = .85$).

Gender

Adolescents were prompted to specify their gender (boy, girl, no answer, or other). For the present study, we will focus on adolescents identifying as boys or girls. The original variable was coded as 1 for males and 2 for females. We created a dummy variable gender to include in the analysis (0= male, 1=female).

Plan of Analysis

Data analysis will be performed using SPSS version 29.0. Warmth and conflict are the two independent variables, aggressive behavior is the dependent variable, and gender is a possible moderator. All variables were measured at the interval level except gender, which is measured at the nominal level. Correlation analysis will assess associations between sibling warmth, conflict, and aggressive behavior. The extent to which this association is moderated by gender is then tested, using PROCESS-macro analysis.

Results

Before conducting the analyses, the Pearson correlation and moderation analysis assumptions were checked. The assumptions controlled for the Pearson Correlation are scale (interval or ratio), normal distribution, linearity, and homoscedasticity. The variables used for this analysis are all at the interval level. Homoscedasticity is checked by creating a scatterplot, where the values have the shape of a cloud. The residuals are not normally distributed, violating the assumption of homoscedasticity. However, further steps can be taken in the analysis because the sample size exceeds thirty (Field & Wilcox, 2017). Finally, a scatterplot is used to check the assumption of linearity. Linearity is assumed (Field, 2018).

The assumptions of a moderation analysis are largely the same as those of the multiple regression. It also examines whether there is no multicollinearity. This assumption is met because the VIF is less than 5. Finally, the independence of errors is examined, where errors are independent of each other, meaning that the errors in one observation do not depend on the errors in other observations (Field, 2018). The results of the t-test show that there are no significant gender differences in sibling conflict, sibling warmth, and aggressive behavior. Table 2 shows the standard deviations and t-scores.

Table 2

Descriptive Statistics and T-test of Sibling Conflict, Sibling Warmth, Aggressive Behavior, and Gender

Variable	Boys (N=249)		Girls (N=260)		T-test
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>
Sibling conflict	2.78	0.99	2.71	0.96	.76
Sibling warmth	3.32	0.69	3.43	0.75	-1.73
Aggressive behavior	1.34	0.31	1.37	0.28	-1.00

Results Correlation Analysis

Pearson correlations were used to investigate if there is an association between sibling conflict and warmth and aggressive behavior. First, the results for sibling conflict showed that sibling conflict was positively significantly related to aggressive behavior ($r = .30, p < .001$). Second, the results for sibling warmth showed that sibling warmth was negatively significantly associated with aggressive behavior ($r = -.16, p < .001$). This means adolescents who reported lower levels of sibling warmth and more sibling conflict exhibited more aggressive behavior. Finally, a negatively significant relationship exists between sibling warmth and sibling conflict ($r = -.14, p = .002$). This implies that adolescents who reported higher levels of sibling warmth report lower levels of conflict.

Results Moderation Analysis

A moderation analysis was then performed using PROCESS-macro analysis. This analysis examined whether gender moderates the association between sibling conflict, warmth, and aggressive behavior in adolescents. Results showed that sibling conflict and gender together explained 10.3% of the variance of aggressive behavior in adolescents ($R^2 = .103, F(3000, 497000) = 19.121, p < .001$). Table 3 shows the results of the moderation analysis.

The results, consistent with the correlation analysis, showed that sibling conflict is positively significantly associated with aggressive behavior in adolescents ($B = .080, p < .001$). Further, gender does not appear to significantly predict aggressive behavior in adolescents ($B = .032, p = .201$), meaning that like what we found in the t-test, there are no gender differences in aggressive behavior. Finally, the interaction effect between gender and sibling

conflict did not significantly predict aggressive behavior in adolescents ($B = .032, p = .215$). This means that there is no significant main effect of gender on aggressive behavior in adolescents.

Table 3

Results Moderation Analysis (N = 509)

Variable	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>LLCI</i>	<i>ULCI</i>
Constant	1.337	.018	74.805	<.001	1.301	1.372
Conflict	.080	.018	4.424	<.001	.044	.115
Gender	.032	.025	1.282	.201	-.017	.081
Gender x Conflict	.032	.026	1.241	.215	-.019	.082

Note. *B* = Unstandardized coefficient, *SE* = standard error value. The gender of respondents was dummy-coded (0=boys). *LLCCI*= Lower Limit of Confidence Interval, *ULCI*= Upper Limit of Confidence Interval

Next, we conducted a similar moderation analysis using the PROCESS-macro for sibling warmth. We examined whether gender moderates the association between sibling warmth and aggressive behavior in adolescents. Results showed that sibling warmth and gender together explained 3.1% of the variance of aggressive behavior in adolescents ($R^2 = .031, F(3000, 497000) = 5.337, p = .001$). Table 4 shows the results of the moderation analysis.

