Peer Aggression and Teacher-Student Relationship Quality: A Meta-Analytic Investigation

Amanda Krause

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Faculty of Education

University of Ottawa

Abstract

The relationship between teachers and students plays a critical role in the psychosocial development of children and youth. Bronfrenbrenner's (2006) bioecological model of development and Bowlby's (1969) attachment theory have been used to understand both the negative effects of peer aggression and the positive potential of social contexts to prevent harms related to aggression among students. Literature shows that teacher-student relationships that are characterized by higher levels of closeness and support are linked to decreases in bullying behaviour and victimization, whereas increased conflict and less support in teacher-student relationships have been found to result in increased bullying perpetration and victimization among students. While the literature suggests trends regarding the association between teacher-student relationship quality and peer aggression prevalence, there remains limited understanding as to the size and direction of the effect. The present meta-analysis synthesizes a substantial body of research examining the association between teacher-student relationship quality and peer aggression in school. A systematic search was conducted using literature from PsycINFO, ERIC, Education Source, and ProQuest (theses and dissertations). Quantitative cross-sectional and longitudinal studies that measured the association between teacher-student relationship quality (i.e., in terms of closeness and conflict) and peer aggression (i.e., perpetration and victimization) were included in the analysis. Additionally, grade level, informant, and scale quality were included as moderators in the analysis to determine their effect on the relation between teacher-student relationship quality and peer aggression. This meta-analysis advances our understanding of the role of teacher-student relationship quality in peer interactions at school, and the results can inform bullying prevention programs by providing insight as to where to allocate resources and energy.

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Table of Contents

List of Tables

List of Figures

Peer Aggression and Teacher-Student Relationship Quality: A Meta-Analytic Investigation

Statement of Research

Bullying is a global public health problem that is pervasive in children's peer networks. Several decades of research has shown conclusively that bullying has many deleterious consequences, such as internalizing symptoms (e.g., depression) and externalizing behaviours (e.g., delinquency) (Ttofi & Farrington, 2008). Bronfrenbrenner's (2006) bioecological model of development, which posits that the developing child is situated within a set of five nested systems that make up the child's social-cultural environment, is often used in the bullying literature to explain the negative effects of bullying and the potential benefits of improved social contexts to mitigate bullying-related harms.

Working within this bioecological framework, researchers have examined the association between teacher-student relationship quality and peer aggression. Attachment theory (Bowlby, 1969), which explains children's psychosocial development in the context of caregiving relationships, has been used to explain teacher-student relationships in terms of three characteristics: closeness, conflict, and dependency (Sabol & Pianta, 2012). Generally, findings show that relationships between teachers and students that are characterized by high levels of conflict and mutual dislike are associated with increased bullying and victimization involvement (Longobardi et al., 2018; Marengo et al., 2018). Conversely, teacher-student relationships that are characterized by high levels of closeness and warmth have been linked to decreases in student bullying behaviour, both as causal (Richard et al., 2011) and correlational findings (Troop-Gordon & Kopp, 2011). There is a paucity of research investigating the influence of teacher-student relationships characterized by high levels of dependency on student bullying involvement. However, the literature seems to indicate that students who are overly dependent

on their teacher experience greater rates of victimization (Kremer, 2010; Troop-Gordon & Kopp, 2011).

Despite the existing literature on the topic, there remains a need for additional research to explore in more depth the role of teacher-student relationships in peer aggression. The primary purpose of this Masters thesis is to evaluate the overall association between teacher-student relationship quality and peer aggression using meta-analysis. A second aim is to assess the potential moderating effects of key factors related to student demographics and study methodology, for example informant type. The implications of this research have importance for several groups of key stakeholders including: peer aggression researchers, educators, and policy makers. Specifically, the present study provides direction to the peer aggression literature by offering empirical evidence of the overall strength and direction of effects regarding teacher-student relationship quality and bullying perpetration and victimization. Certain practical implications also emerge from this meta-analytic investigation. Mainly, results from this study can inform how resources are allocated within bullying prevention programs by, for example, indicating additional training for teachers on developing closer and more supportive relationships with their students.

Literature Review

Bullying is most commonly defined as a continued exposure to negative or harmful intentional acts over time by an individual or a group, and is characterized by a power imbalance between children who bully and victimized children (Olweus, 1994). Bullying can take various forms including physical (e.g., punching, kicking), relational (e.g., spreading rumors, exclusion), and verbal (e.g., calling names, insulting). It is a global public health problem that is pervasive in children’s peer networks of all ages; however, bullying rates tend to peak in middle school

(Dinkes et al., 2009). A recent publication from the United Nations Educational, Scientific and Cultural Organization (UNESCO), synthesizes several worldwide bullying related trends (UNESCO, 2019) using self-report data from 11-17-year-old children and youth collected by the World Health Organization (WHO) and the Health Behaviour in School-aged children (HBSC) Consortium. While bullying prevalence varies substantially according to geographical region, globally, nearly one in three children and youth have experienced bullying victimization by their peers in the past month. Additionally, physical forms of bullying (e.g., hitting, punching) appear to be the most commonly reported form of bullying, as indicated by data from 96 different countries. Although variability exists between geographic areas, overall, girls and boys have equal likelihood of being bullied, however, boys more often participate in more physical forms of bullying, whereas girls partake in more psychological forms of bullying (UNESCO, 2019). Taken together, peer aggression remains a wide spread problem in schools across the globe.

A significant amount of literature has found associations between bullying involvement and numerous deleterious effects. A review by Ttofi and Farrington (2008) outlines several negative consequences linked to bullying victimization and perpetration. Specifically, both children who bully and victims of bullying experience greater levels of depression and suicidal ideation (Kaltiala-Heino et al., 1999). Additionally, conduct problems in childhood, such as bullying other children, have been associated with delinquency and criminal behaviour later on in life (Sourander et al., 2006). Victimized children, on the other hand, experience a wide range of lasting symptoms from being bullied. In a large-scale international study, being bullied was associated with 12 physical and psychological symptoms (Due et al., 2005). Some of these included: headaches and stomach aches, loneliness, and sleeping problems. From an academic engagement perspective, studies have found support for the relation between being bullied and

suffering diminished academic engagement and performance (e.g., Juvonen et al., 2011). Because of these negative consequences, it is vital to advance our understanding of bullying in the school context and to develop viable solutions to bullying problems in order to improve the social contexts, like classrooms and schools, that make critical contributions to positive child and youth development.

Bioecological Framework and School Climate

The bioecological model of development has been used frequently to understand the negative effects of bullying behaviour, as well as the positive potential of social contexts to mitigate, remediate, and ultimately prevent the harms that bullying causes (Bouchard & Smith, 2017; Wang et al., 2015). This theory suggests that development occurs through increasingly complex reciprocal interactions between the developing child and the social environment, described as *proximal processes* (Bronfrenbrenner & Morris, 2006). Influencing the power and direction of proximal processes are individual characteristics of the developing child, including disposition (e.g., impulsiveness), resources (e.g., knowledge), and demand characteristics (e.g., how one attracts attention). The model describes the developing child as situated within a context of several nested systems that both influence the child and can be influenced by the child through reciprocal interactions. These nested systems vary in degrees of proximity to the developing child. The *microsystem* is the most proximate to the child and includes interactions with people in the direct environment, such as parents, peers, and teachers. The *mesosystem* is the level at which individuals from different microsystems that include the child interact with each other. For example, if the child brings a friend home from school, the child's peer and parents will interact, and create a mesosystem over time. The *exosystem* (i.e., social contexts that indirectly influence the child, such as parents' workplace) and *macrosystem* (i.e., societal norms and cultural context)

are more distal to the developing child. Finally, the concept of time is applied to each of these nested systems through the chronosystem (i.e., *micro*time to *macro*time) (Bronfrenbrenner & Morris, 2006).

Peer aggression is encouraged by events and structures within these various systems and can be more effectively investigated through this systemic lens, compared to the perspective that focuses in a more limited way on the individual child. There is a significant amount of research examining the link between bullying and aspects of the microsystem, such as bullying in the family context (Holt et al., 2009). However, research has begun to examine how more distal systems within the bioecological model might influence peer aggression in the school context, for example, interactions between teachers and students and their influence on peer interactions (Hendrickx et al., 2017). As such, using the bioecological model of development as a theoretical foundation, the present study seeks to examine bullying through this wider lens, in consideration of these nested overlapping systems that influence development.

Adopting a bioecological model approach, researchers have examined the impact of the school climate on bullying in schools (Duggins et al., 2016; Lucas-Molina et al., 2015). In general, school climate is defined as the over-arching quality and character of the school as perceived by the students, teachers, administration, and staff (Cohen et al., 2009; Thapa et al., 2013). School climate can be categorized into four dimensions: safety (i.e., perception of physical and social-emotional safety), teaching and learning (i.e., expectations of students, opportunities for participation, and professional development for teachers), relationships (i.e., respect for diversity, school-community involvement, and ‘connectedness’), and institutional environment (i.e., space and materials provided, and extracurricular opportunities) (Cohen et al., 2009; Thapa et al., 2013). Although Bronfrenbrenner places the school environment within an

individual's microsystem (Tudge et al., 2009), school climate is a complex and multidimensional construct that interacts with, and is influenced by factors that span all of Bronfrenbrenner's environmental contexts (Rudasill et al., 2017). For example, discussions between a teacher and a student's parents about the student (i.e., *mesosystem*), the introduction of policies that affect school functioning by the local school board (i.e., exosystem), or the specific social-cultural context of the community that the school is situated within (i.e., *macrosystem*).

Given the above definition, a positive school climate is one where students feel as though they belong and are supported on social and academic levels by both their peers and teachers. Conversely, a negative school climate can include hostility and disrespect for both peers and teachers (Espelage et al., 2014). Cunningham (2007) investigated 517 sixth-eighth grade students' perception of bonding and attachment to their school. Overall, students who experienced low levels of bullying and victimization were most strongly bonded to their school and displayed increased prosocial behaviours towards their peers. A more recent study examining over 2000 students from various middle and high schools across the United States, found that students who experienced bullying episodes that were increasing in severity viewed school climate as mostly negative (Nickerson et al., 2014). Students who experienced bullying episodes less often – about once or twice a week – also perceived their school climate to be more negative, but to a lesser degree. Given the social-emotional and physical safety component of the school climate definition, and the findings from the above research, it appears that a particularly important association exists between school climate and peer aggression.

Teacher-Student Relationships

An important aspect of school climate that has been gaining attention with respect to peer aggression is teacher-student relationship quality (Erveståg, 2016; Huang et al., 2018;

Longobardi et al., 2018; Serdiouk et al., 2016). Teachers are in a unique position to influence their students' behaviours, both positively and negatively (Luckner & Pianta, 2011).

One explanation as to why teachers are able to influence students' behaviours, including bullying, is that students use their teachers as a social reference to inform how they should treat their peers. Findings from a recent study showed that when students perceived their teacher to like a certain student, they were more prone to like this student as well (Hendrickx et al., 2017; Hendrickx et al., 2016). This was also the case when a teacher disliked a particular student: Students were then more likely to dislike the student perceived to be disliked by the teacher. Additionally, cross-sectional research has shown that teachers have a unique influence on student bullying behaviour, above and beyond other relationships the child may have. Specifically, supportive teacher-student relationships reduced levels of school bullying over and above the influence of supportive relationships with peers and family (Murray-Harvey & Slee, 2010). Given these findings, it is clear that teachers can play an important role in the child's peer interactions, with important implications for their psychosocial development.

The teacher-student relationship scholarship is considerably large, and several theories have been used to conceptualize and quantify the types and qualities of this relationship. Several reviews have been conducted to consolidate the vast literature on the topic (Davis, 2003; Pianta et al., 2003; Wubbels & Brekelmans, 2005). Most relevant to the present study and the peer aggression literature, teacher-student relationships are most commonly described and understood from an attachment perspective.

Attachment Perspective of Teacher-Student Relationships

Bowlby's (1969) attachment theory offers a viable explanation for the nature and the quality of relationships that can exist between teachers and students. This theory describes

psychosocial development of children and youth within the framework of intimate and caregiving relationships. More specifically, children develop active models of attachment which are based on their early relationships and interactions with their parents and caregivers. When aspects such as attentiveness, sensitivity, and predictability are provided by the caregiver to the child or youth, a secure attachment is formed (Siegel & Bryson, 2020). Literature documents several positive outcomes related to attachment security including greater social and emotional competencies and improved physical health (see Ranson & Urichuk, 2008 for review of the literature). However, when these critical elements are not present in a caregiving relationship, the child or youth experiences attachment insecurity, which has links to several negative outcomes including those in the areas listed above. These models of attachment consequently extend into future relationships that the child forms with others (e.g., teachers, peers) as they age. Generally, attachment models are relatively stable from childhood into adulthood (Fraley, 2002), but research has shown that relationships with other adults (e.g., teachers) can modify pre-existing attachment models (Buyse et al., 2010).

While attachment theory is most frequently used to explain impacts of parent-child relationships on development, it has also been applied to teacher-student relationships, as research has shown that children's internal models of attachment formed with their mother or primary caregiver influence the relationships they develop with their teachers (Sabol & Pianta, 2012). However, the association between parent-child attachment style and teacher-student attachment style may weaken in older students, such as those in middle school and high school. This may be due to particular contextual changes in the school environment such as student interactions with several teachers and a growing emphasis on relationships with peers (Roeser & Galloway, 2002). Much research has investigated the impact of different types of teacher-student

relationships and their behavioural and developmental outcomes. For example, positive teacher-student relationships have been associated with improved academic performance and social skills, and reduced externalizing behaviours, such as bullying (Sabol & Pianta, 2012). Generally, teacher-student relationship quality has been measured on three distinct characteristics: closeness, conflict, and to a lesser extent, dependency (Birch & Ladd, 1997; Birch & Ladd, 1998; Bouchard & Smith, 2017; Sabol & Pianta, 2012). Measures have been developed, such as the Student-Teacher Relationship Scale (STRS; Pianta, 2001), that are used widely to determine the quality of relationships between teachers and students on these three characteristics. Positive teacher-student relationships are characterized as having high levels of closeness and low levels of conflict, whereas negative teacher-student relationships are defined as having low levels of closeness and high levels of conflict. Findings on each of these attachment characteristics is discussed below.

Conflict. Conflict between a student and teacher can take many forms and can produce several negative implications for the student, such as disengagement from the classroom, and increased externalizing behaviour (Bouchard & Smith, 2017; Longobardi et al., 2018). Conflict in teacher-student relationships is usually characterized by mutual dislike, anger, lack of support, and volatility towards the other (Bouchard & Smith, 2017; Marengo et al., 2018)

With respect to bullying, research has found that students who bully, and students who both bully and are victimized, perceived their relationship with their teachers more negatively than any other group of students, including children who are victimized and non-involved students (Wang et al., 2015). Similar results were found in a cross-sectional Italian study involving 435 sixth to eighth grade students. Results revealed that students who perceived their relationship with their teacher as more conflictual had significantly greater involvement in

bullying and pro-bullying behaviours (e.g., encouraging the bully to continue behaviour by laughing or cheering) (Longobardi et al., 2018). Marengo and colleagues (2018) also explored student-perceived levels of conflict and student involvement in bullying in a group of Italian middle school students. Differing results were found in that victimized children and children who both bully and are victimized perceived their relationship with their teacher as more conflictual compared to students not involved in any bullying behaviour. Surprisingly, children who bully did not perceive their relationships with their teacher as conflictual. This may be due in part to the fact that children who bully, in general, possess more social competencies compared to victimized children and children who both bully and are victimized. For example, children who bully often display strong social skills that allow them to successfully influence their peers and gain popularity status (Marengo et al., 2018; Vaillancourt et al., 2003).

The link between conflictual teacher-student relationships and bullying has also been established in younger children (Shin & Kim, 2008; Troop-Gordon & Kopp, 2011). Troop-Gordon and Kopp (2011) longitudinally examined fourth to fifth grade students' perceptions of their relationships with their teachers and bullying involvement and found that teacher-student relationships that were characterized by increased conflict were negatively associated with acceptance from peers and positively associated with physical and relational aggression.

Combined, studies suggest there is a positive correlation between conflictual teacher-student relationships and bullying involvement. However, it is unclear as to the extent and the direction of effects regarding conflictual teacher-student relationships and its association with peer aggression. Additional research is required to consolidate the existing literature on teacher-child relationships characterized by conflict and provide a broader understanding of the overall effect on bullying involvement.

Closeness. Teacher-student relationships that have high levels of closeness consist of adult involvement that conveys warmth, care, and support for the child (Bouchard & Smith, 2017; Sabol & Pianta, 2012). Close relationships between teachers and students have been associated with positive outcomes, including increased social competence and academic achievement, as well as lower levels of internalizing behaviour (Pianta & Stuhlman, 2004).

Several studies have explored the role of perceived closeness between teachers and students in student bullying involvement (e.g., Akiba, Shimizu, & Zhuang, 2010). In a large-scale cross-sectional study including over 18,000 middle-school students from France, findings revealed that schools who reported more positive teacher-student relationships overall also reported lower rates of both physical and relational bullying involvement (Richard et al., 2011). Similar findings have been found in younger aged children (e.g., in grades 3-5; Kremer, 2010; Troop-Gordon & Kopp, 2011). Both cross-sectional and longitudinal research shows that relationships with teachers characterized by closeness are positively associated with peer acceptance and negatively associated with relational and physical aggression and peer victimization (Kremer, 2010; Troop-Gordon & Kopp, 2011). Additionally, teacher-ratings of teacher-student relationship quality have been found to be predictive of peer-rated student aggression levels in the following academic year (Hughes, Cavell, & Jackson, 1999). Specifically, positive teacher ratings of their relationships with their students in grades 2-4 were associated with reduced rates of peer-rated aggression in the subsequent academic year (e.g., grades 4-5), even when controlling for pre-existing aggression levels.

However, it is important to note that close teacher-student relationships have not always been found to be significantly associated with student bullying involvement. In a study investigating the role of teacher-student relationship quality and its association with peer

victimization in fourth and fifth grade students, Elledge and colleagues (2016) found that close teacher-student relationships did not predict a reduction in peer victimization when student social preference (i.e., degree to which student is liked and/or disliked by their peers) was controlled. Additionally, a study completed by Pabian and Vandebosch (2016), with over 2000 early adolescent participants, did not find any significant linkages between teacher-student bonding (i.e., a sense of support and connection between teacher and student) and bullying at school. These particular studies, among others, raise questions about the strength and direction of the association between positive teacher-student relationships on bullying among students.

Social Support. Embedded within the closeness construct is the concept of social support. While several different definitions exist that seek to explicate social support, Tardy's (1985) definition has gained considerable attention. This definition explains that social support can come in many different forms, including emotional (e.g., providing comfort to someone when sad), instrumental (e.g., offering help to someone), informational (e.g., giving advice or expertise), and appraisal (e.g., providing constructive feedback). The main effect model (Cohen & Wills, 1985) effectively explains how social support of parents, teachers, and peers can help to improve a child's well-being and prevent negative and stressful experiences (e.g., being bullied). Overall, this model indicates that supportive social networks offer frequent positive experiences, create a sense of stability and predictability in one's environment, and produce a feeling of belonging and integration. In turn, the child is likely to experience more positive feelings towards themselves and others, and avoid potentially negative experiences. Measures such as the Child and Adolescent Social Support Scale (CASSS; Malecki & Demaray, 2002) have been developed and widely used, and are informed by both Tardy's (1985) theory of social support and the main effect model (Cohen & Wills, 1985). Supportive teacher student relationships have

been found to have a negative correlation with peer aggression (Meehan et al., 2003; Tanigawa, 2009). For example, findings from a study with over 10,000 Israeli students in middle school and high school indicated that rates of peer victimization were lower for students who also reported having a supportive relationship with their teacher (Marachi et al., 2007).