The results, unlike the correlation analysis, showed no main effect of sibling warmth on aggressive behavior ($B = -.044, p = .106$). Furthermore, there is no significant effect of gender on aggressive behavior in adolescents ($B = .034, p = .194$), which is consistent with the findings from the previous analyses. Finally, the interaction effect between gender and sibling warmth did not significantly predict aggressive behavior in adolescents ($B = -.030, p = .244$). This means that gender does not moderate the association between sibling warmth and aggressive behavior in adolescents. The association between sibling warmth and aggressive behavior is similar for girls and boys.

Table 4

Results Moderation Analysis (N = 509)

Variable	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>LLCI</i>	<i>ULCI</i>
Constant	1.337	.019	741.714	<.001	1.300	1.373
Warmth	-.044	.027	-1.621	.106	-.097	.009
Gender	.034	.026	1.301	.194	-.017	.085
Gender x Warmth	-.043	.036	-1.166	.244	-.114	.029

Note. B = standardized coefficient, SE = standard error value. The gender of respondents was dummy-coded (0=boys. LLCI= Lower Limit of Confidence Interval, ULCI= Upper Limit of Confidence Interval)

Discussion

This study aimed to explore the association between sibling conflict and sibling warmth and aggressive behavior in adolescents. Furthermore, the study examined whether gender moderates the association between sibling warmth, sibling conflict, and aggressive behavior in adolescents. First, we looked at the association between sibling conflict and aggressive behavior in adolescents. Consistent with previous findings, the results of this study show that higher levels of sibling conflict are associated with more aggressive behavior in adolescents (Buist et al., 2013; Button & Gealt, 2009; Natsuaki et al., 2009).

One possible explanation for this positive relationship is based on the concept that conflicts between siblings can influence problem behavior through social learning mechanisms. This implies that children may learn negative behavior patterns through sibling conflicts. In addition, observing sibling conflict can contribute to the generalization of negative behaviors to other contexts (Buist et al., 2014; Button & Gealt, 2009; Stauffacher & DeHart, 2006). Finally, another explanation could be that the sibling relationship is seen as a training ground for aggressive interactions. This may increase the likelihood of externalizing behavior (Slomkowski et al., 2001).

Secondly, this study looked at the relationship between sibling warmth and aggressive behavior in adolescents. The correlation analysis showed that sibling warmth was negatively associated with aggressive behavior, aligning with the expectation (Bowlby, 1979; Buist et al., 2013; Buist et al., 2014; Updegraff et al., 2005). However, the PROCESS analysis just found no significant association between sibling warmth and aggressive behavior, when

considering the confidence intervals. Thus, although there is partial support for the hypothesis, more research is needed to fully understand this association.

An explanation may be that through positive attachment experiences, children and adolescents learn positive strategies for regulating and controlling their emotions. As children and adolescents grow in their emotion regulation, the risk of developing aggressive behavior decreases (DeKlyen & Greenberg, 2008).

The association between SRQ and aggressive behavior in adolescents was stronger for conflict than for warmth. A possible explanation for this may be that conflict in sibling relationships can cause psychological reactions such as anger and frustration, which in turn can lead to aggressive behavior (Dirks et al., 2015). These emotional reactions may be stronger in conflict than in warm interactions.

Thirdly, this study examined gender as a moderator in the association between sibling conflict and aggressive behavior, as well as the association between sibling warmth and aggressive behavior in adolescents. The interaction effects between gender and both sibling conflict and warmth did not significantly predict aggressive behavior in adolescents. This suggests that the association between sibling conflict and sibling warmth and aggressive behavior is consistent across genders. This is consistent with the results of the meta-analysis by Buist et al. (2013), which suggest that gender does not play a moderating role in the association between SRQ and externalizing problems.

One explanation for the lack of gender as a moderator in the relationship between SRQ and aggressive behavior in adolescents could be that sibling interactions are the same for everyone. Family dynamics, age dynamics within the sibling group, and shared experiences collectively shape sibling interactions (McHale et al., 2012; Whiteman et al., 2011), potentially overshadowing gender-specific effects. Therefore, these shared influences could outweigh individual differences between genders, highlighting the importance of shared family experiences over gender differences in influencing the relationship between sibling dynamics and aggressive behavior in adolescents.