Dependency. Teacher-student relationships characterized by dependency incorporate high levels of student reliance and lack of self-sufficiency (i.e. neediness) (Troop-Gordon & Kopp, 2011). Previous research has found that dependency may be an important characteristic in teacher-student relationships in a variety of areas of functioning, including academic performance, attitude towards school, and involvement in school (Birch & Ladd, 1997).

Despite the existing literature investigating dependency in teacher-student relationships, not much is known about how levels of dependency in teacher-student relationships influence peer aggression specifically. Of the limited findings, a longitudinal study with fourth and fifth grade students showed that children who were overly dependent on their teachers experienced increased incidents of physical and relational bullying (Troop-Gordon & Kopp, 2011). Other cross-sectional research has also found that dependency in teacher-student relationships is positively associated with peer victimization. Kremer (2010) found that as student dependency on the teacher increased, the frequency of victimization that the student experienced also increased. Considering the influence of individual characteristics on the social environment, as posited in the Bioecological model, it may be that students who are overly dependent on their teachers are at increased risk of victimization due to changes in number of friendships they have. Specifically, Troop-Gordon and Kopp (2011) found that dependent students experienced a reduced number of friendships compared to their more independent classmates, leading them to

be at greater risk for peer victimization. However, this finding was only significant for male students.

Although some research exists that explicates the association between teacher-student dependency and student bullying involvement, additional research is needed to understand the extent to which dependency interacts with experiences of bullying and victimization in school-aged children. While it would have been interesting to investigate the specific association between teacher-student relationships characterized by dependency and peer aggression in the current meta-analysis, too few primary studies exist at this time to warrant inclusion of this construct.

Influencing Factors

Researchers have identified and evaluated a number of factors that influence experiences and measurement of both peer aggression experiences and teacher-student relationship quality (e.g., Li et al., 2012; Silva et al., 2013; Wang et al., 2015). A selection of these factors is described in more detail below.

School Level

Many researchers have investigated the influence of age in peer aggression. While bullying occurs throughout a student's academic career, previous literature seems to indicate that it decreases with age (e.g., Scheithauer et al., 2006). However, the trends are more nuanced. A review by Berger (2007) outlines several studies that found physical bullying decreases in high school, but verbal, social, and cyberbullying increase with age, with a substantial increase during middle school years (Grade 6-9) (Due et al., 2005). One explanation as to why more covert forms of bullying remain prevalent in older students is their increased social and cognitive skills,

and increasing social demands in the peer ecology lead to more relational forms of bullying perpetration and victimization (Smith et al., 1999).

Literature investigating the role of school level in perceptions of teacher-student relationships indicates that younger students tend to view their relationship with their teachers as more positive, compared to older students (Havik, 2017; Serdiouk, et al., 2016; Wang et al., 2015). It is also well-established in the literature (Lynch & Cicchetti, 1997) that as children age, their focus shifts away from relationships with adults (e.g., parents and teachers) to relationships with peers. As children develop, their need for autonomy increases and their interests shift away from those of the adults in their life (Wang et al., 2015). Additionally, students in upper grades (e.g., Grade 7 and above) often have several teachers they interact with throughout the day, rather than a single homeroom teacher. This too, may influence the observed association between peer aggression and teacher-student relationship quality. It is for these reasons that school level may play an important moderating role in the perception of teacher-student relationships, and the overall effect of these relationships on peer aggression. To account for the cognitive development and changing contextual school landscape seen as students age, school level (i.e., primary, kindergarten-grade 6, intermediate/secondary, grade 7-12) will be included as a moderator in the present analysis.

Informant

Various informants are often used in measuring student bullying-related behaviour and perception of teacher-student relationship quality (Richard et al., 2011; Runions & Shaw, 2013; Troop-Gordon & Kopp, 2011). In an effort to prevent single-source bias, studies often seek to incorporate one or more of the following informants: self-, peer-, parent-, and teacher-reports. There are limitations associated with each type of informant. For example, it is well established

that certain challenges emerge in the use of self-report measures – particularly when measuring an antisocial behaviour such as bullying. It is likely that report bias occurs here due to social desirability concerns (Volk et al., 2017). It is also known that some systematic reporting differences exist between informants when perceiving and reporting peer aggression (Demaray et al., 2013; Stockdale et al., 2002). For instance, peer reports of bullying may be compromised due to reputation concerns and relational issues independent from bullying experiences (Hymel et al., 1990; Volk et al., 2017).

Additionally, research suggests that informants may not agree, especially in regards to perceptions of teacher-student relationship quality (Hendrickx et al., 2016). For example, Li and colleagues (2012) found that teachers and first grade students' reports of teacher-student relationship quality shared little similarly, but teacher and peer reports of teacher-student relationship were more convergent. It seems possible that the association between peer aggression and teacher-student relationship quality would shift as a function of informant. Thus, informant will be included as a moderator in the present analysis to examine its affect on our two variables of interest.

Measurement

The last two decades of research on peer aggression and teacher-student relationship quality have utilized a wide array of measures. Within the bullying literature specifically, researchers must decide whether to include a definition of bullying within the questionnaire (and if so, what the definition will include) and whether to employ a single-item measure asking about the frequency of bullying involvement is sufficient (Volk et al., 2018). Literature indicates that these differences in measurement technique may influence results (Vaillancourt et al., 2010; Kowalski et al., 2014). Many of the measures used to investigate peer aggression and teacher-

student relationship quality are well-established and validated, demonstrating high degrees of validity (measures what it says it will measure) and reliability (replicability) (Kimberlin & Winterstein, 2008). For example, Pianta's (2001) Student-Teacher Relationship Scale measuring aspects of closeness, conflict, and dependency, has been used and cited widely in the teacher-student relationship scholarship. Within the bullying literature, possibly the most well known and well-established measure is Olweus' (1996) Bully/Victim Questionnaire; this measure is employed in countless peer aggression related studies.

However, despite the presence of several validated measures for both variables, many studies choose to employ newly created measures designed specifically for use within their study. Estimates of validity and reliability of these novel measures regarding peer aggression and teacher-student relationship quality is less clear when compared to other more established measures. The present study will assess the influence of measure type as a moderator, comparing well-established measures and novel measures.

Previous Meta-Analyses

Several meta-analyses have been conducted within the peer aggression literature. The majority of these bullying related meta-analytic investigations are concerned with outcomes and potential predictors of bullying involvement in various populations (e.g., Gini & Pozzoli, 2013; Kljakovic & Hunt, 2016). These meta-analyses are important contributions to the bullying literature; increasing clarity and understanding of the causes and consequences that arise from being bullied and bullying others. For example, Reijntjes and colleagues (2010) reported that experiencing peer victimization leads to subsequent increased internalizing behaviour (e.g., anxiety, withdrawal, loneliness) from their analysis of 18 studies. Additionally, Kljakovic and Hunt's (2016) 19-study meta-analysis found several predictors of bullying victimization

including previous victimization experiences, conduct and social challenges, and internalizing behaviours.

While several meta-analyses exist within the peer aggression literature, the same cannot be said for the teacher-student relationship literature, despite the growing emergence of primary research studies related to the topic. To date, there are very few meta-analytic studies investigating the association between teacher-student relationship and other variables. One study that is of considerable relevance to the current study is a meta-analysis that investigated the association between affective teacher-student relationships and student engagement and achievement (Roorda et al., 2011). Overall, the authors found that positive teacher-student relationships were associated with improved student engagement and achievement, whereas negative teacher-student relationships were associated with compromised student engagement and achievement. Additionally, a recent meta-analysis also closely related to the present study, examined the association between affective teacher-student relationships and student externalizing behaviour problems (e.g., conduct problems, hyperactivity, delinquency) (Lei et al., 2016). They found that students who experienced more conflictual relationships with their teacher also reported more externalizing behaviour problems, whereas students who had close relationships with their teachers reported fewer externalizing problems.

Although some quantitative research syntheses exist within these two bodies of literature, particularly in the peer aggression scholarship, I am not aware of an existing meta-analysis that investigates the association between teacher-student relationship quality and peer aggression specifically. Within the past two decades there has been an emergence of primary research examining the association between teacher-student relationship quality and peer aggression in various student populations worldwide. Given the growing research on the topic, there is a need

to provide an over-arching and in-depth understanding of the overall size and direction of the association between teacher-student relationship quality and peer aggression.

The Current Study

Through the wider, systemic lens of Bronfrenbrenner's Bioecological model of psychosocial development, and with a particular focus on the level of the mesosystem, the research above indicates a link between teacher-student relationship quality and peer interactions (e.g., Hendrickx et al., 2017), specifically peer aggression. Attachment theory can describe the various relationships that can develop between teachers and students. Overall, teacher-student relationships defined by high levels of conflict appear to be associated with higher levels of bullying perpetration and victimization; whereas close and supportive teacher-student relationships are linked to lower levels of student bullying involvement and increased prosocial behaviour (Marengo et al., 2018; Richard et al., 2011). Despite the existing literature on teacher-student relationships and bullying, there is a need for additional research to provide a more global understanding of the role of teacher-student relationships in bullying behaviour and bullying related outcomes among students.

The present study seeks to address these gaps in the bullying literature using meta-analysis to examine the association between teacher-student relationship quality and student bullying involvement. In synthesizing the current literature on the topic, this study will provide a clearer understanding of the overall effect and direction of effects of teacher-student relationship quality and peer aggression, which has implications not only for the bullying literature, but also for school-based bullying prevention programs.

This study will seek to address this gap in the literature by asking the following research questions:

1) Overall, what is the association between teacher-student relationship quality (close and conflictual) and peer aggression (perpetration and victimization)?
2) What is the impact of key moderating variables (i.e., school level, informant, scale quality) on the association between peer aggression and teacher-student relationship quality?

First, I predict an overall negative correlation between involvement in bullying, including bullying others and being bullied, and close teacher-student relationships and an overall positive association between involvement in peer aggression, either perpetration or victimization, and conflictual teacher-student relationships. That is, I expect students who report warm and supportive relationships with their teachers will also report lower levels of bullying perpetration and victimization, whereas students that report having more conflictual and discordant relationships with their teachers will report greater experiences of involvement in bullying others and being bullied. I expect all these associations to be bidirectional in that teacher-student relationship quality will influence students' involvement in bullying, and that students' involvement in bullying will affect the type of relationship they form with their teacher. Regarding the moderator analyses, I expect that all three moderators will produce significant effects. Specifically, for the school level moderator, I expect that there will be a stronger association between perceived peer aggression and perceived teacher-student relationship quality for younger students compared to older students. Due to limited research indicating how informant type or measure may influence the correlation between peer aggression and teacher-student relationship quality, these two analyses are exploratory in nature.

Methodology

Meta-analysis was used to synthesize the existing quantitative findings on the relationship between teacher-student relationship quality and peer aggression involvement. Meta-analysis is a powerful analytic technique for combining individual studies on a given topic, permitting the integration of large quantities of data and diverse findings to discern underlying patterns in the research literature. Additionally, because meta-analysis combines studies that include diverse populations, results are often more generalizable to the population compared to an individual study. This meta-analysis is registered with the international database PROSPERO for systematic reviews and meta-analyses (ID: CRD42020153737).

Literature Search

A systematic literature search was conducted to locate relevant literature. Studies were obtained from four online databases including: ERIC, PsycINFO, Education Source, and ProQuest (theses and dissertations). Several combinations of Medical Subject Headings (MeSH) and key words were used to locate relevant literature. These varied according to each online database. MeSH terms that were used included: relational aggression, bullying, victimization, teacher-student interactions, teacher-student relationships. Examples of key words that were used included: ‘bully*’, ‘victim*’, ‘peer harass*’, ‘relation* aggress*’, ‘teacher adj2 student adj2 relation*’, 'teacher NEAR/2 child NEAR/2 interact*' (see Appendix A for full search strategies for each database; see Appendix B for the full search strategy for PSYCInfo). Additionally, backward referencing searches (i.e., examining the references of relevant articles) and forward referencing searches (i.e., examining articles that cite the relevant literature) were utilized. A total of 960 articles were identified in our overall literature search. Once duplicates were removed, there were a total of 816 studies left in our search results. These articles were uploaded

onto a systematic review management website, Covidence, where they were prepared for inclusion screening.

Inclusion and Exclusion of Studies

First, eligibility criteria (i.e., inclusion and exclusion criteria) were established to determine the compatibility of articles with the study purpose. Basic inclusion and exclusion criteria included:

1. Student peer aggression:
    a. Study incorporates a quantitative measure of bullying and/or victimization involvement at school from at least one informant including either the student (self), teacher, and/or peer.
    b. Must have been completed within the school context.
    c. Study provided individual-level statistics.
    d. Must be a continuous measure of peer aggression (i.e., students cannot be categorized into bullying involvement groups based on their response to the measure).
2. Teacher-student relationship quality:
    a. Study incorporates a quantitative measure of perceived teacher-student relationship quality from at least one informant, which must include either the student (self), teacher, and/or peer.
    b. Must have been completed within the school context.
    c. Study provided individual-level statistics.
    d. Must be a continuous measure of teacher-student relationship quality.
3. Studies must be published in the English language.

4. Study participants were students in grades k-12 (i.e., approx. 4-5 years – 18 years of age).
5. Samples were drawn from the general school population (studies were excluded if they specifically sought participation of students with known disabilities such as ADHD and Autism Spectrum Disorder)
6. Studies reported correlation coefficient effect sizes, or sufficient statistical information in order to calculate such ESs, for peer aggression and teacher-student relationship quality.

All decisions related to the inclusion or exclusion of studies throughout the various phases of screening and coding were made through consultation between the student researcher and the thesis supervisor. Figure 1 provides a detailed illustration of the study selection process (see Figure 1 PRISMA diagram). Once studies were identified and duplicates were removed, studies were screened for possible inclusion and relevance to the present study. This screening process required a quick glace at only the study title and abstract to assess its possible relevance. Any study that appeared to meet the inclusion criteria was retained for further examination. From there, eligibility for inclusion was assessed by examining the full text of each article. This required a more thorough investigation into each article to determine whether every inclusion criteria was met, and no exclusion criteria were present.

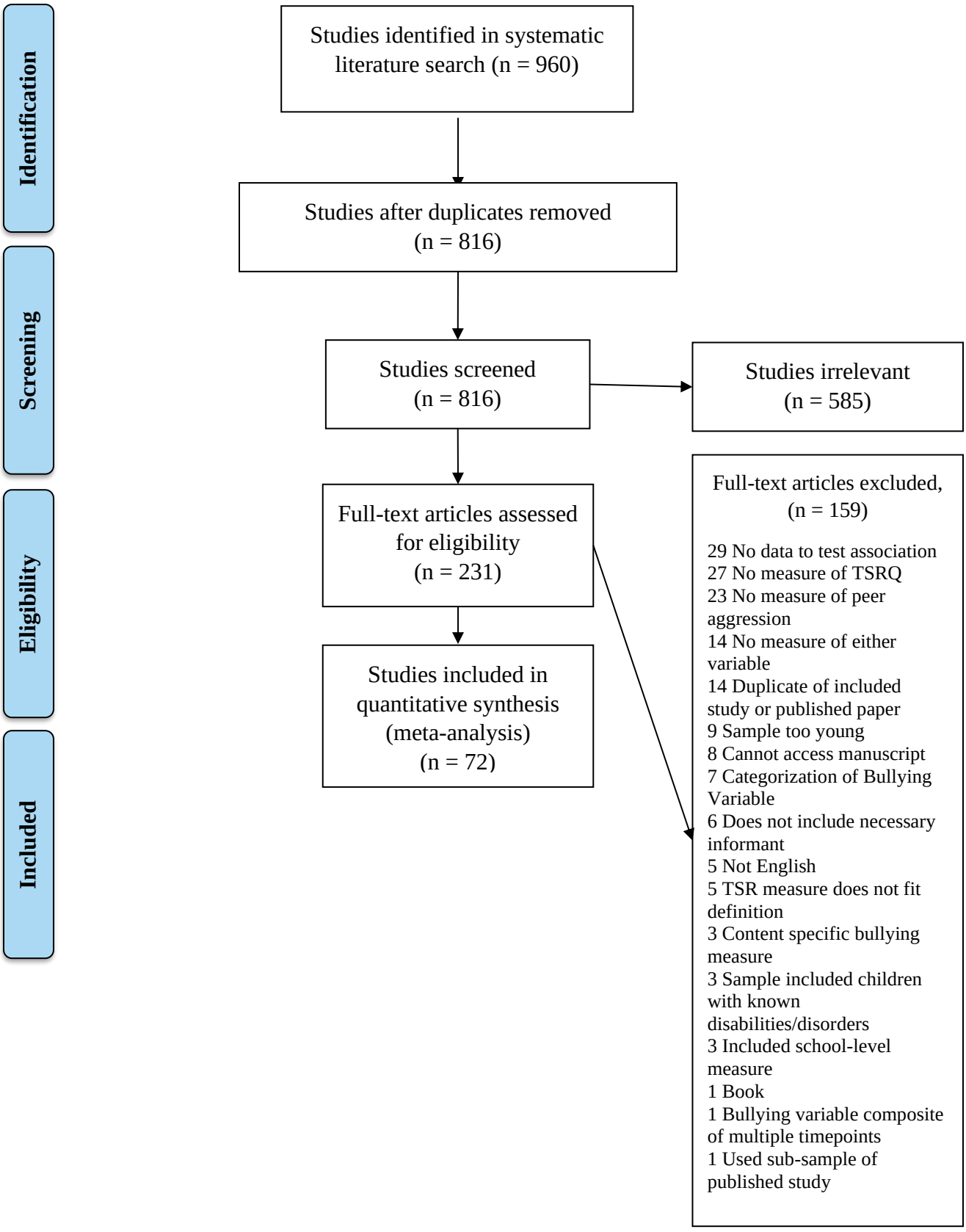
Operationalization of Key Concepts

For the purposes of this meta-analysis, I defined peer aggression to include bullying perpetration and/or peer victimization. This included various forms of perpetration and victimization including, but not limited to, physical, verbal, relational, vandalism of student property, and cyber. I also distinguished between peer aggression and other, more general, forms

of aggression, and I excluded all studies that assessed aggression not directed at peers (e.g., disruptive classroom behaviour, throwing objects). For example, a study by Ochoa and colleagues (2007) was excluded because it measured generally violent behaviour at school rather than peer aggression specifically. Additionally, the bullying literature indicates that there are several roles (e.g., pro-bullying, defender) associated with peer aggression in the school context (Salmivalli, 1999). An important role identified in this literature are bully-victims. These are students who both bully others and are bullied themselves. Due to key differences between students who both bully and are victimized and students who only bully or are purely victims of bullying, it would be necessary to examine these roles in separate analyses. Only five studies included data specifically on students who both bully others and are victimized (e.g., Conners-Burrow et al., 2009; Demanet & Van Houtte, 2011; Huang et al., 2018). Because of the limited data, I decided not to analyze the association between students who both bully and who are victimized and teacher-student relationship quality. I also excluded other bullying-related roles (e.g., pro-bullying behaviour, bystander) for the present study due to very minimal research providing data on these specific roles. Lastly, I was interested in studies that generally assessed peer-on-peer aggression, rather than more limited content-specific forms of bullying. For this reason, three studies were excluded because they assessed bias-based peer aggression only (e.g., Earnshaw et al., 2014; Özdemir & Stattin, 2014; Price et al., 2019).

Figure 1

PRISMA diagram of study selection process



Regarding teacher-student relationship quality, I define this concept as incorporating aspects of closeness, support, and conflict. Measures that assessed positive aspects of teacher-student relationships (i.e., support from teacher, trust and warmth) were included (e.g., Aceves et al., 2009; Espelage et al., 2014b). It is worth noting that support encompasses several different forms, including emotional, instrumental, informational, and appraisal (Malecki & Demaray, 2002). I also included studies with measures that assessed negative aspects of the teacher-student relationship. This included concepts such as conflict, lack of support, and unfair treatment (e.g., Doumen et al., 2008; Runions, 2014). The attachment literature also describes a dependency dimension (Sabol & Pianta, 2012) when describing characteristics of teacher-student relationships. I decided to exclude this dimension from our analysis given that only two studies (Kremer, 2010; Troop-Gordon & Kopp, 2011) contained a measure assessing this dimension. This resulted in listwise deletions and no full exclusions from the final set. Importantly, our operational definition only includes studies that measure the overall quality of teacher-student relationships. Given this definition, certain studies were excluded from our final set because they did not fit within these parameters. For example, one study was excluded because it assessed the limited construct of students' trust in teachers when the student was being victimized (Berger et al., 2019). Additionally, one study was excluded because it assessed the teacher's ability to manage the social context of the classroom (e.g., mitigating status extremes) and another for inclusion of irrelevant items (e.g., school policies) in the same measure as teacher-student relationship quality items (Higuita-Gutiérrez & Cardona-Arias, 2017). Once coding of study details and decisions around inclusion and exclusion were completed, the final set of studies numbered 72 (see Appendix C for summary of all included studies).

Coding of Study Characteristics

Table 1 (see Appendix C) lists all of the studies along with their coded characteristics that are included in the four separate meta-analyses conducted for this study. Each study was coded across five different categories including: source characteristics, sample characteristics, measurement characteristics, design characteristics, and quality assessment. The components of each category are below:

1. Source characteristics:
    a. Status of publication (published vs. unpublished)
    b. Year of publication
    c. Whether the study was funded
2. Sampling characteristics:
    a. Sample size
    b. Year of data collection
    c. Country of sample age and/or grade level
    d. School level (i.e., elementary, intermediate/secondary)
    e. Gender
    f. Ethnicity
3. Measurement characteristics:
    a. Peer aggression measure used
    b. Teacher-student relationship measure used
    c. Who administered each measure
    d. Who completed each measure
    e. At what timepoints each measure was completed (if longitudinal).
4. Study design characteristics:

   a. Cross-sectional or longitudinal
   b. If they were longitudinal, number of timepoints
5. Quality assessment (items extracted from the Quality Assessment Tool for Studies with Diverse Designs (QATSDD; Sirriyeh et al., 2012) (scored with a yes or no):
   a. Whether there was a clear description of the research setting (i.e., description of research problem in specific population)
   b. Whether there was a clear description of the data collection procedure
   c. Whether the study included a statistical assessment of reliability and validity for measurement tools

Some studies did not provide sufficient information to code for all the characteristics listed above. Cells were left blank if there was missing information.

As the student researcher, I was the first coder and coded the entire final set of studies. A second coder was recruited to code a subset of the final sample of studies. This second coder was a graduate student completing a Masters degree in education, had no knowledge of the study purpose, and was trained on how to identify and code each component of the above characteristics. They coded 16 studies (> 20%) of the final set of studies to ensure inter-rater reliability. Agreement among raters was very high, indicating 95.87% agreement. All disagreements regarding coding decisions between the two coders were resolved through discussion.

Aggregation of Effect Sizes

To ensure independence of effect sizes (i.e., a single study sample is represented only once in a meta-analysis), several measures were undertaken to aggregate and combine multiple effect sizes within studies (Card, 2011). First, I aggregated across various measures of peer

aggression and teacher-student relationship quality. For example, if a study provided three different effect sizes assessing physical, verbal, and relational bullying perpetration separately, these effect sizes were combined by calculating the average of the three effect sizes. This was required for a total of 31 studies. The average amount of variability between the combined effect sizes for bullying perpetration and teacher-student relationship closeness was .006, while the average amount of variability across the combined effect sizes for bullying perpetration and teacher-student relationship conflict was .011. Regarding bullying victimization and teacher-student relationship closeness and conflict, the average amount of variability was .008 and .006 respectively. For longitudinal studies, of which there were 18, effect sizes were combined if they corresponded with timepoints occurring within the same academic year (e.g., Timepoint 1 = fall, Timepoint 2 = spring). For longitudinal studies that included timepoints beyond one academic year, I only extracted the first timepoint. This decision was made for two reasons. First, the inclusion of multiple time points would violate this assumption of independence of effect sizes. Second, research indicates that peer aggression and teacher-student relationship quality change as students age (Archer & Cote, 2005; Havik, 2017). These developmental differences may be lost if the data were aggregated across several years. The smallest sample in the longitudinal studies (due to attrition) was chosen to compute the inverse variance weight of the aggregated effect size. Lastly, there were several studies that reported on the same sample of students. In some of these cases, two provided unique data on the same sample. For example, one study included data on victimization measures while the other reported on bullying perpetration data studies (Troop-Gordon & Kopp, 2011; Troop-Gordon & Kuntz, 2013). If this was observed, both studies with their respective data were included in the final set. Sometimes two studies reported on the same sample of students. If the data in the two studies were exactly the same, only one

study's data was included. If the data of two studies were different (likely due to the use of different measures), the effect sizes from the two studies were aggregated to maintain effect size independence.

Once all effect sizes were extracted and aggregated to ensure independence, I had a final total of 115 independent effect sizes. Of the 72 included studies, 65 (approximately 90%) were published studies, and seven (nearly 10%) were unpublished studies. Of the unpublished studies, two were Master's theses, and five were doctoral dissertations. Please refer to the reference section to see citations of all included studies. Publication dates of the included studies were spread across two decades, from 1999 to 2019. A total of 361 781 participants are represented in the present meta-analysis. As indicators of central tendency, the mean sample size within the final set was approximately 5200 participants. The median of the sample sizes of the included studies was 794. Study sample sizes ranged widely from 89 participants to 121 311 participants. It is worth noting that the United States sample from the Doty et al. (2017) study makes up about one third of the total meta-analytic sample. Results should be interpreted with this in mind.

Geographical Diversity

The final set of studies represents children and adolescents from across the globe. See Table 2 for a breakdown across countries and continents. The majority of studies were conducted in the United States of America (32), with Canada and Norway also contributing several studies to the overall set. Regarding the dispersion of studies across continents, it is clear that the majority of the meta-analytic sample (75.6%) is comprised of North American children, which can be attributed to the large number of studies from the United States. However, both European countries and Asian countries contribute substantially to the overall participant count, with fewer

participants from Australia. South America has minimal representation with only a single study from Brazil.

Table 2

Breakdown of included studies and participants by geographical region

Geographical Region	Number of Studies	Number of Participants
By Country		
Australia	4	5534
Belgium	2	2282
Brazil	1	426
Canada	6	3703
China	3	2349
France	1	18 222
Germany	1	332
Iceland	1	7084
Israel	3	13 524
Italy	2	1169
Japan	1	2970
Netherlands	1	781
New Zealand	1	1168
Norway	5	8559
South Korea	2	2984
Spain	2	2837
Sweden	1	899
Taiwan	2	10 899
Turkey	1	3742
United Kingdom	1	364
USA	32	271 953
By Continent		
North America	37	275 656
South America	1	426
Europe	18	46 271
Asia	11	32 726
Australia	6	6702

Description of Participants

Although a specific description of all the participants represented in the current meta-analysis is not possible, due to the diversity and breadth of the studies included, it is still meaningful to consolidate the overarching gender, ethnic make-up, socioeconomic status (SES), and school level information of the total sample. Regarding the gender breakdown of participants, overall, there is an equal proportion of males and females across all studies. Sixty studies (83.3%) reported nearly equal amounts (between 45-55% females) of boys and girls within their study. Three studies (4.1%) reported more males than females, and four studies (5.6%) reported more females than males. Six studies (8.3%) did not provide any information on gender for their sample.

For ethnic background, studies were coded for whether they had a homogenous sample of participants (i.e., over 80% of sample is comprised of one ethnic background) or a heterogenous sample (i.e., sample combines multiple ethnic backgrounds). Sixteen studies (22.2%) reported ethnically homogenous samples. Almost 30 studies (40.3%) reported samples that were considered heterogenous. Further investigation revealed that these heterogeneous studies were almost exclusively from the United States or Canada, with the exception of three studies; one from South Korea, one from Israel, and one from Australia. It is unsurprising that the heterogenous samples are observed in studies from the United States or Canada given that these North American countries are comprised of many immigrant groups, lending themselves to greater ethnic diversity. Twenty-eight studies (38.9%) did not report any ethnic information.

Under half (45.2%) of the studies provided socioeconomic status information about their sample. Adding to the difficulty of interpretation, there was little consistency regarding the type of measure used to examine SES. Of the limited information available, it appears that many studies recruited participants from a wide-range of socio-economic backgrounds. For example,

Thornberg et al. (2018) recruited participants that represented the overall SES make-up of the larger community, and Longobardi et al. (2018) stratified their sample by SES to capture the overall SES make-up of the surrounding area.

All school levels were represented in the current data set. Twenty-one (30.6%) studies included students at the primary school level (Kindergarten-Grade 5) only, 17 (23.6%) studies collected data only from middle school or intermediate school-aged students (Grade 6-8), and seven studies (9.7%) reported data from secondary school (Grade 9-12) participants. Several studies collected data across various school levels. Ten (13.9%) studies provided information on students in elementary and middle/intermediate school, and ten other studies (13.9%) reported on students in middle/intermediate and secondary school. Eight studies (11.1%) collected data from students across all school levels; from elementary to secondary school.

Quality Assessment

As described above, three quality assessment criteria were coded to determine the amount and specificity of information for each indicator of reporting quality. A combined score was computed for each study out of three. For example, if a study adequately described the research setting and the data collection procedure, but did not provide enough validity and reliability information about the measures, the study would receive a score of two out of three. Considering all the studies in the final set, 56 (77.8%) met all three quality assessment criteria. Fourteen studies (19.4%) met two of three quality assessment criteria, and only two studies (2.8%) met one of the criteria. Of the three quality assessment criteria, the item that was most often missing or considered inadequate was the statistical assessment of validity/reliability of study measures. It is worth noting here that the absence of this information in the reports does not necessarily equate to a low quality study. It is very possible that the authors conducted a methodologically

rigorous study but simply did not include the information in their manuscript. It is also possible that the authors used a previously validated measure and therefore did not include the validity/reliability information in their study.

Meta-Analytic Procedure

The effect size chosen for this meta-analysis is the correlation coefficient. This decision was made with several considerations in mind (Borenstein et al., 2011). First, peer aggression and teacher-student relationship quality are continuous variables by nature, lending themselves to correlational analysis. Second, I am interested in the linear associative relationship between peer aggression and teacher-student relationship quality. Lastly, the correlation coefficient is used frequently in the social sciences and is readily interpretable by journal readers.

A majority of studies (56) in our final set included a correlation matrix within their published manuscript which aided in data extraction. Several studies (20) did not include a correlation matrix. In these cases, we emailed the corresponding authors of each manuscript to request the bivariate correlations for our variables of interest (i.e., peer aggression involvement and teacher-student relationship quality). While we did receive several replies from study authors accompanied by the requested data, twelve studies remained where correlational data was not able to be obtained. Three were excluded because they did not include appropriate data to calculate a correlation coefficient. Of the remaining studies, those that included odds ratio data was transformed using the CMA software. Studies that reported a beta value (e.g., from a regression analysis), of which there were eight (e.g., Moore et al., 2018; Rigby & Bagshaw, 2003), were transformed using the method recommended by Peterson and Brown (2005). Recently, this method of transforming beta values to correlation coefficients has received some criticism (Roth et al., 2018). Despite the literature cautioning against the computation of

correlation coefficients from regression betas since this method can impart error into the data, this solution is more favourable than excluding the studies altogether (Borenstein et al. 2011). To account for this recent critique, and to mitigate potential added skewness of the effect size, a moderator analysis was conducted to compare standardized data (beta) transformed to correlation coefficients and direct estimates of Pearson *r* extracted from studies. The results of the moderator analysis suggest a significant moderating effect of data type when examining the association between bullying perpetration and teacher-student relationship closeness in that transformed standardized beta coefficients may be a more conservative estimate of the association.

Using Borenstein and colleagues (2011) suggestion, all correlation coefficients extracted from studies were first transformed using Fisher's *Z* to normally distribute each data point. The standard error of a correlation coefficient is dependent on both the sample size and the correlation itself (Borenstein et al., 2007). Using correlation coefficients as effect sizes themselves can introduce skewness into the data as larger correlations have smaller standard errors and would be considered more precise and given more weight in a meta-analysis, even though they may not actually be a more accurate measure of the association. The Fisher's *Z* transformation computes the standard error with only the sample, reducing bias among studies, particularly for those with substantially large sample sizes. Effect sizes were weighted using the inverse variance using the standard error (i.e., how the study effect size compares to the population effect size) from the study (Card, 2011). All meta-analyses were conducted with the converted data. However, effect sizes were transformed back to Pearson *r* coefficients in reporting for easier interpretation. Aligned with Cohen's (1992) recommendations for qualitatively assessing sample size values, effect sizes are interpreted as small (*r*=.10-.29),

medium (r=.30-.49), or large (r>.50). Comprehensive Meta-Analysis (CMA) Version 3 was used for computation of effect sizes and all subsequent moderator analyses (Borenstein et al., 2013).

When conducting a meta-analysis, there are typically two options regarding data analysis. The first is a fixed effects model. This model assumes that all studies included in the meta-analysis share a single common effect size (Borenstein et al., 2011; Card, 2011). This model posits that all between-study variability (evident in differences between effect sizes) is entirely due to sampling error. If each study had an infinite number of participants in the fixed effects model, all effect sizes would be identical and there would be no variation between effect sizes. Importantly, if the fixed effect model is applied, the researcher is unable to generalize the findings to studies beyond the current selection and particular care must be taken when interpreting results. Studies with larger samples are given more weight in a fixed effects model, and confidence intervals for effect sizes are smaller. Alternatively, the random effects model assumes that while the studies included in a meta-analysis are similar enough to combine and synthesize across findings, they are in no way identical to one another. In contrast to the fixed effects model, the random effects model does not assume that there is one true effect among studies. Rather, the random effects model assumes that effect sizes are normally distributed. With this model, the purpose of a meta-analysis is to find the average of these varying effect sizes. With the random effects model, variability between studies comes from both sampling error, and other factors that may influence study outcomes and vary between studies (e.g., age, country of sample). Additionally, studies are weighted more evenly. For example, a study with a very large sample will only be given marginally more weight compared to a study with a small sample. Confidence intervals for effect sizes are also larger in a random effects model. Given these considerations and recommendations from the field, I chose a random effects model for the

main analysis since I assumed that between-study variance was from both sampling error and from other factors that may contribute additional heterogeneity to the findings.

Four separate random effects model meta-analyses were run. See Table 3 for a breakdown of analyses and the total effect sizes present in each analysis. Analyses were split in this way for several reasons. First, the bullying literature routinely and reliably divides children into various roles related to bullying involvement (Yang & Salmivalli, 2013). Scholarship also documents unique outcomes related to bulling involvement for students who are victimized, and students who perpetrate against others (Ttofi & Farrington, 2008). Additionally, relevant literature indicates that the constructs of closeness and conflict regarding the teacher-student relationship should be differentiated (Davis, 2003; Sabol & Pianta, 2012), rather than thought of as two ends on the same continuum.

Table 3

Breakdown of Meta-Analyses and Total Number of Effect Sizes

	Teacher-Student Relationship Closeness	Teacher-Student Relationship Conflict
Bullying Perpetration	42	13
Bullying Victimization	48	12

Moderator Analysis Procedure

In order to explain some of the heterogeneity among study effect sizes, three categorical moderating variables (school level, informant, scale quality) were conducted to determine their effects on the relation between teacher-student relationships and peer aggression. Moderators were analyzed using an analysis analogous to an Analysis of Variance (ANOVA) to determine if

effect sizes differ significantly across different levels of the moderator. Following the recommendations from Borenstein et al. (2011), I conducted a mixed effects analysis for the moderator analyses. This means that studies within one level of a moderator (e.g., studies including elementary school sample) were combined using a random effects model, while synthesis of studies across levels of a moderator (e.g., studies with elementary school sample versus studies with intermediate/secondary school sample) utilized a fixed effects model. A mixed effects analysis was chosen because I assumed that effect sizes within one level of a moderator would still vary due to other unaccounted for factors (e.g., gender). Importantly, some moderator levels included fewer than five studies. In these cases, a fixed effects model was used to combine these effect sizes, since random effects models are only accurate when there are more than five effect sizes (Hedges & Vivea, 1998). Additionally, each moderator level must include a minimum number of effect sizes ($k \geq 3$; Borenstein et al., 2011) to allow for analysis. All moderator analyses were performed for each of the four meta-analysis.

Between-Study Variance

Heterogeneity statistics are reported with each of the individual meta-analyses. These involve the *Q* statistic and the I^2 index. Each of these values provide a different, but equally important, indicator of the heterogeneity present in each meta-analysis. The *Q* statistic is a significance test that tests the assumption of homogeneity of effect sizes (Borenstein et al., 2011). More plainly, if the value of *Q* is significant, as indicated by its relative *p* value, it can be assumed that effect sizes vary for reasons beyond sampling error, and are not merely estimates of a single common effect size. Importantly, a significant *Q* statistic indicates that the effect sizes will differ across study populations, and that sample and methodological characteristics (i.e., potential moderators) play a critical role in accurate interpretation of meta-analytic results. While

this statistic is useful in determining whether or not there is real variability in our effect sizes, it is not possible to ascertain the magnitude of heterogeneity. The I^2 index allows us to determine the amount of heterogeneity among the effect sizes (Card, 2011). Conceptually, this statistic represents the between-study variability proportionate to the overall variability. Rough estimates of the I^2 index are: ~25% is equal to small heterogeneity beyond sampling error, ~50% is representative of moderate heterogeneity outside of sampling error, and ~75%+ is considered to be large heterogeneity independent of sampling error. Specifically, if the I^2 index is close to 100%, it can be assumed that the dispersion observed among effect sizes would remain even if sampling error was accounted for (Borenstein et al., 2016).

Results

Publication Bias

Before proceeding to the results of the primary meta-analyses, it is essential to examine the possibility of publication bias in the sample of effect sizes collected for this study. In consideration of recommendations from meta-analytic experts (Borenstein, 2011; Card, 2011), two methods were used to assess publication bias in this study. The first, Rosenthal's failsafe *N* (1979), indicates the number of excluded studies, assumed to have an overall effect of zero, that would have to exist to conclude that no effect exists (Card, 2011). Guidelines suggest that Rosenthal's failsafe *N* must be equal to $5(k) + 10$ (k = number of studies) to confidently conclude that no publication bias exists. The second, Egger's linear regression (Egger et al., 1997), assesses whether or not studies were published due to statistically significant results by assessing the amount of asymmetry when studies are plotted by effect size and sample size (Card, 2011). It is assumed that there is no evidence of publication bias when $p < .05$.

For bullying perpetration and teacher-student relationship closeness, Rosenthal's failsafe-*N* was 696, indicating that there would have to be 696 missing studies with no effect for us to conclude that no effect exists, well above the suggested number of 220. Egger's linear regression was not significant ($p = .69$). Rosenthal's failsafe-*N* equaled 360 for bullying perpetration and teacher-student relationship conflict, much greater than the required 75. Egger's linear regression was not significant ($p = .19$). For peer victimization and teacher-student relationship closeness, Rosenthal's failsafe-*N* was 1120, far above the guideline of 250, and Egger's linear regression produced non-significant results ($p = .74$). Lastly, for peer victimization and teacher-student relationship conflict, Rosenthal's failsafe-*N* was above the suggested guideline of 70 at 148 studies, and Egger's test corroborated these results with non-significant results ($p = .55$). Taken together, these results suggest that there are no compelling indicators of publication bias in this meta-analysis.