Although gender does not play a role as a moderator in this study, other potential moderators or mediators may contribute to a better understanding of the association between SRQ and aggressive behavior in adolescents. Examining these factors may shed light on the underlying dynamics. For example, emotion regulation may serve as a mediator between sibling warmth and aggressive behavior in adolescents (Kennedy & Kramer, 2008). Positive

sibling relationships have been associated with effective emotion regulation, which is a protective factor against externalizing problems. Future research on this mediator is recommended.

Limitations, Strengths, and Future Research

The study has several limitations. Firstly, the current study was cross-sectional, collecting data at one point. Given that aggressive behavior in adolescents changes with age (Piquero et al., 2012; Voulgaridou & Kokkinos, 2015), it may be necessary to collect data at multiple time points to document developmental changes more comprehensively. Future research should consider longitudinal studies to better understand the dynamics over time.

Secondly, this study only examines the direction of SRQ on the development of aggressive behavior in adolescents. However, it does not look in the other direction, namely, what is the role of aggressive behavior in the escalation of SRQ over time (Campiono-Barr et al., 2012). It is noteworthy that childhood temperament in younger siblings predicts increased negativity in sibling relationships during early adolescence (Dirks et al., 2015). Future research should explore the bidirectional association between aggressive behavior in adolescents and sibling conflict dynamics.

Thirdly, aggressive behavior is addressed as a broad concept, with no distinction between different forms of aggression, such as reactive and proactive. Reactive aggression involves emotionally and impulsively charged responses to perceived threats, while proactive aggression involves purposeful and organized aggressive behavior (Euler et al., 2017; Moore et al., 2019). Specifying the concept of aggressive behavior according to existing literature facilitates comparison and integration of research findings. This increases the understanding of underlying mechanisms and risk factors, allowing interventions tailored to the needs of individuals with different types of aggressive behavior.

Fourthly, in this study, there is a risk of social desirability bias when using self-reported data from instruments such as SRQ and YSR. Participants might conform to social norms rather than report their experiences accurately. While the SRQ and YSR are valuable and valid instruments, it is crucial to recognize the inherent bias of self-reporting. Despite this limitation, the study included the SRQ and YSR questionnaires given their reliability.

However, there are also some strengths to be noted. First, this study is characterized by significant diversity within the sample regarding school levels and the distribution between boys and girls. This diversity contributes to the external validity of our findings and improves

the generality of the results across different gender groups and educational contexts. Moreover, this study uses a large sample size of 521 adolescents. A large sample increases the statistical power of the analysis, meaning that the findings are more reliable and generalizable. Furthermore, this study is one of the first to look at the association between SRQ and aggressive behavior in adolescents and whether this association is moderated by gender.

Conclusion and Implications of Findings

This study found no significant difference between boys and girls in the association between SRQ and aggressive behavior in adolescents. This is an important finding, suggesting that separate interventions for boys and girls may not be necessary. Despite the absence of a moderating effect, publishing these data is important. Non-significant results offer insights that prevent researchers from repeatedly conducting the same studies (Nair, 2019).

Furthermore, the focus is on sibling conflict, as the effect of sibling warmth on aggressive behavior was not robust. Current research does show that sibling conflict has a significant association with aggressive behavior in adolescents. Therefore, (preventive) interventions may focus on reducing sibling conflict. Interventions for parents can focus on training mediation techniques to then use during conflicts between siblings to indirectly improve children's social skills (Tucker & Finkelhor, 2015). Interventions for children can focus on directly improving children's social skills during sibling interactions, such as problem-solving and conflict management (Kennedy & Kramer, 2008; Tucker & Finkelhor, 2015).

Finally, the sibling relationship needs more attention in research and practice, while the current study suggests that the sibling relationship contributes to improving adolescent functioning (Defoe et al., 2013; Feinberg et al., 2012).