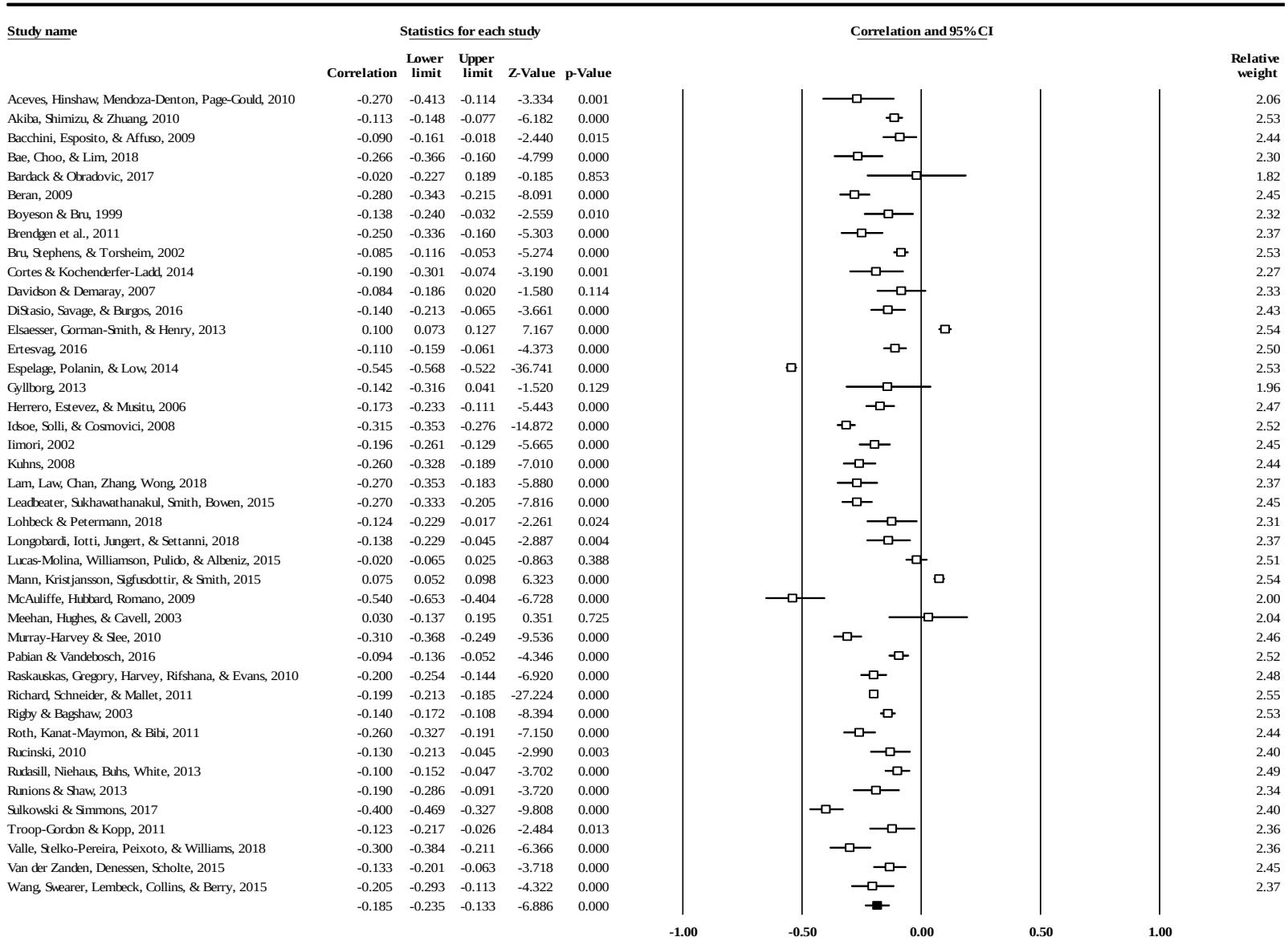
Bullying Perpetration and Teacher-Student Relationship Closeness

Figure 2 displays the distribution of all 42 effect sizes and the summary effect (listed last in the figure) corresponding to peer aggression perpetration and teacher-student relationship closeness. Effect sizes ranged from -.545 to .100. The overall aggregated effect represents a small, negative significant association between bullying perpetration and teacher-student relationship characterized by warmth and support [$r = -.185$ (95% CI. $-.235 < r < -.133$), $Z = -6.886$, $p = .000$]. The results indicate that as students are involved in increasing levels of bullying others, they tend to have decreasing closeness within their relationships with teachers. This supports our hypothesis that students who aggress against their peers will also experience reduced feelings of closeness, warmth, and support with their teachers.

The test for homogeneity of variance was significant revealing that there was true variability between study effect sizes, beyond sampling error [Q (41) = 1811.805, p = .000]. The magnitude of the heterogeneity outside of sampling error was very large, with an I^2 index approaching 100% (I^2 index = 97.737).

Figure 2

Distribution of effect sizes and summary effect for bullying perpetration and teacher-student relationship closeness



Bullying Perpetration and Teacher-Student Relationship Conflict

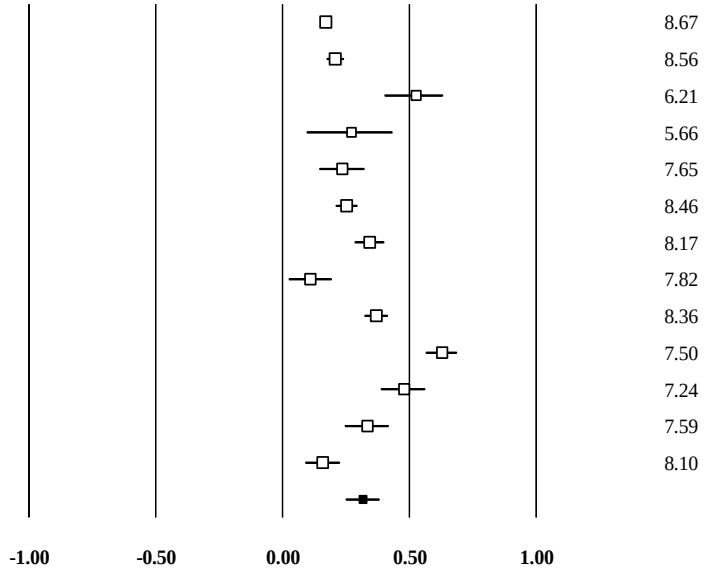
Next, the link between bullying perpetration and conflictual teacher-student relationship was analyzed. Figure 3 shows the distribution of the 13 effect sizes, which ranged from .110 to .630. In support of our hypothesis, the meta-analytic results revealed a moderately positive and significant correlation between bullying others and conflict in the teacher-student relationship [r = .318 (95% CI. .250 < r < .382), Z = 8.718, p = .000]. These results indicate that as bullying perpetration increases, conflict in teacher-student relationships also increases.

The test for homogeneity of variance was significant across the 13 studies [Q (12) = 235.794, p = .000], indicating that variability in effect sizes was due to factors other than sampling error. The I^2 index = 94.911, suggesting that variability among effect sizes is almost entirely due to variability beyond sampling error.

Figure 3

Distribution of effect sizes and summary effect for bullying perpetration and teacher-student relationship conflict

Study name	Correlation	Lower limit	Upper limit	Z-Value	p-Value	Relative weight
Chen & Astor, 2011	0.171	0.149	0.192	15.289	0.000	8.67
Chen & Astor, 2012	0.208	0.174	0.242	11.667	0.000	8.56
Doumen et al., 2008	0.527	0.402	0.632	7.201	0.000	6.21
Gyllborg, 2013	0.273	0.095	0.433	2.972	0.003	5.66
Longobardi, Iotti, Jungert, Settanni, 2018	0.236	0.145	0.323	4.999	0.000	7.65
Lucas-Molina, Williamson, Pulido, & Albeniz, 2015	0.253	0.210	0.295	11.156	0.000	8.46
Murray-Harvey & Slee, 2010	0.344	0.285	0.401	10.669	0.000	8.17
Rucinski, 2010	0.110	0.025	0.194	2.526	0.012	7.82
Rudasill, Niehaus, Buhs, & White, 2013	0.370	0.323	0.415	14.330	0.000	8.36
Runions & Shaw, 2013	0.630	0.565	0.687	14.338	0.000	7.50
Stipek & Miles, 2008	0.480	0.388	0.563	9.028	0.000	7.24
Troop-Gordon & Kopp, 2011	0.335	0.246	0.418	7.030	0.000	7.59
van der Zanden, Denessen, & Scholte, 2015	0.159	0.089	0.226	4.459	0.000	8.10
	0.318	0.250	0.382	8.718	0.000	



Bullying Victimization and Teacher-Student Relationship Closeness

The third meta-analysis synthesized 48 effect sizes corresponding to the association between peer victimization and teacher-student relationship closeness, ranging from -.46 to .12. The distribution of these effect sizes, including the summary effect, can be found in Figure 4. Results of the meta-analysis revealed a small, negative significant association between bullying victimization and teacher-student relationships characterized by closeness and warmth [r =-.157 (95% CI. -.190 < r < -.123), Z = -8.933, p = .000]. Although the effect is small in scale, these results support our hypothesis, indicating that overall, as bullying victimization increases, closeness in teacher-student relationships decreases.

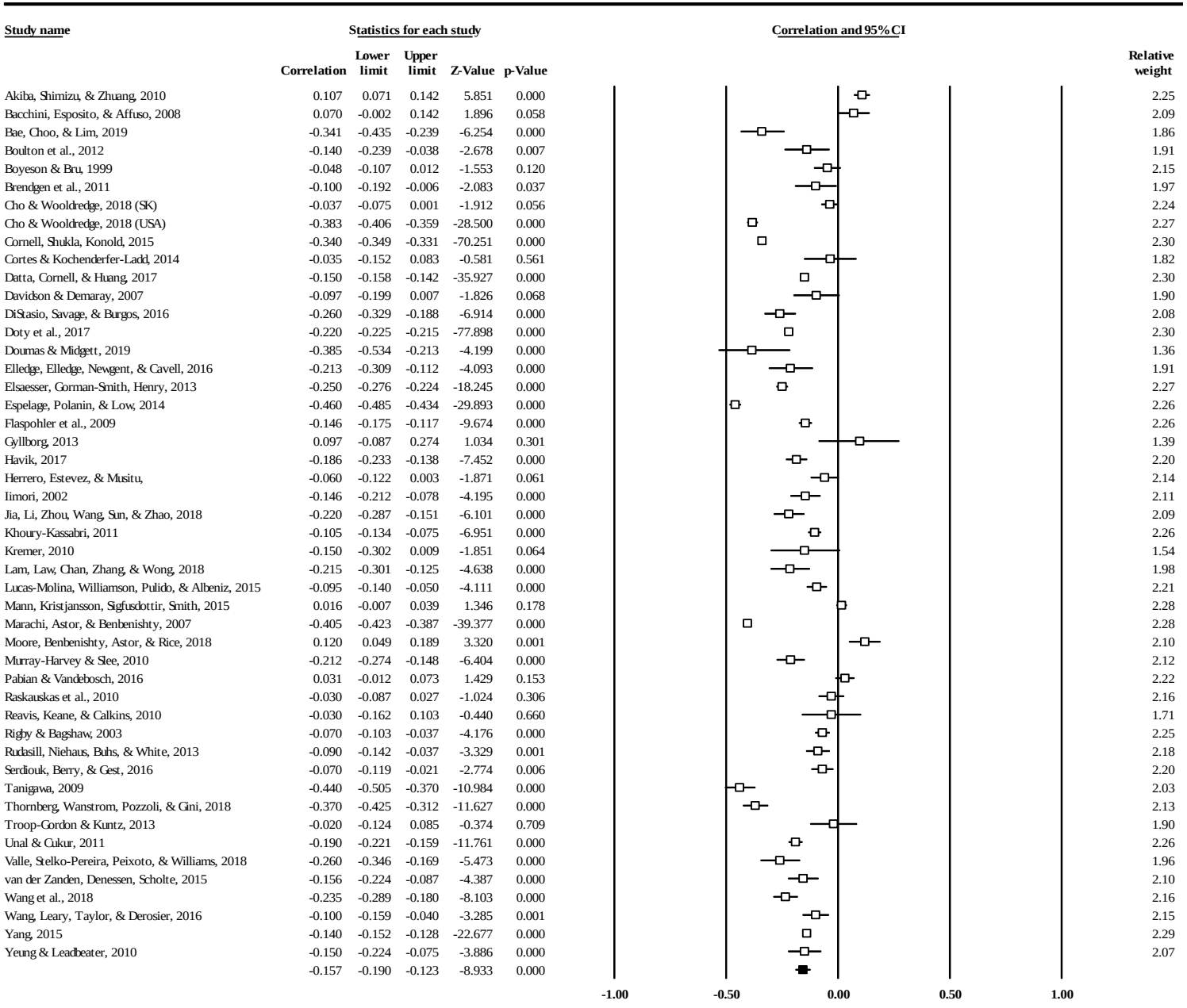
The test for homogeneity of variance was significant, indicating that there was true variance between effect sizes, more than what could be attributed to sampling error [Q (47) = 3515.449, p = .000]. The I^2 index = 98.663, revealing a very large amount of between-study variance.

Bullying Victimization and Teacher-Student Relationship Conflict

The fourth, and final primary meta-analysis investigated peer victimization and conflictual teacher-student relationships. Figure 5 shows the distribution of the 12 effect sizes,

Figure 4

Distribution of effect sizes and summary effect for peer victimization and teacher-student relationship closeness



Study name	Correlation	Lower limit	Upper limit	Z-Value	p-Value	Relative weight
Akiba, Shimizu, & Zhuang, 2010	0.107	0.071	0.142	5.851	0.000	2.25
Bacchini, Esposito, & Affuso, 2008	0.070	-0.002	0.142	1.896	0.058	2.09
Bae, Choo, & Lim, 2019	-0.341	-0.435	-0.239	-6.254	0.000	1.86
Boulton et al., 2012	-0.140	-0.239	-0.038	-2.678	0.007	1.91
Boyeson & Bru, 1999	-0.048	-0.107	0.012	-1.553	0.120	2.15
Brendgen et al., 2011	-0.100	-0.192	-0.006	-2.083	0.037	1.97
Cho & Wooldredge, 2018 (SK)	-0.037	-0.075	0.001	-1.912	0.056	2.24
Cho & Wooldredge, 2018 (USA)	-0.383	-0.406	-0.359	-28.500	0.000	2.27
Cornell, Shukla, Konold, 2015	-0.340	-0.349	-0.331	-70.251	0.000	2.30
Cortes & Kochenderfer-Ladd, 2014	-0.035	-0.152	0.083	-0.581	0.561	1.82
Datta, Cornell, & Huang, 2017	-0.150	-0.158	-0.142	-35.927	0.000	2.30
Davidson & Demaray, 2007	-0.097	-0.199	0.007	-1.826	0.068	1.90
DiStasio, Savage, & Burgos, 2016	-0.260	-0.329	-0.188	-6.914	0.000	2.08
Doty et al., 2017	-0.220	-0.225	-0.215	-77.898	0.000	2.30
Doumas & Midgett, 2019	-0.385	-0.534	-0.213	-4.199	0.000	1.36
Elledge, Elledge, Newgent, & Cavell, 2016	-0.213	-0.309	-0.112	-4.093	0.000	1.91
Elsaesser, Gorman-Smith, Henry, 2013	-0.250	-0.276	-0.224	-18.245	0.000	2.27
Espelage, Polanin, & Low, 2014	-0.460	-0.485	-0.434	-29.893	0.000	2.26
Flaspohler et al., 2009	-0.146	-0.175	-0.117	-9.674	0.000	2.26
Gyllborg, 2013	0.097	-0.087	0.274	1.034	0.301	1.39
Havik, 2017	-0.186	-0.233	-0.138	-7.452	0.000	2.20
Herrero, Estevez, & Musitu,	-0.060	-0.122	0.003	-1.871	0.061	2.14
Iimori, 2002	-0.146	-0.212	-0.078	-4.195	0.000	2.11
Jia, Li, Zhou, Wang, Sun, & Zhao, 2018	-0.220	-0.287	-0.151	-6.101	0.000	2.09
Khoury-Kassabri, 2011	-0.105	-0.134	-0.075	-6.951	0.000	2.26
Kremer, 2010	-0.150	-0.302	0.009	-1.851	0.064	1.54
Lam, Law, Chan, Zhang, & Wong, 2018	-0.215	-0.301	-0.125	-4.638	0.000	1.98
Lucas-Molina, Williamson, Pulido, & Albeniz, 2015	-0.095	-0.140	-0.050	-4.111	0.000	2.21
Mann, Kristjansson, Sigfusdottir, Smith, 2015	0.016	-0.007	0.039	1.346	0.178	2.28
Marachi, Astor, & Benbenishty, 2007	-0.405	-0.423	-0.387	-39.377	0.000	2.28
Moore, Benbenishty, Astor, & Rice, 2018	0.120	0.049	0.189	3.320	0.001	2.10
Murray-Harvey & Slee, 2010	-0.212	-0.274	-0.148	-6.404	0.000	2.12
Pabian & Vandebosch, 2016	0.031	-0.012	0.073	1.429	0.153	2.22
Raskauskas et al., 2010	-0.030	-0.087	0.027	-1.024	0.306	2.16
Reavis, Keane, & Calkins, 2010	-0.030	-0.162	0.103	-0.440	0.660	1.71
Rigby & Bagshaw, 2003	-0.070	-0.103	-0.037	-4.176	0.000	2.25
Rudasill, Niehaus, Buhs, & White, 2013	-0.090	-0.142	-0.037	-3.329	0.001	2.18
Serdiouk, Berry, & Gest, 2016	-0.070	-0.119	-0.021	-2.774	0.006	2.20
Tanigawa, 2009	-0.440	-0.505	-0.370	-10.984	0.000	2.03
Thornberg, Wanstrom, Pozzoli, & Gini, 2018	-0.370	-0.425	-0.312	-11.627	0.000	2.13
Troop-Gordon & Kuntz, 2013	-0.020	-0.124	0.085	-0.374	0.709	1.90
Unal & Cukur, 2011	-0.190	-0.221	-0.159	-11.761	0.000	2.26
Valle, Stelko-Pereira, Peixoto, & Williams, 2018	-0.260	-0.346	-0.169	-5.473	0.000	1.96
van der Zanden, Denessen, Scholte, 2015	-0.156	-0.224	-0.087	-4.387	0.000	2.10
Wang et al., 2018	-0.235	-0.289	-0.180	-8.103	0.000	2.16
Wang, Leary, Taylor, & Derosier, 2016	-0.100	-0.159	-0.040	-3.285	0.001	2.15
Yang, 2015	-0.140	-0.152	-0.128	-22.677	0.000	2.29
Yeung & Leadbeater, 2010	-0.150	-0.224	-0.075	-3.886	0.000	2.07
	-0.157	-0.190	-0.123	-8.933	0.000	

which ranged from .060 to .526. The results from the meta-analytic investigation revealed a small, positive and significant correlation between bullying victimization and teacher-student relationships characterized by conflict and hostility [r = .250 (95% CI. .170 < r < .327), Z = 5.964, p = .000]. These results support my hypothesis, and suggest that students who experience higher rates of victimization from their peers tend also to experience greater conflict with their teachers.

The test for homogeneity of variance was significant, allowing us to assume that the variance seen between studies is more than what sampling error could account for [Q (11) = 273.271, p = .000]. The I^2 index = 95.975% revealing a very large amount of between-study variance.

Moderator Analyses

Below are the results of the four moderator analyses that were conducted for each of the four meta-analyses.

School Level

Given the range in age of participants represented in the current meta-analysis, school level was entered as a moderator to determine its effect on the association between teacher-student relationship quality and peer-on-peer aggression. Results of the moderator analysis can be found in Table 4. Grade level was divided into two ordinal categories: primary (Kindergarten – Grade 6) and intermediate/secondary (Grade 7 – Grade 12).

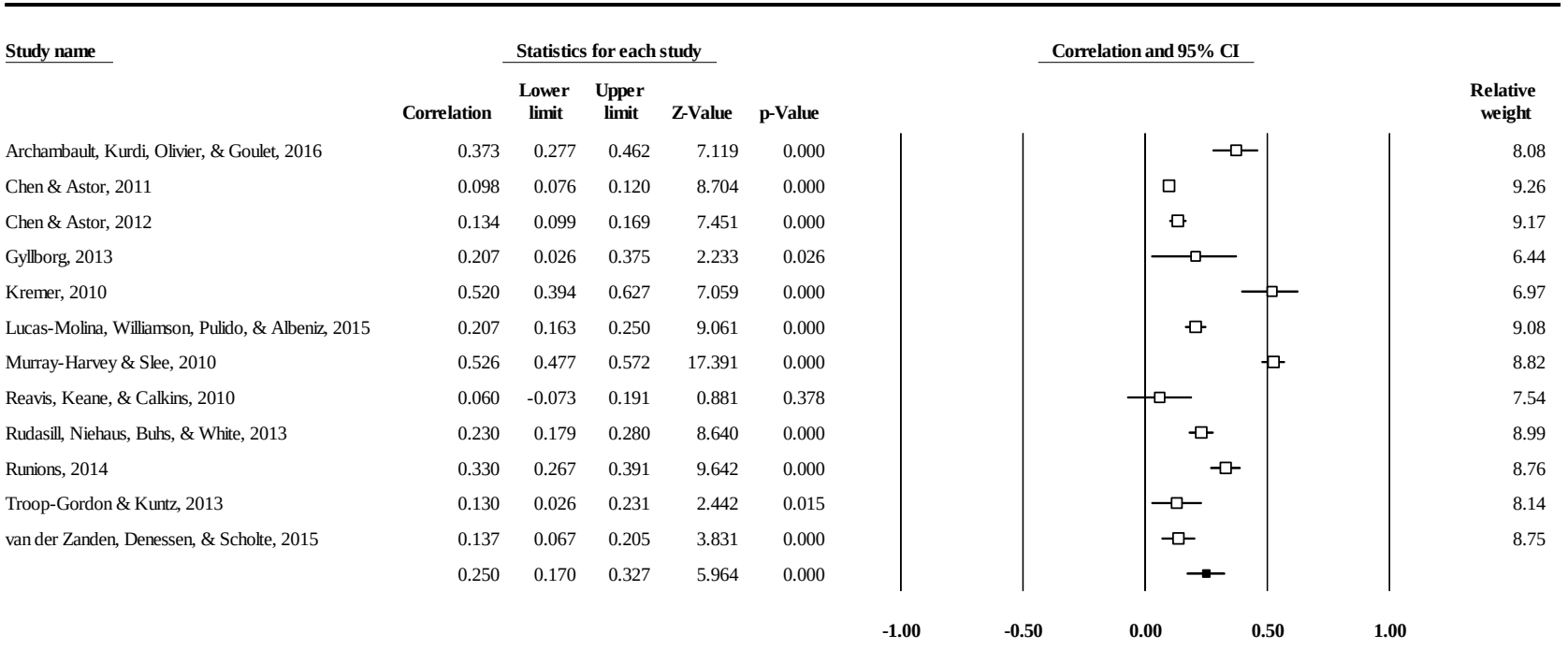
For bullying perpetration and teacher-student relationship closeness, no significant difference was found between students in primary school level (r = -.173, p = .000, n = 15) and students in intermediate or secondary school level (r = -.191, p = .000, n = 27) (Q (1) = .096, p = .756). When investigating bullying perpetration and teacher-student relationships characterized

by conflict, a significant moderating effect was found between elementary school participants (r = .311, p = .000, n = 9) and participants in intermediate or secondary school level (r = .196, p = .000, n = 4), (Q (1) = 60.457, p = 000). These results reveal that conflictual teacher-student relationships are more strongly associated with increased peer directed aggression in younger students compared to older students. For peer victimization and teacher-student relationship closeness, no significant difference was found between primary school level participants (r = -.127, p = .000, n = 19) and intermediate or secondary level participants (r = -.174, p = .000, n = 29), (Q (1) = 1.770, p = .183). Finally, school level had a significant moderating role on the association between peer victimization and conflictual teacher-student relationships (Q (1) = 31.058, p = .000), where a stronger correlation was found between bullying victimization and teacher-student relationship conflict in primary school level participants (r = .229, p = .000, n = 9) compared to students in intermediate or secondary school (r = .143, p = .000, n = 3).

Overall, the above moderator analysis revealed that grade level had a significant influence on the association between peer aggression and victimization and teacher-student conflict, but not on teacher-student closeness. More specifically, the reciprocal relation between bullying involvement and discordant teacher-student relationships is stronger for younger students than compared to older students who attend middle/intermediate or secondary schools.

Figure 5

Distribution of effect sizes and summary effect for peer victimization and teacher-student relationship conflict



Study name	Correlation	Lower limit	Upper limit	Z-Value	p-Value	Relative weight
Archambault, Kurdi, Olivier, & Goulet, 2016	0.373	0.277	0.462	7.119	0.000	8.08
Chen & Astor, 2011	0.098	0.076	0.120	8.704	0.000	9.26
Chen & Astor, 2012	0.134	0.099	0.169	7.451	0.000	9.17
Gyllborg, 2013	0.207	0.026	0.375	2.233	0.026	6.44
Kremer, 2010	0.520	0.394	0.627	7.059	0.000	6.97
Lucas-Molina, Williamson, Pulido, & Albeniz, 2015	0.207	0.163	0.250	9.061	0.000	9.08
Murray-Harvey & Slee, 2010	0.526	0.477	0.572	17.391	0.000	8.82
Reavis, Keane, & Calkins, 2010	0.060	-0.073	0.191	0.881	0.378	7.54
Rudasill, Niehaus, Buhs, & White, 2013	0.230	0.179	0.280	8.640	0.000	8.99
Runions, 2014	0.330	0.267	0.391	9.642	0.000	8.76
Troop-Gordon & Kuntz, 2013	0.130	0.026	0.231	2.442	0.015	8.14
van der Zanden, Denessen, & Scholte, 2015	0.137	0.067	0.205	3.831	0.000	8.75
	0.250	0.170	0.327	5.964	0.000	

Table 4

School level moderator analysis for each meta-analysis

Peer Aggression and Teacher-Student Relationships	School Level Category				
	Elementary	*k*	Intermediate/Secondary	*k*	*Q*
P x TSRclos	-.173	15	-.191	27	.096
P x TSRcon	.311	9	.196	4	60.457**
V x TSRclos	-.127	19	-.174	29	1.770
V x TSRcon	.229	9	.143	3	31.058**

Note. P = Perpetration, V = Victimization, TSRclos = Teacher-student relationship closeness, TSRcon = Teacher-student relationships conflict.
** indicates *p*-value ≤ .001

Informant

Although many studies employed student self-reports as their method of informant, several other studies also included peer and teacher informants as an alternative way to measure peer aggression and teacher-student relationship quality. The results of this moderator analysis can be found in Table 5. Informants were divided into two categories: self and other (comprised of peer and teacher reports). Peer and teacher reports were combined for two reasons. First, there were few studies who utilized peer and teacher reports, compared to studies who used self-reports. Second, research indicates a large amount of inter-rater agreement for both teacher-student relationship quality and peer aggression (Cornell & Brockenbrough, 2004; Li et al., 2012) Studies were included in this moderator analysis only if they used the same informant (self/self or other/other) for the peer aggression and the relationship measures.

For bullying perpetration and teacher-student relationship closeness, no significant moderating effect was found between self as the informant (r = -.176, p = .000, n = 28) and

teacher or peer as the informant (r = -.204, p = .000, n = 7), (Q (1) = .220, p = .639), indicating no difference in effect size for each sub-group. For bullying perpetration and conflictual teacher-student relationships, informant type was a significant moderator (Q (1) = 139.048, p = .000). A much stronger effect was observed when a teacher or peer reported (r = .441, p = .000, n = 3), compared to when the student reported themselves (r = .190, p = .000, n = 6). A significant moderating effect was also found for peer victimization and close teacher-student relationships (Q (1) = 30.285, p = .000). A significantly stronger effect was found for self informants (r = -.206, p = .000, n = 35) compared to teacher and peer informants (r = .090, p = .000, n = 4). Lastly, for peer victimization and teacher-student relationship conflict, a significant moderating effect was found between the student (self) informant (r = .149, p = .000, n = 6) and the teacher or peer as the informant (r = .267, p = .000, n = 4), (Q (1) = 32.581, p = .000), indicating that the association between peer victimization and conflictual teacher-student relationships is stronger with teacher or peer informants, compared to student self-reports.

Overall, the results of this moderator analysis indicate that there is a significant moderating effect of informant for three of the four meta-analyses. For peer aggression and victimization and teacher-student relationship conflict, the results reveal stronger effects for peer or teacher informants. Conversely, for peer victimization and teacher-student relationship closeness, a stronger effect is observed with self-reports compared to other reports.

Table 5

Informant type moderator analysis for each meta-analysis

	Informant Category				
Peer Aggression and Teacher-Student Relationships	Self	*k*	Other	*k*	*Q*

P x TSRclos	-.176	28	-.204	7	.220
P x TSRcon	.190	6	.441	3	139.048**
V x TSRclos	-.206	35	-.090	4	30.285**
V x TSRcon	.149	6	.267	4	32.581**

Note. P = Perpetration, V = Victimization, TSRclos = Teacher-student relationship closeness, TSRcon = Teacher-student relationships conflict.
** indicates *p*-value ≤ .001

Scale Quality

Studies included in the meta-analysis varied in quality of scales used to measure the research variables: Some used established measures (e.g., STRS; Pianta, 2001) with strong foundations of validity evidence and extensive track records in the literature, while others used measures created specifically for the individual study which lack a track record and substantial validity evidence. The results of the moderator analysis can be found in Table 6. Studies were included in this moderator analysis only if they used the same quality of measure for both variables (i.e., established/established or novel/novel for both peer aggression and teacher-student relationship quality).

For bullying perpetration and teacher-student relationship closeness, no significant moderating effects were found between established (r = -.199, p = .000, n = 28) and novel measures (r = -.197, p = .007, n = 6), (Q (1) = .001, p = .981). A significant moderating effect was found for bullying perpetration and conflictual teacher-student relationships (Q (1) = 51.787, p = .000), indicating that there was a stronger association observed when an established measures were used (r = .330, p = .000, n = 6) compared to novel measures (r = .194, p = .000, n = 3). Regarding peer victimization and teacher-student relationships characterized by closeness, although means differed substantially, no moderating effect was found (Q (1) = 2.228, p = .135),

and no statistically meaningful differences were found when studies used an established measure to assess variables (r = -.176, p = .000, n = 29) or a novel measure (r = -.114, p = .002, n = 8). Finally, a significant moderating effect was found for the correlation between peer victimization and teacher-student relationship conflict (Q (1) = 29.739, p = .000), indicating that there was a stronger association for studies that utilized established measures (r = .240, p = .000, n = 7) versus studies that employed novel measures (r = .143, p = .000, n = 3).

Overall, the moderator analyses suggest measure type is an important moderating variable when examining perpetration and victimization and teacher-student relationship conflict. Specifically, the results show that when studies employ established measures, a stronger effect is observed than when novel measures are used. While the moderating effect is not found for perpetration and victimization and teacher-student relationship closeness, there appears to be a trend to observe larger effect sizes when established measures are used.

Table 6

Measure type moderator analysis for each meta-analysis

Peer Aggression and Teacher-Student Relationships	Measure Category				
	Established	*k*	Novel	*k*	*Q*
P x TSRclos	-.199	28	-.197	6	.001
P x TSRcon	.330	6	.194	3	51.787**
V x TSRclos	-.176	29	-.114	8	1.985
V x TSRcon	.240	7	.143	3	29.739**

Note. P = Perpetration, V = Victimization, TSRclos = Teacher-student relationship closeness, TSRcon = Teacher-student relationships conflict.
** indicates p-value ≤ .001

Computations from Standardized Coefficients

Eight studies (11%) only provided standardized beta coefficients for our variables of interest. When correlational data were not provided, I imputed Pearson *r* from the data using the method recommended by Peterson and Brown (2005). Given some recent criticisms that this method may impart undue error into the data, a moderator analysis was run to assess whether or not transforming the data in this way impacted effect sizes. Only two of the meta-analyses had enough studies including standardized beta coefficients to allow for a moderator analysis. Results of the moderator analysis can be found in Table 7.

For bullying perpetration and teacher-student relationship closeness, a significant moderating effect was found (Q (1) = 4.208, p = .040), suggesting that studies with direct correlational estimates were associated with stronger effect sizes (r = -.206, p = .000, n = 36) compared to studies with transformed standardized beta coefficients (r = -.061, p = .354, n = 6). No significant moderating effect was found for bullying victimization and teacher-student relationship closeness (Q (1) = .001, p = .980), indicating no statistically meaningful differences between studies with direct correlational estimates (r = -.156, p = .000, n = 40) and studies with imputed Pearson *r*'s (r = -.158, p = .000, n = 8).

Table 7

Standardized coefficient moderator analysis for each meta-analysis

Peer Aggression and Teacher-Student Relationships	Data Category				
	Untransformed	*k*	Transformed	*k*	*Q*
P x TSRclos	-.206	36	-.061	6	4.208*
V x TSRclos	-.156	40	-.158	8	.001

Note. P = Perpetration, V = Victimization, TSRpos = Teacher-student relationship closeness.
* indicates *p*-value ≤ .05

Overall, the results of the moderator analysis suggest a significant moderating effect of data type when examining the association between bullying perpetration and teacher-student relationship closeness. Specifically, it appears that transformed standardized beta coefficients may be a more conservative estimate of the association, and influence effect sizes and the summary effect size downwards.

Discussion

The current study is a meta-analytic investigation examining the extant, and ever growing, literature on peer aggression and teacher-student relationship quality. While existing scholarship indicates relatively clear trends regarding student bullying involvement and the quality of teacher-student relationships (Bae et al., 2019; Thornberg et al., 2017), there was little understanding of the overall direction and magnitude of this association. This is the first study to my knowledge to quantitatively synthesize the peer aggression and teacher-student relationship literature. Seventy-two studies were included in the final set, with 115 independent effect sizes. The included studies comprised a large and diverse group of students: they number more than 360,000, ranged from ages four to 18 years, and originated in 21 different countries across five continents. The studies also diverged in their methodologies. Studies included reports from various informants, a wide range of questionnaires, and employed diverse data collection strategies to assess peer aggression experiences and teacher-student relationship quality. My results provide support for the trends observed in the literature in that children and youth who bully others or are victimized tend to have relationships with teachers characterized by high levels of conflict and low levels of warmth and support.

Additionally, the inclusion of several moderating variables in these analyses provide greater clarity as to how underlying factors may influence the association between the key study

variables. Within the context of relevant literature, the discussion will explicate the results of the four primary meta-analyses conducted, and describe the results of the moderator analyses conducted. Limitations will be discussed in detail, followed by implications and possible avenues for future research.

Peer Aggression and Teacher-Student Relationship Closeness

The results show that there is a small, but significant, negative association between peer aggression, including perpetration and victimization, and close teacher-student relationships, meaning that students who experience higher rates of bullying perpetration and victimization, also tend to have relationships with their teacher as lacking in warmth and support. This supports my hypothesis and is consistent with the overall trends that appear in the literature (Elsaesser et al., 2013; Murray-Harvey & Slee, 2010) indicating that increased bullying involvement in any capacity is often associated with poorer relationships between students and teachers. Studies conducted on the topic have not always found significant and negative correlations between students who are involved in bullying perpetration and victimization and warm and supportive teacher-student relationships (Elledge et al., 2016; Pabian & Vandenbosch, 2016), leading to ambiguity whether a negative association exists. The present meta-analysis included such studies that did not find support for a negative association between peer aggression and teacher-student relationship closeness (e.g., Meehan et al., 2003). Even with the inclusion of studies that offer disparate results from the expected trends, the results reveal a significant negative correlation between bullying involvement and close teacher-student relationships, although small in size. Interestingly, the summary effect sizes for bullying perpetration and close teacher-student relationships, and peer victimization and teacher-student relationship closeness were very similar (r = -.186, r = -.154 respectively). It has been previously suggested that students who bully may

actually develop positive and close relationships with their teachers due to increased social competencies (Sutton et al., 1999; Vaillancourt et al., 2003). It might therefore be expected that the overall effect size for bullying perpetration and close teacher-student relationships would be significantly smaller than the effect size for victimization and teacher-student relationships. The results of my meta-analyses do not support this explanation. While it is highly probable that some students who aggress against their peers may also have enhanced social skills leading to warm and supportive relationships with their teachers, my findings suggest that these students are not the majority. Although speculative, an important consideration in understanding this discrepancy between my findings and that of previous research may be the type of bullying that the student is engaging in. Verbal and relational types bullying require a greater understanding of and competencies in social interactions and relationship building (Rodkin et al., 2015), to ultimately manipulate the peer social network. Whereas more physical types of bullying do not rely so heavily on such competencies to be developed. While many of the studies included in the meta-analysis assessed various forms of bullying, it is possible that a greater number of the students who reported involvement in bullying perpetration engaged in more physical forms of bullying against their classmates and may therefore also have poorer social skills compared to students who more often relationally or verbally bully others. In turn, this lack of social skills may lead to less close and more conflictual relationships with their teacher. It is certainly not inconceivable that a subset of students who are involved in bullying in some capacity do have close relationships with their teachers, which is perhaps why the summary effect sizes found in my analyses are relatively small. For example, a teacher may make greater efforts to support and show care for a student who is observed to be victimized by their peers (Gyllborg, 2013).

Due to the correlational nature of the summary effect sizes, it is not possible to make any causal claims regarding the association between students who bully others or are bullied and have relationships with teachers characterized by warmth and support. While it could be that this relation is sequential, such as peer aggression leads to more conflictual teacher-student relationships, a more viable explanation is that the association is reciprocal in nature. Previous longitudinal research examining teacher-student relationship closeness and peer aggression have found support for a bidirectional effect (Holfeld & Leadbeater, 2017; Pabian & Vandenbosch, 2016; Serdiouk et al., 2016). It is possible to imagine myriad ways in which this reciprocal relation can manifest in the school context. For example, a teacher who witnesses a student routinely aggress against their peers may begin to dislike the student and withdraw their support and care for them. This may lead the student to feel disconnected from their teacher and lacking in adequate support, which in turn may lead the student to bully their peers more often. Conversely, a student who continues to be victimized by their peers may perceive their teacher as unhelpful, and unable to provide protection and support, ultimately leading to further disconnection and isolation in the classroom context and more at risk of continued victimization.

Overall, the results of the two meta-analyses investigating peer aggression and victimization and teacher-student relationship closeness illustrate that when students perceive that their teacher cares about them and provides them with support and emotional warmth, they are less likely to be involved in bullying incidents as either bullying or victim roles.

Peer Aggression and Teacher-Student Relationship Conflict

In support of my hypothesis, the results of this study show that students who experienced higher rates of bullying involvement, either bullying others or being bullied themselves, also reported higher rates of hostility, mutual dislike, and discordance in their relationships with their

teacher(s). These findings are aligned with the trends in the current literature (Chen & Astor, 2012; Lucas-Molina et al., 2011; Murray-Harvey & Slee, 2010) indicating that peer aggression and conflictual teacher-student relationships are positively correlated. Studies examining this correlation have produced inconsistent findings indicating that greater bullying involvement is not always positively associated with teacher-student relationship conflict (Marengo et al., 2018). A key strength of this meta-analysis is to combine many studies investigating teacher-student relationship conflict and peer aggression, including studies that did not find overwhelming support for a positive correlation. The results from the present meta-analyses provide evidence that students who are involved in bullying, either by aggressing against their peers or through victimization, also have relationships with their teachers characterized by hostility, conflict, and discordance.