References

- Achenbach, T.M. (1991). *Manual for the Youth Self-Report and 1991 profile*. Burlington: University of Vermont, Department of Psychiatry.
- Aguilar, B., O'Brien, K.M., August, G. J., Aoun, S. L., & Hektner, J. M. (2001). Relationship quality of aggressive children and their siblings: A multiinformant, multimeasure investigation. *Journal of Abnormal Child Psychology*, 29(6), 479–489.
<https://doi.org/10.1023/a:1012273024211>
- Ara, E. (2016). Internalizing and externalizing problems in adolescents analyzing the gender difference. *International Journal of Research in Social Sciences*, 6(1), 328–337.
<https://www.indianjournals.com/ijor.aspx?target=ijor:ijrss&volume=6&issue=1&article=020>
- Bailen, N. H., Green, L. M., & Thompson, R. J. (2018). Understanding emotion in adolescents: A review of emotional frequency, intensity, instability, and clarity. *Emotion Review*, 11(1), 63–73. <https://doi.org/10.1177/1754073918768878>
- Baker, L. A., Raine, A., Liu, J., & Jacobson, K. C. (2008). Differential genetic and environmental influences on reactive and proactive aggression in children. *Journal of Abnormal Child Psychology*, 36(8), 1265–1278. <https://doi.org/10.1007/s10802-008-9249-1>
- Bandura, A. (1978). Social learning theory. *Contemporary Sociology*, 7(1), 84.
<https://doi.org/10.2307/2065952>
- Borairi, S., Plamondon, A., Rodrigues, M., Sokolovic, N., Perlman, M., & Jenkins, J.M. (2022). Do siblings influence one another? Unpacking processes that occur during sibling conflict. *Child Development*, 94(1), 110-125.
<https://doi.org/10.1111/cdev.13842>
- Bowlby, J. (1979). The Bowlby-Ainsworth attachment theory. *Behavioral and Brain Sciences*, 2(4), 637–638. <https://doi.org/10.1017/s0140525x00064955>
- Buhrmester, D., & Furman, W. (1990). Perceptions of sibling relationships during middle childhood and adolescence. *Child Development*, 61(5), 1387–1398.
<https://doi.org/10.1111/j.1467-8624.1990.tb02869.x>
- Buist, K. L., Deković, M., & Prinzie, P. (2013). Sibling relationship quality and psychopathology of children and adolescents: A meta-analysis. *Clinical Psychology Review*, 33(1), 97–106. <https://doi.org/10.1016/j.cpr.2012.10.007>

- Buist, K. L., Paalman, C. H., Branje, S., Deković, M., Reitz, E., Verhoeven, M., Meeus, W., Koot, H. M., & Hale, W. W. (2014). Longitudinal effects of sibling relationship quality on adolescent problem behavior: A cross-ethnic comparison. *Cultural Diversity & Ethnic Minority Psychology, 20*(2), 266-275. <https://doi.org/10.1037/a0033675>
- Buist, K. L., & Vermande, M. M. (2014). Sibling relationship patterns and their associations with child competence and problem behavior. *Journal of Family Psychology, 28*(4), 529–537. <https://doi.org/10.1037/a0036990>
- Button, D. M., & Gealt, R. (2009). High risk behaviors among victims of sibling violence. *Journal of Family Violence, 25*(2), 131–140. <https://doi.org/10.1007/s10896-009-9276-x>
- Campione-Barr, N., Greer, K. B., & Kruse, A. (2012). Differential associations between domains of sibling conflict and adolescent emotional adjustment. *Child Development, 84*(3), 938–954. <https://doi.org/10.1111/cdev.12022>
- Campione-Barr, N., & Smetana, J. G. (2010). “Who said you could wear my sweater?” Adolescent siblings’ conflicts and associations with relationship quality. *Child Development, 81*(2), 464–471. <https://doi.org/10.1111/j.1467-8624.2009.01407.x>
- Caspi, J. (2011). *Sibling aggression: Assessment and treatment*. https://digitalcommons.montclair.edu/all_books/343/
- Defoe, I. N., Keijsers, L., Hawk, S. T., Branje, S., Dubas, J. S., Buist, K. L., Frijns, T., Van Aken, M. A. G., Koot, H. M., Van Lier, P., & Meeus, W. (2013). Siblings versus parents and friends: Longitudinal linkages to adolescent externalizing problems. *Journal of Child Psychology and Psychiatry, 54*(8), 881–889. <https://doi.org/10.1111/jcpp.12049>
- DeKlyen, M., & Greenberg, M. T. (2008). Attachment and psychopathology in childhood. In J. Cassidy & P. R. Shaver (Eds.). *Handbook of attachment: Theory, research, and clinical applications* (pp. 637–665). The Guilford Press.
- Del Carmen Pérez Fuentes, M., Del Mar Molero Jurado, M., Martínez, J. J. C., Rubio, I. M., & Gázquez, J. J. (2016). Sensation-Seeking and impulsivity as predictors of reactive and proactive aggression in adolescents. *Frontiers in Psychology, 7*. <https://doi.org/10.3389/fpsyg.2016.01447>