As with the above results, the summary effects of these two primary meta-analyses are correlational, thus preventing us from making any conclusions regarding causal ordering of the variables. Although there are limited studies determining the longitudinal relation between teacher-student relationship conflict and peer aggression, relevant scholarship suggests that it is also bidirectional (e.g., Doumen et al., 2008; Stipek & Miles, 2008). In much the same way as peer aggression and close teacher-student relationships are subject to reciprocal influence, it is possible to envision a bidirectional effect between bullying involvement and conflictual teacher-student relationships. For example, a teacher who observes one of their students continually perpetrate against their peers may develop feelings of anger, dislike, and callousness towards the child. Such negative emotions, which are often observed in teacher stress and burnout (Jennings & Greenberg, 2009) increase the likelihood that the teacher will respond to this student with

harsh and punitive discipline, exacerbating the hostility in their relationship with the student and ultimately leading the student to further bully their peers.

Most notably, the summary effects between peer aggression and teacher-student relationship conflict were substantially larger than the effect sizes corresponding to peer aggression and teacher-student relationship closeness. These findings suggest that teacher-student relationships characterized by conflict and hostility are more strongly related to involvement in student bullying perpetration and victimization than close teacher-student relationships. Previous scholarship investigating teacher-student relationship quality and academic achievement and engagement have found more robust associations for conflictual teacher-student relationships than for close teacher-student relationships (Baker, 2006; Hamre & Pianta, 2001) indicating that low-quality, high conflict teacher-student relationships are particularly damaging to student functioning. The results of the present meta-analysis extend this literature by providing evidence that a particularly damaging link exists between teachers' poor relationships with students and student' psychosocial development, at least as it concerns involvement in bullying. One possible explanation for these findings may be the stability of conflictual teacher-student relationships, as research shows that conflict in teacher-student relationships appears to be more stable from year to year, compared to close teacher-student relationships which tend to fluctuate more with each given year (Spilt et al., 2012). It may be that students develop a persistent reputation within their school that they are difficult and often do not get along with teachers which follows them throughout their schooling years, even as they switch teachers. Given the stability of these relationships documented in literature, it is plausible that this reputation would be stronger for these students compared to students who tend to, on average, develop warm and close relationships with their students. These consistent and

unyielding conflictual relationships between the student and the teacher may compound throughout the student's school experience and lead to increased engagement in bullying involvement.

A Bioecological Model Conceptualization

Overall, the results from the four primary meta-analyses investigating peer aggression and teacher-student relationship quality highlight the unique and critical role of teacher-student relationships within the interconnected social context of the classroom; a finding that continues to emerge in the literature (Bierman, 2011; Luckner & Pianta, 2011), and provides further support for Bronfrenbrenner's (2006) systems perspective of development. While all levels of Bronfrenbrenner's Bioecological model can be applied, more specifically, this study examines the constructs of peer aggression and teacher-student relationship at the level of the mesosystem, the level at which individuals from various microsystems interact. In the context of the present study, the mesosystem is illustrated as students learn how to treat their peers (either with warmth and support or conflict and hostility) by looking to their teacher's interactions with their classmates (Hendrickx et al., 2017). The role of the teacher has also been discussed as 'the invisible hand' in the classroom society and peer ecology (Farmer et al., 2011). Using this framework, the teacher is responsible for inconspicuously creating parameters and opportunities that foster positive, constructive, and independent interactions among peers, and to disclose, through their relationships with students, the classroom social values and characteristics.

Another possible explanation that may further elucidate the associations found between peer aggression and teacher-student relationships are certain student characteristics that may make students more at risk to be involved in bullying incidents, but also more likely to experience less close and more conflictual relationships with their teachers. Several correlates of

bullying and victimization experiences in the school context are well documented in the literature including anger, depression, and positive attitudes towards bullying (see Espelage & Swearer, 2003 for a review of the literature).

Research shows that students who aggress against their peers also tend to exhibit externalizing behavior problems (e.g., disruptive and noncompliant outbursts in the classroom) and an inability to consider another's perspective and show empathy (Cook et al., 2010; Kokkinos & Panayiotou, 2004; Smokowski & Holland Kopasz, 2005). Indeed, a study with over 22,000 middle school students found that children who bully others displayed more problematic and disruptive behaviours in the classroom compared to students not involved in bullying incidents in any capacity (Jalon & Arias, 2013). Importantly, research also shows that students who display externalizing and problematic behavioural challenges also tend to have more conflictual and less close relationships with their teachers (Fowler et al., 2008; Lei et al., 2016). Studies have shown that teachers report that one of the main contributors to workplace stress and burnout is managing student problematic and externalizing behaviours (Skinner & Beers, 2016), which will only foster greater hostility and conflict in their relationship with the student(s). Given these associations, it is possible to imagine how the same characteristics that encourage bullying behaviour also become a problem in the classroom context with the teacher and simultaneously dissuade the development of a close relationship between the teacher and student while promoting a relationship characterized by conflict. For instance, a student who has uncontrolled outbursts in the classroom and subsequently develops a hostile relationship with their teacher is also more likely to verbally or physically harass their classmates.

Regarding students who are victimized, Smokowski and Kopasz (2005) outline several characteristics often identified in this group of students, including poor social skills and

emotional maladjustment. While these characteristics are not as disruptive and external as is often observed in students who bully their peers, these characteristics may discourage students and teachers from forming positive relationships with high closeness and low conflict. Conversely, Marengo and colleagues (2018) found that students who demonstrated conduct problems were also more likely to be victimized by their peers. In some cases, it may be that students who break rules and do not listen to authorities may become a target of bullying from their classmates. These students can often fall into the 'bully-victim' group, as their conduct problems may extend to bullying their peers, but also lead to becoming victimized (Smokowski & Kopasz, 2005). Due to greater emotional and social dysregulation (Schwartz et al., 2001), this group of students (compared to students who only bully and students who are only victimized) is also most at risk for negative outcomes such as poorer academic achievement (Felipe et al., 2011).

In this way, it is possible to employ Bronfrenbrenner's (2006) Bioecological model, and particularly the level of the mesosystem, to frame our thinking of these associations between student bullying experiences and the quality of the relationship between the teacher and student. As described above, the child's individual characteristics (e.g., conduct problems, poor social skills) also have important contributions in shaping the association between student bullying and victimization experiences and their relationships with their teachers at the level of the mesosystem. It is also worth mentioning that compared to microsystems, effect sizes observed in the mesosystem are consistently smaller than effect sizes detected in microsystems. In mesosystems, chains of influence are longer, more convoluted, and subject to other influences, making them more difficult to accurately measure. Whereas in microsystems, chains of influence are shorter and more direct, increasing accessibility and opportunity for reliable assessment.

Thus, it is possible that the effect sizes observed in the four primary meta-analyses underestimate the associations between student bullying and victimization and teacher-student relationship quality.

The Moderating Effect of School Level

To provide a more nuanced understanding of the correlation between peer aggression and teacher-student relationship quality, several moderators were investigated, including school level. The results of the analysis revealed that school level significantly moderated the relationship between bullying involvement and conflictual teacher-student relationships. More specifically, these results suggest that relationships between teachers and students characterized by dislike and discordance are more influential for younger children (Kindergarten – Grade 6) compared to older children (Grade 7 – Grade 12). One possible explanation for this finding is that young children may be particularly vulnerable to the adult figures in their life, including teachers (Hughes & Im, 2016; Pianta et al., 2003) than older students who are in upper elementary, middle school or high school. As such, young students may be more vulnerable to the negative effects of a conflictual relationship with their teacher, and this experience will inform to a greater extent than it does for adolescent students their interactions with peers.

Factors related to differing school context and student development may also help to shed light on the findings from this moderator analysis. Often times, when students enter middle school and secondary school, they no longer interact with one teacher throughout the day, but rather with several teachers for different subjects. This may limit opportunities to develop a close relationship with any one teacher. Additionally, as children grow older their focus shifts away from adults in their life to their peers (Davis, 2003; Durkin, 1995), reducing the possible damaging association between conflictual teacher-student relationship and peer aggression. It

seems plausible that this same natural developmental shift away from adults and the evolving school structure might also deter the formation and maintenance of close teacher-student relationships. However, this was not reflected in the findings. One explanation for this lack of school level moderating effect regarding close-teacher-student relationships is that older students may have more neutral or moderately close relationships with their teachers due to fewer interactions and being less dependent. It is possible that within the included studies, older students rated their relationship as close and supportive, even if they did not feel strongly about the quality of their relationship, as it might be for students in earlier years.

The Moderating Effect of Informant

Informant was included as a moderator analysis since the research literature has long documented important differences in scores for peer aggression and teacher-student relationship quality depending on who completed the measure (Cornell & Brockenbrough, 2004; Li et al., 2012; Volk et al., 2017). The analysis revealed that informant type (self versus other, which includes peers or teachers for the purposes of this study) significantly influenced results for three meta-analyses; bullying perpetration and teacher-student relationship conflict, peer victimization and teacher-student relationship closeness, and peer victimization and teacher-student relationship conflict. These findings are mostly consistent with the current literature indicating that key differences do exist between informant reports for both peer aggression and teacher-student relationship quality. Studies have found that self-reports of involvement in bullying others and being bullied share little agreement with reports from teachers and peers (Cornell & Brockenbrough, 2004). These differences among informants may be due to a number of reasons. Perhaps, informants other than students themselves are not always privy to more covert forms of bullying (e.g., exclusion, cyberbullying), and will therefore report lower bullying rates. This

pertains particularly to teacher informants. Research has shown that as children age, their participation in more physical and more overt forms of bullying decreases (Berger, 2007), making it more difficult for teachers to observe and accurately report the frequency of bullying perpetration and victimization among students. Further investigation into this hypothesis revealed that no studies in the included sample utilized reports from teachers or peers for students in intermediate and secondary school levels, preventing me from determining whether differences exist across informants in bullying involvement reports for older students. As such, it would be interesting and worthwhile for future research to utilize multiple informants and investigate possible differences in older students in particular, given the increase in more covert types of bullying. Additionally, teachers observe student behaviour in limited settings, mainly the classroom (Pellegrini & Bartini, 2000). This can also lead to inaccurate reporting of student bullying perpetration and victimization as research suggests that bullying often takes place in other areas of the school such as on the playground (Espelage & Swearer, 2003). Likewise, the teacher-student relationship literature finds similar patterns in that self-reports of teacher-student relationship quality differ from teacher and peer reports of relationship quality (Li et al., 2012). One possible reason for the difference in informant reports is a difference in perception about the relationship experience between the participants (Pianta et al., 2003). For example, a teacher may believe that they are providing the student with adequate support, but the student does not feel like they are being offered enough support from their teacher. As such, rather than one informant considered the ‘gold standard’ for teacher-student relationship measurement, multiple informant perspectives are required to obtain a more complete picture of the quality of the teacher-student relationship.

Interestingly, teacher and peer reports produced larger effect sizes for peer aggression and victimization and teacher-student relationship conflict, whereas self-reports produced larger effect sizes for peer victimization and teacher-student relationship closeness. These results suggest that teacher and peer informants assess stronger relationships of bullying perpetration and victimization and conflict in teacher-student relationships compared to students themselves, but that students assess greater levels of victimization and closeness in their relationships with their teachers compared to teacher and peer informants. The literature provides minimal guidance for interpreting these results. As one possible explanation, research has shown that teachers and students assess different aspects of the constructs of closeness and conflict (Hughes, 2011; Wubbels & Brekelmans, 2005). It may be that students can perceive their relationship with their teacher as conflictual, and at the same time, supportive and caring, whereas the teacher may only perceive the relationship with the student as conflictual (Hughes, 2011). However, more research is needed to understand the differences and similarities between student and other-reports of peer aggression and teacher-student relationship quality. It is also possible, albeit purely speculative at this point, that relationship conflict is more accessible and observable by others than is the experience of relationship closeness, or that conflictual teacher-student relationships are more inferred by teachers and peers to try and explain a student's bullying behaviour. For example, a teacher or classmate may see a child that is always getting in trouble at school, and create a narrative about the particular child in that they seem to always have difficulties getting along with their peers and teachers. Whereas the student themselves may be more reluctant to disclose that they are involved in bullying incidents and have a poor relationship with their teacher. Future research probing the lived experience of teachers and

students in their mutual relationships would be informative in shedding some light on this possibility.

One possible concern regarding both the informant moderator and the school level moderator are that the moderating effects are conflated. That is, studies investigating peer aggression and teacher-student relationship quality in younger students used other-reports more frequently than self-reports, whereas studies that examined these variables in older students were more likely to use self-reports. While studies within the sample that collected data from younger students used self-reports just as frequently as other-reports, as mentioned above, no studies that included students in intermediate or secondary school levels utilized peer or teacher reports. As such, it is possible that the moderating effects of school level and informant type are conflated. Therefore, in addition to the aforementioned suggestion that future research utilize other-reports in older students, it would also be useful to examine the moderating effect of one moderator variable (e.g. informant type) separately for each school level.

The Moderating Effect of Scale Quality

An array of measures was used to assess peer aggression and teacher-student relationship quality among the included studies. Established and validated measures, such as the Student-Teacher Relationships Scale (STRS; Pianta, 2001), the Child and Adolescent Social Support Scale (CASSS; Malecki & Demaray, 2002), Olweus Bully/Victim Questionnaire (OBVQ; Olweus 1996), and the Aggressive with Peers subscale of the Child Behaviour Scale (CBS; Ladd & Profilet, 1996) were found frequently in the included studies. However, many studies utilized novel measures that were created specifically for the purposes of the individual study, or extracted specific items from existing measures, and therefore lacking validity evidence for this new version of the scale (e.g., Lohbeck & Petermann, 2018; Rigby & Bagshaw, 2003; Roth et

al., 2011). The moderator analysis revealed that the type of measure used had no effect for peer aggression (perpetration and victimization) and teacher-student relationship closeness, but that there was a significant effect of measure type for both peer aggression and victimization and teacher-student relationship conflict. An examination of moderator level effect sizes within these significant findings reveals that studies that employed established measures documented stronger associations between bullying perpetration and victimization and teacher-student relationship conflict than studies that used novel measures, suggesting that the long and arduous work of developing a valid measure of these psychological constructs pays dividends to the research literature in the long run; generating more accurate and precise estimates of scores.

Limitations

There are some limitations inherent with meta-analysis as an analytical approach. First, publication bias can occur, as studies with statistically significant results have a greater likelihood of being published than studies with insignificant results. This may lead to an overestimation of effect sizes, since studies unable to reject the null can fall victim to the "file drawer problem" (Hedges & Vevea, 1996). To address this potential limitation, we assessed for publication bias using two distinct methods. Approximately ten percent of studies were unpublished works, and no influence of publication was found for all four primary meta-analyses, according to the statistical analysis intended to address this question.

Second, some data were transformed into correlation coefficients when direct estimates were not available. Some of these data were standardized beta coefficients. Transforming data in this way can impart error into the meta-analysis dataset (Roth et al., 2018). To account for this possible additional error, moderator analyses were run to assess whether statistically significant differences existed between direct correlational estimates and imputed data. Of the two

moderator analyses run, only one moderator analysis indicated significant differences between the two data types. However, inspection of the mean effect sizes of each subgroup revealed that data that were transformed from standardized beta coefficients produced lower effect sizes. As such, it seems that transforming standardized data using the Peterson and Brown (2005) method may only make the estimates of effect size more conservative.

One limitation of the present meta-analysis is the difficulty in accounting for the large volume of between-study variance beyond sampling error. The studies included in the meta-analysis are diverse in their populations and their methodologies (e.g., measures, data collection). While this, of course, is also a key strength of the paper by making results more generalizable, it imparts a level of complexity, and potential error, when trying to account for the underlying causes of the heterogeneity. Certain moderator analyses were conducted to explain, at least in part, some of the between-study variance. However, a significant amount of heterogeneity remained unexplained. Therefore, it is unclear as to how the association between peer aggression and teacher-student relationship quality might change as a function of a particular moderator. For example, literature indicates that there may be gender-related differences in bullying victimization and perpetration (DiStasio et al., 2016; Espelage & Holt, 2001; Yoneyama & Rigby, 2006) and teacher-student relationship quality (Birch & Ladd, 1998; Hughes et al., 2001; Serdiouk et al., 2016). However, given the restrictions in deciding to examine only a few moderators, I was unable to test the effect of gender, nor others of potential interest.

A fourth limitation of this meta-analysis is an inability to make any statements of causality regarding peer aggression and teacher-student relationship quality. All studies entered into the present meta-analysis were of cross-sectional design. While some studies that were included did report longitudinal data between peer aggression and teacher-student relationships,

either a single timepoint was selected, or multiple timepoints were aggregated to create one effect size. As such, conclusions regarding the possible sequential nature of the association cannot be made. It may be that increased reports of peer aggression lead to more conflictual teacher-student relationships, or that close and supportive teacher-student relationships ultimately lead to fewer experiences of student bullying perpetration and victimization. However, because the present meta-analysis did not synthesize the extant longitudinal literature, we are not able to make any causal claims. Future research intended to investigate the longitudinal nature of the association between peer aggression and teacher-student relationships would be informative in this regard.

Fifth, for simplicity the moderator variables were dichotomized, and in some cases, combined across peer aggression and teacher-student relationship quality (i.e., informant, measure type). Some limitations inevitably arise with these decisions. Consider the dichotomization of schools into elementary and secondary levels. First, not every study sample perfectly fit within one of the two levels. If a study's sample included students in grades six through eight, this sample would be characterized as the intermediate/secondary school category, even though the category is for grade seven students and higher. Second, school systems and the organization of grades vary widely between the included studies. In Canada alone, there is variation of school structure within and across provinces. For example, the largest school board in Ontario has 129 kindergarten to grade 6 schools, and 145 kindergarten to grade 8 schools, with schools varying in size from 200 to over 1000 students. This variation in school organization, coupled with students continued cognitive and social-emotional development adds further complexity to the moderator variable. The dichotomization was to try and capture to the best of my ability differences that may present because of age and school organization. It would be

useful for future meta-analytic research to further divide students into smaller grade categories to address these developmental and contextual factors more fully. Regarding the aggregation across peer aggression and teacher-student relationship quality, some unique differences between variables may have been lost. For example, it may be that self-reports of peer aggression produce larger effect sizes compared to other reports, but peer and teacher reports produce larger effect sizes for teacher-student relationship quality. By combining across the two constructs, it is not possible to parse out potential differences between them.

Lastly, given the limited number of studies in a single level for some moderator analyses ($k < 5$), a fixed effects model was employed (Hedges & Vevea, 1998). Fixed effects models yield higher power and are less conservative compared to random effects models. This difference in model used may explain why some levels of a moderator were significant, and others were not (Card, 2011). It is possible that we failed to detect some significant differences among moderator levels when a random effects model was employed. It is also possible that no meaningful differences exist between levels of moderators, but the increased power of the fixed effects model lead to significant results. This should be taken into consideration when interpreting the moderation analyses results.

Implications of Study

The results of this meta-analysis has implications for both the bullying literature and key stakeholders involved in the implementation and maintenance of bullying prevention programs. Although studies have investigated the role of teacher-student relationships and its links to student bullying involvement (e.g., Longobardi et al., 2018; Marengo et al., 2018), there has been, until now, limited understanding as to the size of the effect and overall direction of effects. The present study provides direction to the bullying literature by offering a deeper understanding

of the specific context of a child, and in particular at the level of mesosystem (Bronfrenbrenner, 2006). Particularly, it offers greater insight and comprehension into the specific influence of teacher-student relationships in peer interactions at school. Importantly, because random effects models were used for the four primary meta-analyses, the findings can be generalized beyond the studies included in this meta-analysis. In this way, educators, policy makers, and researchers can apply the findings from this meta-analysis to their own unique populations of students. While the literature on teacher-student relationships and peer aggression indicates relatively clear trends, some inconsistency exists in the scholarship. By summarizing the findings across studies, including studies that did not find results consistent with the trends, and parsing out the unique effects of bullying perpetration and victimization and teacher-student relationship closeness and conflict, this study provides a specific and thorough understanding into how these two constructs interact.

Results can inform bullying prevention programs worldwide by providing understanding as to where to allocate resources and energy. Using Bronfrenbrenner's Bioecological model as a theoretical backdrop, which postulates that various contexts and systems (e.g., peer networks and relationships with teachers) are interconnected and must be considered together, the results support the inclusion of additional training for teachers to promote relationships with their students that are characterized by high levels of closeness and low levels of conflict. Sabol and Pianta (2012) outline several studies that demonstrate the effectiveness of intervention programs that highlight the development of positive teacher-student relationships.

Importantly, the results of this meta-analysis highlight the particularly damaging association between teacher-student relationships characterized by conflict and peer aggression. It appears that these negative relationships have a significantly stronger link to peer aggression,

and potentially a stronger influence, than positive teacher-student relationships have on mitigating the nefarious effects of bullying. Programs should focus not only on fostering positive teacher-student relationships, but also concentrate on how to identify bullying risk-factors such as teacher-student relationships characterized by high conflict and low closeness, and ultimately de-escalate and reduce hostility and discord when they are present while at the same time foster warmth and support. Research that examines teacher's social-emotional competencies is particularly relevant here (Bouchard & Smith, 2017; Hen & Goroshit, 2016). Skills such as teacher attunement (i.e., identify and understand social dynamics of students; Rodkin & Gest, 2011), communicating care (i.e., connect with students where they are at; Noddings, N., 2005), and mindfulness (i.e., cultivating an awareness of self and other; Lynch & Ciccheti, 1992) are integral to mitigating conflictual teacher-student relationships and bolstering the development of close and supportive teacher-student relationships while also reducing bullying related experiences among students.

Future Research

This meta-analysis highlights some important areas for future research. First, more research is needed investigating conflictual teacher-student relationships in relation to peer aggression. Ninety out of 115 effect sizes were associated with teacher-student relationship closeness, but effect sizes regarding conflictual teacher-student relationships were far stronger. These results are aligned with literature examining teacher-student relationship quality and student engagement and achievement (Hamre & Pianta, 2001), indicating that conflictual teacher-student relationships appear to be more influential in determining student behaviours and outcomes. Given this trend, it is interesting that most studies in the meta-analysis included a measure of positive or close teacher-student relationships. It would be worthwhile for future

research to examine in more depth how teacher-student relationships characterized by conflict may relate to student bullying experiences to further understanding of this relationship dynamic in the context of peer aggression.

Another useful direction for future research is the consolidation and validation of measures for both bullying behaviour and teacher-student relationship quality. As noted prior, there was a large amount of heterogeneity between studies regarding the types of measures used. Moderator analyses were used to try and account for some of this heterogeneity. Volk and colleagues (2017) elude to this heterogeneity in relation to bullying literature. While peer aggression and teacher-student relationship quality can be conceptualized and measured in several ways, this variance in methodologies makes comparisons among studies difficult. Additionally, estimates of validity and reliability are less clear when using novel measures. It would be worthwhile for researchers in the field to work towards using measures with strong track records and substantial validity evidence to assess teacher-student relationship quality and peer aggression.

Conclusion

Overall, the results of this meta-analysis reveal the dynamic and interconnected nature between children and youth who bully others and are bullied themselves and their relationships with their teachers. That is, students who have relationships with their teachers that are positive, warm, and supportive are less likely to be involved in bullying incidents at school, whereas, students who experience conflictual, discordant, and hostile relationships with their teachers are more likely to bully others or be bullied. It is also an important reminder about how seemingly separate social contexts of the relationships with teachers and with peers nonetheless are mutually influential, as predicted by the Bioecological Model of development (Bronfrenbrenner

& Morris, 2006). Previous research has consistently found evidence for the unique role of student relationships with teachers in peer interactions (Luckner & Pianta, 2011; Elledge et al., 2016). This meta-analysis confirms these findings on a large, even global, scale. While the research synthesized in this meta-analysis includes extremely diverse participants, remarkably, the trends remain consistent. The results speak to a global need for students to feel as though there is an adult in their school who cares about them, who wants to connect with them, and endeavors to support them in their academics and otherwise. When such a positive relationship is manifested, students seem to extend this same warmth and care to their peers, and the classroom and playground become less aggressive and hostile environments.

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Appendix A

Literature Searches for Online Databases

PSYCInfo

MeSH Terms: Relational aggression (explode); victimization; teacher-student interaction.

Keywords: Teacher adj2 student adj2 relation*; teacher adj2 child adj2 relation*; teacher adj2 student adj2 interact*; teacher adj2 child adj2 interact*; 'peer harass*'; bully*; victim*; 'relation* aggress*.

Total Articles Identified: 229

ERIC

MeSH Terms: Bullying; victims; teacher student relationship.

Keywords: Teacher adj2 student adj2 relation*; teacher adj2 child adj2 relation*; teacher adj2 student adj2 interact*; teacher adj2 child adj2 interact*; bully*; victim*; 'peer harass*'.

Total Articles Identified: 409

ProQuest (Theses and Dissertations)

MeSH Terms: None.

Keywords: Teacher n/2 student n/2 relation*; teacher n/2 child n/2 relation*; teacher n/2 student n/2 interact*; teacher n/2 child n/2 interact*; bully*; victim*; 'peer harass*'; 'relation* aggress*'.

Specifics. Select 'anywhere but full text.

Total Articles Identified: 163

Education Source

MeSH Terms: Bullying (explode); victims of bullying, teacher student relationships.

Keywords: Teacher n2 student n2 relation*; teacher n2 child n2 relation*; teacher n2 student n2 interact*; teacher n2 child n2 interact*; bully*; victim*; 'peer harass*'; 'relation* aggress*'.

Specifics: Limit search to 'full text', academic journals only.

Total Articles Identified : 159

Appendix B

Draft of Literature Search for PsycInfo Database

1. exp Relational Aggression/

2. Victimization/

3. 'peer harass*'.mp.

4. bully*.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]

5. victim*.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]

6. 'relation* aggress*'.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]

7. 1 or 2 or 3 or 4 or 5 or 6

8. teacher student interaction/

9. ('teacher adj2 student adj2 relation*').mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]

10. ('teacher adj2 child adj2 relation*').mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]

11. ('teacher adj2 student adj2 interact*').mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]

12. ('teacher adj2 child adj2 interact*').mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]

13. 8 or 9 or 10 or 11 or 12

14. 7 and 13

Appendix C

Table 1

Characteristics of studies included in the meta-analyses

		Sample Characteristics					Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
Aceves et al., 2009	148	USA	Middle; Secondary	49.3% female	76 (51.5%) Latino, 36 (24.2%) Asian American, 28 (18.9) African American, 8 (5.3%) other (including Caucasian, Middle Eastern, or mixed ethnicity)	Reactive-Proactive Aggression Questionnaire (RPQ; Raine et al., 2006) to measure pro-active peer aggression	Self	Trust In and Respect For Teacher Scale (Battistich et al., 2004) to assess students appraisals of TSRQ	Self	-.277 (P/TSRclos)
Akiba et al., 2010	2970	Japan	Middle; Secondary			Created own measure to assess victimization and bullying behaviour	Self	Created own measures to assess Teacher Bonding, Student guidance, and Instructional support	Self	-.113 (P/TSRclos) .107 (V/TSRclos)
Archambault et al., 2016	333	Canada	Elementary	52.6% female		Extracted items from Socio-educational Environment Questionnaire to assess frequency of victimization	Self	Extracted items from the Student-Teacher Relationship Scale (Pianta, 2001) to assess conflict level in TSR	Self	.392 (V/TSRcon)
Bacchini et al., 2008	734	Italy	Middle; Secondary	50.1% female		Olweus Bully victim questionnaire (Olweus 1986	Self	Created own measure to assess student perceived relationship with	Self	-.090 (P/TSRclos) .070 (V/TSRclos)

		Sample Characteristics				Measurement Characteristics				Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
						1996) to assess frequency of victimization and perpetration		teacher, and if teacher has favourites		
Bae et al., 2019	313	South Korea	Middle; Secondary	51.6% female	148 (59%) of sample were of ethnic minority (at least 1 foreign born parent); Other half were of Korean ethnicity	Olweus Bully/Victim Questionnaire (modified version; Harel-Fisch et al., 2001; Olweus, 2007) to assess frequency of victimization and perpetration	Self	Student's Perceived Relationship with Teachers to assess teacher support and care of student (Harel-Fisch et al., 2011)	Self	-.273 (P/TSRclos) -.355 (V/TSRclos)
Bardack & Obradovic, 2017	89	USA	Elementary	52% female	59% minority status (25% Hispanic/Latino, 19% Asian, 12% Multiracial/ other, 3% Black)	MacArthur Health and Behaviour Questionnaire (Armstrong & Goldstein, 2003) to assess relational aggression	Teacher	Teacher-child closeness scale (Armstrong & Goldstein, 2003) adopted from STRS to assess teacher's perceptions of closeness with individual child	Teacher	-.020 (P/TSRclos)
Beran, 2009	794	Canada	Middle; Secondary	49.8% female		Survey developed for National Longitudinal Survey of Children and Youth (Statistics Canada, 1999) to measure frequency of victimization and bullying behaviour	Self	Survey developed for National Longitudinal Survey of Children and Youth (Statistics Canada, 1999) perceived support from teachers and fair treatment	Self	-.288 (P/TSRclos)

		Sample Characteristics				Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
Boulton et al., 2012	364	United Kingdom	Elementary	46.7% female		Peer nominations with items derived from previous studies (e.g., Boulton & Smith, 1994) to assess variety of bullying experiences	Peer	Created own scale to measure TSR on positive aspects only	Self	-.141 (V/TSRclos)
Boyesen & Bru, 1999	1071	Norway	Middle; Secondary			Created own measure to assess harassment of others and exposure to harassment by peers	Self	Created own measure to assess student perceptions of teacher support	Self	-.138 (P/TSRclos) -.048 (V/TSRclos)
Brendgen et al., 2011	434	Canada	Elementary	50.2% female	87% European decent, 3% African descent, 3% Asian descent, 1% Native North Americans. 6% did not disclose.	Peer nominations with items from Victimization subscale of modified Peer Nomination Inventory (Perry et al., 1988) and items inspired by Preschool Behaviour Questionnaire (PBQ; Behar & Stringfield, 1974) to assess victimization and bullying	Peer	Teacher-Child Relationships Scale (STRS; Pianta et al., 1995), to assess closeness and conflict in TSR	Teacher	-.255 (P/TSRclos) -.100 (V/TSRclos)

		Sample Characteristics				Measurement Characteristics				Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
						experiences of classmates				
Bru et al., 2002	3834	Norway	Middle; Secondary			Created own measure to assess harassment of others	Self	Scale developed by Center for Behavioural Research to assess student perception teacher support	Self	-.085 (P/TSRclos)
Chen & Astor, 2011	7841	Taiwan	Middle; Secondary	51.3% female, 0.3% did not indicate gender		Created own scale to assess student violence against students and direct victimization	Self	Created own scale to assess experiences of poor TSR	Self	.098 (V/TSRcon) .173 (P/TSRcon)

		Sample Characteristics				Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
Chen & Astor, 2012	3058	Taiwan	Middle; Secondary	49.5% female, 2.3% did not indicate gender		Created own scale to assess student violence against others and direct victimization	Self	Created own scale to assess experiences of poor TSR	Self	.135 (V/TSRcon) .211 (P/TSRcon)
Cho & Wooldredge, 2018 (South Korea)	2671	South Korea	Middle; Secondary		Mostly homogenous racial make-up of country's youth population	No specific scale mentioned to assess frequency of bullying	Self	No specific scale mentioned to assess attachments to teachers	Self	-.037 (V/TSRclos)
Cho & Wooldredge, 2018 (USA)	4990	USA	Middle; Secondary		22% Non-white	No specific scale mentioned to assess frequency of bullying	Self	No specific scale mentioned to assess attachments to teachers	Self	-.404 (V/TSRclos)
Cornell et al., 2015	39 364	USA	Middle; Secondary	51.7% female	52.4% White, 18.2% Black, 12.8% Hispanic, 3.4% Asian, 1.6% American Indian or Alaska Native, .5% Native Hawaiian or Pacific Islander,	No specific scale name mentioned to assess frequency of victimization; General Victimization scale (Gottfredson, 1999) to assess	Self	Derived from Learning Environment Scale (Austin & Duerr, 2005) and Willingness to Seek Help scale (Bandyopadhyay et al., 2009) to assess perceived	Self	-.354 (V/TSRclos)

		Sample Characteristics					Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
					15.6% identifying self as more than one race	general victim experiences		supported-ness of teacher		
Cortes & Kochenderfer-Ladd, 2014	278	USA	Elementary	51.4% female	46.3% Hispanic or Mexican American, 43.5% White, 10.2% Black and Other	Created own peer rating items to assess classmates picking on others; Multi-source Peer Victimization Inventory to measure victimization experiences	Peer; Self	Student-Teacher Relationship Scale (STRS; Pianta, 2001) to assess closeness of TSR	Teacher	-.192 (P/TSRclos) -.035 (V/TSRclos)
Datta et al., 2017	56 508	USA	Middle; Secondary	48.3% female	15.8% Hispanic or Latino, 49.4% White, 18.1% Black, 6.8% Asian, 2.2% American Indian or Alaskan Native, 1.0% Native Hawaiian or Pacific Islander, 22.5% Multiracial	No specific scale mentioned to assess frequency of being bullied	Self	Derived from the Authoritative School Climate Survey (Cornell, 2013) to assess supportiveness of TSR	Self	-.151 (V/TSRclos)
Davidson & Demaray, 2007	355	USA	Middle; Secondary	53% female	97% Caucasian (344), 2% Hispanic (7), 0.8% African American (3), .3% Asian American (1)	Bully-Victimization Scale (BVS; Reynolds, 2003) to assess victimization and bullying experiences	Self	Child and Adolescent Support Scale (CASSS; Malecki et al., 2000) to measure social support from teachers	Self	-.084 (P/TSRclos) -.097 (V/TSRclos)

		Sample Characteristics					Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
Di Stasio et al., 2016	678	Canada	Middle	51% female	55.2% European descent, 4.4% South Asian, 1.4% Southeast Asian, 1.7% African American, 1% Aboriginal, .7% West Asian, .7% Latin American, 23.3% other, 11% no response	Illinois Bully Scale (IBS; Espelage & Holt, 2001) to assess frequency of bullying, victimization, and fighting	Self	Student's Classroom Environment Measurement (SCEM; Midgley et al., 1991), subscale of Teacher/student relations to assess fair treatment and care for students	Self	
Doty et al., 2017	121 311	USA	Middle; Secondary	49.8% female	74% White, 6.9% Multiracial, 7.3% Hispanic, 5.3% Black, 5.6% Asian or Pacific Islander, 1.2% American Indian/Alaskan Native	California Healthy Kids survey (California Department of Education, 2010) to assess frequency of bullying perpetration and victimization	Self	Created for the Minnesota Student Survey to assess perceived connectedness with teacher	Self	-.224 (V/TSRclos)
Doumas & Midgett, 2019	110	USA	Elementary	59.1% female	62.7% Caucasian, 9.1% Hispanic, 9.1% African American, 6.4% Asian, 0.9% Pacific Isalnder, 11.8% other	Olweus Bullying Questionnaire (Olweus, 1996) to assess bullying perpetration and victimization	Self	Psychological Sense of School Membership (PSSM; Goodenow, 1993), used subscale of caring relationships to assess quality of TSR	Self	-.406 (V/TSRclos)

		Sample Characteristics					Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
Doumen et al., 2008	154	Belgium	Elementary	52% female	9% at least one parent who was not Belgian nationality.	Subscale Aggressive with Peers of the Child Behaviour Scale (CBS; Ladd & Profilet, 1996) to measure frequency of peer aggression; Extracted single item from CBS (Ladd & Profilet, 1996) for peer nomination procedure to assess bullying perpetration	Teacher; Peer	Conflict subscale in Student-Teacher Relationship Scale (STRS; Pianta, 2001) to assess conflict experienced in TSR; Peer nomination procedure paralleled STRS (Pianta, 2001) to assess peer's perspective of conflict in TSR of classmates	Teacher; Peer	.586 (P/TSRcon)
Elledge et al., 2016	361	USA	Elementary	53.9% female	61.1% Caucasian, 25.4% Hispanic, 13.5% other racial/ethnic groups	Adapted School Experiences Questionnaire (SEQ; Kochenderfer-Ladd, 2004) to assess peer victimization; No specific scale mentioned to assess teacher's ratings of victimization frequency; Modified version of Revised Class Play (Masten et al., 1985) to	Self; Teacher; Peer	Peer nomination procedure (Hughes et al., 2001) to assess peer perceptions of classmate TSR quality	Peer	-.216 (V/TSRclos)

		Sample Characteristics					Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
						assess bullying and victimization of classmates				
Elsaesser et al., 2013	5106	USA	Middle; Secondary	49.2% female	52.1% African American, 21.2% Hispanic, 17.3% Caucasian, remaining as American Indian or Asian	Problem Behaviour Frequency Scales (Farrell et al., 2000) to assess relational aggression and victimization	Self	Vessels' School Climate Survey (Vessels, 1998) to assess fair treatment and criticisms from teachers	Self	.100 (P/TSRclos) -.255 (V/TSRclos)
Ertesvag, 2016	1571	Norway	Middle; Secondary	50.8%, 1.4% did not report gender		No specific scale (previously validated by Roland, 1999) mentioned to assess various types of bullying	Self	No specific scale mentioned to assess teacher emotional support and teacher instructional support scale (validated by Ertesvag & Havik, 2016)	Self	-.110 (P/TSRclos)
Espelage et al., 2014	3616	USA	Middle; Secondary	48% female	Illinois: Black=33.5%, 33.1% Latino, 1.0 Asian, 20.2% White, 11.7% Biracial. Kansas: Latino=35.2%, White=30.4%, 17.5% Black,	Illinois Bully Scale to measure bullying perpetration; Illinois Fighting scale to measure frequency of physical aggression; Illinois Victimization	Self	Subscale of School Environment Survey, adapted from Colorado Trust's Bullying Prevention Initiative (Csuti, 2008), to assess positive teacher-staff-student interactions	Teacher	-.611 (P/TSRclos) -.497 (V/TSRclos)

		Sample Characteristics					Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
					4.2% Asian, 12.8% Biracial.	Scale to assess frequency of peer victimization (all Espelage & Holt, 2001)				
Flaspohler et al., 2009	4331	USA	Elementary	49.2% female		Bully/Victim Questionnaire (Olweus, 1996) to assess frequency of peer victimization	Self	Teacher subscale of Child and Adolescent Social Support Scale (CASSS; Malecki et al., 2000) to assess social support from teachers	Self	-.147 (V/TSRclos)
Gyllborg, 2013	116	USA	Elementary	54.3% female	90.4% (103) White, 5.3% (6) Hispanic, .9% Black (1), 3.5% Asian (4)	Relational aggression subscale of Children's Social Behaviour Scale (CBS-S; Crick & Grotpeter, 1995) to measure relational aggression; Relational victimization subscale from Children's Social Experiences	Self	Short form of Student-Teacher Relationship Scale (Pianta, 1995) to assess conflict and closeness in TSR	Teacher; Self	-.143 (P/TSRclos) .097 (V/TSRclos) .210 (V/TSRcon) .280 (P/TSRcon)

		Sample Characteristics				Measurement Characteristics				Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
						Questionnaire to assess relational victimization experiences				
Havik, 2017	1571	Norway	Middle; Secondary	50.8% female		Scale developed by Roland and Idsoe (2001) to assess various types of peer victimization	Self	No specific scale mentioned to assess teacher emotional support and teacher instructional support (validated by Ertesvag & Havik, 2016)	Self	-.188 (V/TSRclos)
Herrero et al., 2006	973	Spain	Middle; Secondary	52.8% female		Scale taken from Mynard and Joseph (2000) to measure various forms of peer victimization	Self	Created own measure to assess quality TSR and degree of non-conflict	Teacher	-.175 (P/TSRclos) -.060 (V/TSRclos)
Idsoe et al., 2008	2083	Norway	Middle; Secondary	51.5% female		Developed at Centre for Behavioural Research (Roland & Idsoe, 2001) to assess frequency of bullying behaviour	Self	Adopted from School Environment Questionnaire developed by Centre for Behavioural Research to assess teacher emotional support and teacher autonomy	Self	-.326 (P/TSRclos)