- Derkman, M. M. S., Scholte, R. H. J., Van Der Veld, W. M., & Engels, R. C. M. E. (2010). Factorial and construct validity of the sibling relationship questionnaire. *European Journal of Psychological Assessment, 26*(4), 277–283. <https://doi.org/10.1027/1015-5759/a000037>
- Dirks, M. A., Persram, R. J., Recchia, H., & 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. <https://doi.org/10.1016/j.cpr.2015.07.003>
- Euler, F., Steinlin, C., & Stadler, C. (2017). Distinct profiles of reactive and proactive aggression in adolescents: Associations with cognitive and affective empathy. *Child and Adolescent Psychiatry and Mental Health, 11*(1). <https://doi.org/10.1186/s13034-016-0141-4>
- Feinberg, M. E., Solmeyer, A. R., & McHale, S. M. (2012). The third rail of family systems: Sibling relationships, mental and behavioral health, and preventive intervention in childhood and adolescence. *Clinical Child and Family Psychology Review, 15*(1), 43–57. <https://doi.org/10.1007/s10567-011-0104-5>
- Field, A. (2018). *Discovering statistics using IBM SPSS Statistics*. SAGE Publications Ltd
- Field, A. P., & Wilcox, R. R. (2017). Robust statistical methods: A primer for clinical psychology and experimental psychopathology researchers. *Behaviour Research And Therapy, 98*, 19–38. <https://doi.org/10.1016/j.brat.2017.05.013>
- Fraley, R. C., & Tancredy, C. M. (2012). Twin and sibling attachment in a nationally representative sample. *Personality and Social Psychology Bulletin, 38*(3), 308–316. <https://doi.org/10.1177/0146167211432936>
- Kennedy, D. E., & Kramer, L. (2008). Improving emotion regulation and sibling relationship quality: The more fun with sisters and brothers' program. *Family Relations, 57*(5), 567–578. <https://doi.org/10.1111/j.1741-3729.2008.00523.x>
- Kim, J. Y., McHale, S. M., Osgood, D. W., & Crouter, A. C. (2006). Longitudinal course and family correlates of sibling relationships from childhood through adolescence. *Child Development, 77*(6), 1746–1761. <https://doi.org/10.1111/j.1467-8624.2006.00971.x>
- McHale, S. M., Updegraff, K. A., & Whiteman, S. D. (2012). Sibling relationships and influences in childhood and adolescence. *Journal of Marriage and Family, 74*(5), 913–930. <https://doi.org/10.1111/j.1741-3737.2012.01011.x>

- Milevsky, A. (2011). *Sibling relationships in childhood and adolescence: Predictors and outcomes*. Columbia University Press.
- Moore, C., Hubbard, J. A., Bookhout, M. K., & Mlawer, F. (2019). Relations between reactive and proactive aggression and daily emotions in adolescents. *Journal of Abnormal Child Psychology*, 47(9), 1495–1507. <https://doi.org/10.1007/s10802-019-00533-6>
- Nair, A. S. (2019). Publication bias - Importance of studies with negative results! *Indian Journal of Anaesthesia*, 63(6), 505. https://doi.org/10.4103/ija.ija_142_19
- Natsuaki, M. N., Ge, X., Reiss, D., & Neiderhiser, J. M. (2009). Aggressive behavior between siblings and the development of externalizing problems: Evidence from a genetically sensitive study. *Developmental Psychology*, 45(4), 1009–1018. <https://doi.org/10.1037/a0015698>
- Noller, P. (2005). Sibling relationships in adolescence: Learning and growing together. *Personal Relationships*, 12(1), 1-22. <https://doi.org/10.1111/j.1350-4126.2005.00099.x>
- Österman, K., Björkqvist, K., Lagerspetz, K., Kaukiainen, A., Landau, S.F., Frączek, A., & Caprara, G. V. (1998). Cross-cultural evidence of female indirect aggression. *Aggressive behavior*, 24(1), 1-8. [https://doi.org/10.1002/\(sici\)1098-2337\(1998\)24:1](https://doi.org/10.1002/(sici)1098-2337(1998)24:1)
- Petot, D., Petot, J., & Chahed, M. (2022). Is the Youth Self-Report total score a reliable measure of both a general factor of psychopathology and Achenbach's eight syndromes? a cross-cultural study. *Journal of Psychopathology and Behavioral Assessment*, 45(1), 58–74. <https://doi.org/10.1007/s10862-022-10004-w>
- Piquero, A. R., Carriaga, M. L., Diamond, B., Kazemian, L., & Farrington, D. P. (2012). Stability in aggression revisited. *Aggression and Violent Behavior*, 17(4), 365–372. <https://doi.org/10.1016/j.avb.2012.04.001>
- Rende, R., Slomkowski, C., Lloyd-Richardson, E. E., & Niaura, R. (2005). Sibling effects on substance use in adolescence: social contagion and genetic relatedness. *Journal of Family Psychology*, 19(4), 611–618. <https://doi.org/10.1037/0893-3200.19.4.611>
- Ribeaud, D., & Eisner, M. (2010). Risk factors for aggression in pre-adolescence: risk domains, cumulative risk, and gender differences - Results from a prospective longitudinal study in a multi-ethnic urban sample. *European Journal of Criminology*, 7(6), 460–498. <https://doi.org/10.1177/1477370810378116>

- Slomkowski, C., Rende, R., Conger, K. J., Simons, R. L., & Conger, R. D. (2001). Sisters, brothers, and delinquency: Evaluating social influence during early and middle Adolescence. *Child Development, 72*(1), 271–283. <https://doi.org/10.1111/1467-8624.00278>
- Stormshak, E. A., Bullock, B. M., & Falkenstein, C. A. (2009). Harnessing the power of sibling relationships as a tool for optimizing social-emotional development. *New Directions for Child and Adolescent Development, 2009*(126), 61–77. <https://doi.org/10.1002/cd.257>
- Stauffacher, K., & DeHart, G. (2006). Crossing social contexts: relational aggression between siblings and friends during early and middle childhood. *Journal of Applied Developmental Psychology, 27*(3), 228–240. <https://doi.org/10.1016/j.appdev.2006.02.004>
- Tucker, C. J., Cox, G. R., Sharp, E. H., Van Gundy, K. T., Rebellon, C. J., & Stracuzzi, N. F. (2012). Sibling proactive and reactive aggression in adolescence. *Journal of Family Violence, 28*(3), 299–310. <https://doi.org/10.1007/s10896-012-9483-8>
- Tucker, C. J., & Finkelhor, D. (2015). The state of interventions for sibling conflict and aggression: A systematic review. *Trauma, Violence, & Abuse, 18*(4), 396–406. <https://doi.org/10.1177/1524838015622438>
- Updegraff, K. A., Thayer, S. M., Whiteman, S. D., Denning, D. J., & McHale, S. M. (2005). Relational aggression in adolescents' sibling relationships: Links to sibling and parent-adolescent relationship quality. *Family Relations, 54*(3), 373–385. <https://doi.org/10.1111/j.1741-3729.2005.00324.x>
- Van Der Kaap-Deeder, J., Vansteenkiste, M., Soenens, B., & Mabbe, E. (2017). Children's daily well-being: The role of mothers', teachers', and siblings' autonomy support and psychological control. *Developmental Psychology, 53*(2), 237–251. <https://doi.org/10.1037/dev0000218>
- Voulgaridou, I., & Kokkinos, C. M. (2015). Relational aggression in adolescents: A review of theoretical and empirical research. *Aggression and Violent Behavior, 23*, 87–97. <https://doi.org/10.1016/j.avb.2015.05.006>
- Waid, J., Tanana, M., Vanderloo, M. J., Voit, R., & Kothari, B. H. (2020). The role of siblings in the development of externalizing behaviors during childhood and adolescence: A

scoping review. *Journal of Family Social Work*, 23(4), 318–337.

<https://doi.org/10.1080/10522158.2020.1799893>

Whiteman, S. D., McHale, S. M., & Soli, A. R. (2011). Theoretical perspectives on sibling relationships. *Journal of Family Theory and Review* 3(2), 124–139.

<https://doi.org/10.1111/j.1756-2589.2011.00087.x>

Zemp, M., Friendrich, A., Schirl, J., Dantchev, S., Voracek, M., & Tran, U. S. (2021). A systematic review and meta-analysis of the associations between interparental and sibling relationships: Positive or negative? *PLOS ONE*, 16(9), e0257874.

<https://doi.org/10.1371/journal.pone.0257874>