		Sample Characteristics					Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
Iimori, 2002	817	USA	Middle; Secondary	48.7% female	90.3% Caucasian, 1.8% Asian, 1.1% African-American, 1.1% Hispanic, 1.0% Native American, 4.7% other.	No specific scale indicated to assess peer aggression; No specific scale mentioned to assess peer victimization experiences	Self	No specific scale mentioned to assess teacher support for student	Self	-.199 (P/TSRclos) -.147 (V/TSRclos)
Jia et al., 2018	747	China	Middle; Secondary	48.9% female		Adolescent Peer Victimization Questionnaire (Li et al., 2017) to assess frequency of peer victimization	Self	Adapted from Inventory of Parent and Peer Attachment (Jia et al., 2017) to assess closeness in TSR	Self	-.224 (V/TSRclos)
Khoury-Kassabri, 2011	4495	Israel	Elementary	54% female	Two ethnic groups: Arab schools and Jewish schools. Higher response rate from Arab schools (58.8%).	Adapted from California School Climate Survey (Furlong et al., 2005; Rosenblatt & Furlong, 1997) to measure frequency of peer victimization	Self	The School Climate Scale (Benbenishty, 2003) to assess teacher support	Self	-.105 (V/TSRclos)
Kremer, 2010	153	USA	Elementary	47.1% female	42% Hispanic, 46% White, 2% African American, 4% Native American, 1% Asian, 5% Biracial	This Child's Interactions with Peers Scale (Ladd & Kochenderfer-Ladd, 2002) to assess frequency of peer victimization	Teacher	Truncated version of Student-Teacher Relationship Scale (Pianta, 1994), to assess closeness, and conflict	Teacher	-.151 (V/TSRclos) .576 (V/TSRcon)

		Sample Characteristics					Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
Kuhns, 2008	697	USA	Elementary	47.4% female	34.1% White, 37.4% Hispanic, 23.2% African-American, 3.6% Asian/Pacific Islander, .3% Native American/Alaskan Native, 1.5% Other	Peer nomination procedure to assess aggressive behaviour of classmates	Peer	Teacher Student Relationship Inventory (TSRI; Hughes et al., 2001) to assess teacher support and conflict; Peer nomination procedure to assess teacher support of classmates	Teacher; Peer	-.266 (P/TSRclos)
Lam et al., 2017	454	Hong Kong	Middle; Secondary	49.4% female	All Chinese	Several scales to assess frequency of peer aggression and victimization (all scales Hill & Werner, 2006)	Self	Caring Adult Relationships in School Scale in California Healthy Kids Survey (WestEd, 2000) to assess teacher support for relatedness	Self	-.277 (P/TSRclos) -.218 (V/TSRclos)
Leadbeater et al., 2015	800	Canada	Elementary	51% female	95% European Caucasian, 2% Aboriginal, 1% Asian, 1% mixed ethnicity. Less than 1% Hispanic, Indo-Canadian, or African Canadian.	Social Experience Questionnaire (SEQ, Crick & Grotpeter, 1996) to assess frequency of peer victimization experiences	Self	Student-teacher relations aspect of School Climate Survey (Haynes et al., 1993) to assess closeness and trust in TSR	Self	-.277 (P/TSRclos)

		Sample Characteristics				Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
Lohbeck & Petermann, 2018	332	Germany	Middle; Secondary	54.5% female		Created new scales to assess various forms of cyber-victimization	Self	Adapted from Teacher-Student Relationship Questionnaire of PISA (Kunter et al., 2002) to assess quality and caring in TSR	Self	-.125 (P/TSRclos)
Longobardi et al., 2018	435	Italy	Middle; Secondary	48.8% female	4.4% of sample consisted of 1st of 2nd generation immigrants.	Olweus Bully/Victim Questionnaire (OBVQ; Olweus, 1996) and Participant Role Scale (PRS; Jungert et al., 2016) to assess involvement in bullying behaviour and victimization	Self	Student Perception of Affective Relationship with Teacher Scale (SPARTS; Koomen & Jellesma, 2015) to assess closeness, conflict, and negative expectations within TSR	Self	-.139 (P/TSRclos) .241 (P/TSRcon)

		Sample Characteristics				Measurement Characteristics				Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
Lucas-Molina et al., 2015	1864	Spain	Elementary	50.7% female		Adapted from another study (Children's Ombudsman of the Region of Madrid, 2006) to assess frequency of victimization and peer aggression	Self	Adapted from Benbenishty and Astor (2005) to assess student perceived teacher support in TSR; Student-to-teacher aggression scale (Mendoza, 2006), to assess frequency of aggressive behaviours towards teacher by student; Direct and indirect teacher-to-student aggression scale (Mendoza, 2006) to assessed frequency of teacher aggressive behaviour towards student	Self	-.020 (P/TSRclos) -.095 (V/TSRclos) .210 (V/TSRcon) .259 (P/TSRcon)
Mann et al., 2015	7084	Iceland	Middle; Secondary	51.5% female		Developed by Icelandic Institute for Educational Research (IER) and ICSRA to assess frequency of bullying perpetration and victimization	Self	No specific scale indicated to assess quality of TSR	Self	.075 (P/TSRclos) .016 (V/TSRclos)
Marachi et al., 2007	8404	Israel	Middle; Secondary	50% female		Adapted from California School Climate Survey (Furlong, 1999) to	Self	Adapted from California School Climate Survey (Furlong, 1999) to	Self	-.430 (V/TSRclos)

		Sample Characteristics					Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
						assess presence of victimization		assess teacher support		
McAuliffe et al., 2009	127	USA	Elementary	49.6% female	32.3% European American, 31.5% African American, 25.2% Hispanic/Latino, 3.2% another race. 6.3% more than one race, 1.6% no response	Peer nomination procedure (Crick & Grotpeter, 1995) to assess peer aggression in classmates	Peer	No specific scale indicated to assess teacher liking for each individual student	Teacher	-.604 (P/TSRclos)
Meehan et al., 2003	140	USA	Elementary	33.6% female	37% Caucasian, 41% African American, 22% Hispanic.	Modified version of Revised Class Play Method (Masten et al., 1985) to assess relational aggressive behaviour in classmates	Peer	Network of Relationships Inventory (NRI; Furman & Buhrmester, 1985) to assess aspects of support from teacher including	Self	.030 (P/TSRclos)
Moore et al., 2018	761	USA	Middle/Secondary	25.6% female	11.4% (133) Other, 13.1% (153) Black, 14.1% (165)White, 10.9% (128) Mixed, 50.5% (590) Hispanic	California Healthy Kids Survey (CHKS; WestEd, 2000) to assess frequency of victimization	Self	California Healthy Kids Survey (CHKS; WestEd, 2000) to assess caring relationships with teacher	Self	.121 (V/TSRclos)

		Sample Characteristics					Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
Murray-Harvey & Slee, 2010	888	Australia	Middle; Secondary	49% female	No specific data on sample - population typically Anglo-European, with minority of Asian, Middle-Eastern, and Indigenous Australian students.	Your Life at School questionnaire to assess frequency of bullying perpetration and victimization	Self	Your Life at School questionnaire to measure presence of stressfulness and supportiveness in TSR	Self	-.321 (P/TSRclos) -.215 (V/TSRclos) .585 (V/TSRcon) .359 (P/TSRcon)
Pabian & Vandebosch, 2016	2128	Belgium	Middle; Secondary	50.5% female	94.8% Belgian nationality.	No specific scale mentioned to assess frequency of cyber-bullying, cybervictimization, traditional bullying, and traditional bullying victimization	Self	Adapted Dutch language school commitment scale (Murdock & Phelps, 1973) to assess student bonding to teacher	Self	-.094 (P/TSRclos) .031 (V/TSRclos)
Raskauskas et al., 2010	1168	New Zealand	Elementary	52% female	Although no data collected here, sample represented ethnic makeup of New Zealand school pop.:70% European, 15% Maori, 10% Asian, 5% Pacific nations.	Peer Relations Questionnaire (PRQ; Rigby 1997) to assess prevalence of bullying and victimization	Self	Student-teacher relationships subscale from Safe Communities -Safe Schools survey (Elliott et al., 2000) to assess quality of TSR	Self	-.203 (P/TSRclos) -.030 (V/TSRclos)

		Sample Characteristics				Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
Reavis et al., 2010	218	USA	Elementary	56% female	64% Caucasian	Peer nomination procedure (Coie et al., 1982) to assess peer victimization	Peer	Student-Teacher Relationship Scale (STRS; Pianta, 2001) to assess conflict and closeness in TSR	Teacher	-.030 (V/TSRclos) .060 (V/TSRcon)
Richard et al., 2011	18 222	France	Middle; Secondary	52% female	85% Caucasian	Scale developed by Dauphin and Trosseille (2004) to assess peer victimization	Self	Scale developed by Dauphin and Trosseille (2004) to measure quality of TSR	Self	-.202 (P/TSRclos)
Rigby & Bagshaw, 2003	3551	Australia	Middle; Secondary			No specific scale indicated (e.g., Rigby & Bagshaw, 2001) to assess frequency of indirect bullying perpetration and victimization	Self	Created own scale for study to assess perceived helpfulness and fair treatment of teachers	Self	-.141 (P/TSRclos) -.070 (V/TSRclos)
Roth et al., 2011	725	Israel	Middle; Secondary	50% female		Scale developed by Rolider et al. (2001) to assess frequency of peer aggression	Self	Created own measure from Assor et al. (2002) Roth et al. (2007) and the Learning Climate Questionnaire (Williams & Deci, 1996) to assess student perception of teacher supporting student autonomy	Self	-.266 (P/TSRclos)

		Sample Characteristics					Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
Rucinski, 2010	526	USA	Elementary	53.8% female	44.5% (234) Hispanic, 18.1% (95) Black, 11.8% (62) White, 25.5% (134) Other racial-ethnic groups (approx. 95% of Other group identified as Asian/Pacific Islander).	Aggression Scale (Orpinas and Frankowski, 2001) to assess frequency of peer aggression	Self	Student-Teacher Relationship Scale (STRS; Pianta, 2001) to assess closeness and conflict of TSR; Drawn from Classroom Assessment Scoring System to assess trust and emotional support (Pianta et al., 2010)	Teacher; Self	-.131 (P/TSRclos) .110 (P/TSRcon)
Rudasill et al., 2013	1364	USA	Elementary	48.3% female, 1 missing	80% (1097)White, 13% (176) Black, 7% (91) Hispanic, Asian American, or American Indian.	Adapted from Child Behaviour Scale (Ladd & Profilet, 1996), Peer Victimization Scale (Kochenderfer & Ladd, 1996), and Relational Aggression scale (Crick et al., 1996) to assess bullying perpetration and victimization	Teacher	Student-Teacher Relationship Scale (STRS; Pianta, 2001) to assess closeness and conflict of TSR	Teacher	-.100 (P/TSRclos) -.090 (V/TSRclos) .234 (V/TSRcon) .388 (P/TSRcon)

		Sample Characteristics					Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
Runions & Shaw, 2013	377	Australia	Elementary	50.1% female	Most spoke English in home. Non-English speakers were representative of immigration to Western Australia.	Derived from the Social Behaviour Questionnaire (SBQ; Tremblay et al., 1991) to assess physical peer aggression	Teacher	Student-Teacher Relationship Scale (STRS; Pianta, 2001) to assess closeness and conflict in TSR	Teacher	-.192 (P/TSRclos) .741 (P/TSRcon)
Runions, 2014	794	Australia	Elementary	48% female	Teacher reported on perceived ancestries of children: 58.4% North-Western Europe, 5.4% Aboriginal or Torres Straight Islander, 5.6% Asian, 1.8% African, 10.2% Continental European, 2.0% Middle-Eastern or North African, 17.2% reported I don't know.	Social Behaviour Questionnaire (SBQ; Tremblay et al., 1991) to assess victimization experiences	Teacher	Student-Teacher Relationship Scale (STRS; Pianta, 2001) to assess level of conflict in TSR	Teacher	.343 (V/TSRcon)
Serdiouk et al., 2016	1568	USA	Elementary	48.8% female	47% European American, 35% African American, 10% Hispanic, 4% Other	Olweus Victim Questionnaire (Olweus, 1996) to assess frequency of peer victimization	Self	Created own scale resembling closeness subscale of the Student-Teacher Relationship Scale (STRS; Pianta &	Teacher	-.070 (V/TSRclos)

Authors	*N*	Sample Characteristics: Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	Measurement Characteristics: PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	Effect Size: *r*
								Steinberg, 1992) to assess closeness and avoidance in TSR		
Stipek & Miles, 2008	301	USA	Elementary	51.7% female	35% African American, 34% White, 28% Latino, 2% Asian, 1% Native American.	Subscale of the Child Behaviour Scale (CBS; Ladd & Profilet, 1996) to assess peer aggression	Teacher	Items from the Student-Teacher Relationship Scale (STRS; Pianta et al., 1995) to assess level of conflict in TSR	Teacher	.523 (P/TSRcon)
Sulkowski & Simmons, 2017	539	USA	Middle; Secondary	51% female	43% (236) Hispanic/Latino, 27% (145) White/Caucasian, 8% (41) Black/African American, 4% (19) Asian American, 2% (8) Native American/American Indian, 1% (4) Pacific Islander, 4% (19) Other.	Peer Victimization scale on Revised Peer Experiences Questionnaire (RPEQ; Prinstein et al., 2001) to assess frequency victimization	Self	Teacher-Student Relationships subscale on School Climate Measure (SCM; Zullig et al., 2010) to assess quality of TSR	Self	-.424 (P/TSRclos)

		Sample Characteristics					Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
Tanigawa, 2009	544	USA	Middle; Secondary	56% female	40% Hispanic/Latino, 29% White, 20% Multi-ethnic, 5% Asian, 2% Black/African American, <1% American Indian or Alaskan Native, <1% Other.	Victim scale of the California Bully/Victim Scale (Furlong et al., 2010) to assess frequency of peer victimization	Self	Child and Adolescent Social Support Scale (CASSS; Malecki et al., 2000) to assess perceived social support from teachers	Self	-.472 (V/TSRclos)
Thornberg et al., 2018	899	Sweden	Elementary	48.4% female	Majority Swedish background, 16% had immigrant background.	Created own measure (Thornberg et al., 2016) to assess prevalence of peer victimization	Self	Adopted the Class relational climate scale (Thornberg et al., 2016) to assess quality of TSR	Self	-.388 (V/TSRclos)
Troop-Gordon & Kopp, 2011	410	USA	Elementary	52.9% female	87.1% European American, 1% African-American, 1.2% Asian-American, 4.6% Native American, 1% Hispanic, 5.1% mixed ethnic background.	Peer rating derived from Ladd and Kochenderfer-Ladd's (2002) scales to assess frequency of peer aggression and victimization	Peer	Student-Teacher Relationship Scale (STRS; Pianta & Steinberg, 1992) to assess closeness and conflict	Teacher	-.123 (P/TSRclos) .348 (P/TSRcon)

		Sample Characteristics				Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
Troop-Gordon & Kuntz, 2013	352	USA	Elementary	52.8% female	88% Caucasian, .9% Asian-American, .6% African-American, 1.4% Hispanic, 4.6% Native American, 4.6% mixed or other ethnicity.	Adapted from Multi-Informant Peer Victimization Inventory (Ladd & Kochenderfer-Ladd, 2002) to assess peer harassment	Self	Items taken from the Student-Teacher Relationship scale (STRS; Pianta & Steinberg, 1992) to assess closeness and conflict in TSR	Self	-.020 (V/TSRclos) .131 (V/TSRcon)
Unal & Cukur, 2011	3742	Turkey	Middle; Secondary	48% female		No specific measure indicated to assess frequency of victimization	Self	Adopted from Richmond Youth Project (Hirschi, 1969) to assess student attachment to teacher	Self	-.192 (V/TSRclos)
Valle et al., 2018	426	Brazil	Middle; Secondary	58% female		School Violence Scale (Stelko-Pereira et al., 2010) to assess prevalence of bullying perpetration and victimization	Self	Teacher-Student Relationship Scale (Lamas et al., 2013) to assess closeness and conflict in TSR	Self	-.310 (P/TSRclos) -.266 (V/TSRclos)
van der Zanden et al., 2015	781	Netherlands	Elementary	49.9% female		Bullying others' and 'victim of bullying' subscale of Olweus Bully/Victim Questionnaire (Olweus, 1989) to assess frequency of bullying perpetration and victimization	Self; Self	Questionnaire on Teacher Interaction (QTI; Wubbels et al., 2006) to assess aspects of closeness and conflict	Self	-.133 (P/TSRclos) -.157 (V/TSRclos) .137 (V/TSRcon) .160 (P/TSRcon)

		Sample Characteristics				Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
Wang et al., 2015	435	USA	Middle; Secondary	56.8% female	71.3% Caucasian, 6% African American, 4.1% Asian American, 3.4% Hispanic, 1.4% Eastern European.	Verbal and Physical Bullying Scale (VPBS; Swearer et al., 2008; Radliff et al., 2015) to assess bullying perpetration	Self	School Climate Survey Revised Edition - Elementary and Middle School Version (SCS-ESV; Emmons et al., 2002) to assess teacher-student relationship quality	Self	-.208 (P/TSRclos)
Wang et al., 2018	1148	China	Elementary	45% female		Delaware Bullying Victimization Scale (Bear et al., 2011) to assess perceived bullying victimization	Self	Delaware School Climate Survey (Bear et al., 2016) to assess teacher-student relationship quality	Self	-.239 (V/TSRclos)
Wang et al., 2016	1075	USA	Elementary	50% female	48.1% White/European American, 28.7% Black/African American, 11% Hispanic, 7.3% Asian, .4% American Indian, 4.5% multiracial.	No specific scale indicated to assess prevalence of peer victimization	Self	No specific scale indicated, assessed teacher preference for each child, 1 item (5-point scale); No specific scale indicated, assessed student perceived relationship quality with teacher,	Teacher; Self	-.100 (V/TSRclos)

		Sample Characteristics					Measurement Characteristics			Effect Size
Authors	*N*	Country	School Level	Gender	Ethnicity	Peer Aggression (PA) Measure	PA Informant	Teacher-Student Relationship (TSR) Measure	TSR Informant	*r*
Yang, 2015	25 896	USA	Middle; Secondary	51.5% female	45.4% Caucasian, 24.6% African American, 14.6% Hispanic/Latino, 3.55% Asian, 11.9% Other	Delaware Bullying Victimization Scale - Student (DBCS-S; Bear et al., 2014) to assess frequency of bullying victimization	Self	Teacher-Student Relationships subscale of Delaware School Climate Survey - Student (DSCS-S; Bear et al., 2014), assessed quality of interactions between teachers and students, 4 items (4-point scale)	Self	-.141 (V/TSRclos)
Yeung & Leadbeater, 2010	664	Canada	Middle; Secondary	51.5%	86% Caucasian, 4% Asian, 2% Aboriginal, 1% Hispanic, 1% African, 1% East Indian, 1% Middle Eastern, 4% Other	Relational victimization and physical victimization subscales of Social Experiences Questionnaire (SEQ; Crick & Grotpeter, 1995) to assess frequency of peer victimization	Self	No specific scale indicated, assessed teacher emotional support and reciprocity as perceived by student, 3 items (5-point scale)	Self	-.151 (V/TSRclos)

Note. P = Peer perpetration, V = Peer victimization, TSRclos = Teacher-student relationship closeness, TSRcon = Teacher-student relationships conflict.