

Universal Factors and Tier 1 Interventions Associated with Quality Student-Teacher  
Relationships

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## **Dedication**

To my best friend and husband, you are my brightest light in life. Although this work is authored by me on paper, I truly believe it is just as much yours. Your endless sacrifices and dedication to my success are the main reasons I have reached this goal. From the bottom of my heart, thank you.

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*On to our next adventure.*

## Abstract

Past research has shown student-teacher relationships (STRs) are associated with a variety of positive and negative student-outcomes including academic achievement, engagement, school adjustment, attendance, disruptive behaviors, suspension, and risk of dropping out. Schools can support student-teacher relationships universally by implementing school- and class-wide programs and practices that facilitate positive, high-quality STRs. Due to the volume of studies that have examined the relationship between school- and class-wide factors and programs with STRs, high quality research synthesis is needed. Study 1 contributed a systemic review of school- and class-wide factors found to be associated with STRs. Study 2 applied meta-analytic and common element techniques to determine effect sizes and practice elements of interventions that improve STRs. The programs with the largest effects sizes were Establish-Maintain-Restore (EMR) and BRIDGE. Other programs demonstrated larger effect sizes in one study; however, their overall combined effect sizes revealed smaller effects. The common elements procedure identified 44 total practices across all organizational categories teachers can use to promote positive STRs. More specifically, this procedure identified 14 proactive practices that directly impact relationships between students and teachers. Programs with the largest effect sizes contained the most proactive and direct practices for improving STRs. Implications of these findings and future research recommendations are discussed.

*Keywords:* student-teacher relationship, universal influences, school- and classroom level factors, programs, and practice

## Table of Contents

<b>DEDICATION .....</b>	<b>I</b>
<b>ACKNOWLEDGEMENTS .....</b>	<b>II</b>
<b>ABSTRACT.....</b>	<b>IIV</b>
<b>LIST OF TABLES .....</b>	<b>VIII</b>
<b>LIST OF FIGURES .....</b>	<b>IIX</b>
<b>CHAPTER 1.....</b>	<b>1</b>
BACKGROUND .....	1
RATIONALE.....	2
STUDY 1. ....	3
STUDY 2. ....	4
SUMMARY .....	4
DEFINITION OF TERMS.....	6
<b>CHAPTER 2.....</b>	<b>8</b>
STUDENT-TEACHER RELATIONSHIP DEFINED .....	8
IMPORTANCE OF THE STUDENT-TEACHER RELATIONSHIP .....	9
THE STUDENT-TEACHER RELATIONSHIP SYSTEM .....	10
INDIVIDUAL CHARACTERISTICS.....	12
TEACHER’S AND STUDENT’S PERCEPTIONS.....	12
STUDENT-TEACHER INTERACTIONS (STIs).....	13
EXTERNAL INFLUENCES OF EDUCATIONAL SYSTEMS/CONTEXTS ON THE STR. ....	14
PURPOSE.....	16
<b>METHOD.....</b>	<b>16</b>
SEARCH STRATEGY .....	16
INCLUSION CRITERIA.....	19
DATA EXTRACTION/CODING.....	20
QUALITY APPRAISAL.....	21
<b>RESULTS.....</b>	<b>22</b>
STUDY CHARACTERISTICS .....	22
MEASUREMENT TOOLS .....	23
SCHOOL- AND CLASSROOM LEVEL FACTORS RELATED TO THE STR .....	24
SEL CURRICULA/PROGRAMS.....	24
PROGRAMS DESIGNED TO IMPROVE STRS.....	26
STUDENT-TEACHER INTERACTIONS (STIs).....	27
CLASSROOM MANAGEMENT OF TEACHERS.....	28
ADDITIONAL RELATIONSHIPS.....	28

<b>DISCUSSION.....</b>	<b>39</b>
STR SYSTEM COMPONENTS.....	41
FINDING ACROSS AGE RANGES .....	42
METHODOLOGICAL RIGOR OF STUDIES CAPTURED.....	42
LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH .....	44
IMPLICATION FOR PRACTICE .....	46
CONCLUSION .....	48
<b>CHAPTER 3.....</b>	<b>49</b>
THE STUDENT-TEACHER RELATIONSHIP: CONCEPTUALIZATIONS AND THEORETICAL UNDERPINNINGS.....	49
OUTCOMES ASSOCIATED WITH STUDENT-TEACHER RELATIONSHIPS.....	51
IMPORTANCE OF PREVENTION .....	52
HIERARCHY OF RESEARCH EVIDENCE .....	53
META-ANALYSIS.....	54
COMMON ELEMENTS. ....	54
GAPS IN LITERATURE AND PURPOSE.....	56
<b>METHOD.....</b>	<b>56</b>
SEARCH STRATEGY .....	56
INCLUSION CRITERIA.....	60
META-ANALYSIS.....	63
CONVERTING AND REPORTING EFFECT SIZES. ....	63
WEIGHTING EFFECT SIZES.....	65
PUBLICATION BIAS. ....	66
COMMON ELEMENTS DATA EXTRACTION/CODING .....	66
<b>RESULTS.....</b>	<b>70</b>
META-ANALYSIS.....	70
STUDY CHARACTERISTICS. ....	70
MEASUREMENT TOOLS.....	71
EFFECTS.....	72
PUBLICATION BIAS. ....	72
COMMON ELEMENTS RESULTS .....	72
<b>DISCUSSION.....</b>	<b>84</b>
CHARACTERISTICS OF STUDIES CAPTURED IN META-ANALYSIS .....	86
FINDINGS COMPARED TO PREVIOUS STUDIES.....	87
LIMITATIONS AND FUTURE DIRECTIONS.....	87
IMPLICATIONS FOR PRACTICE .....	88
CONCLUSION .....	89



<b>CHAPTER 4.....</b>	<b>91</b>
IMPLICATIONS FOR RESEARCH AND PRACTICE.....	91
RESEARCH.....	91
PRACTICE.....	94
CONCLUSION.....	95
<b>REFERENCES.....</b>	<b>96</b>
<b>APPENDIX A.....</b>	<b>120</b>
<b>APPENDIX B.....</b>	<b>122</b>
<b>APPENDIX C.....</b>	<b>123</b>
<b>APPENDIX D.....</b>	<b>125</b>
<b>APPENDIX E.....</b>	<b>132</b>

## **List of Tables**

Table 1. *Themes That Emerged Related to the STR and Their Definitions*

Table 2. *Study Characteristics*

Table 3. *Study Findings*

Table 4. *Quality Appraisal Tool of Quantitative Studies Findings*

Table 5. *Demographic Variables (total N = 19 studies)*

Table 6. *Effect Sizes (Cohen's D) of Program on STR Across Studies*

Table 7. *Organizational Scheme of Practices Components Across Effective Interventions*

Table 8. *Frequency of practice components and proportions across programs*

## List of Figures

- Figure 1.* Conceptual model of the Student-Teacher Relationship System
- Figure 2.* PRISMA chart: Systematic review process
- Figure 3.* Response to intervention approach with resource allocation
- Figure 4.* PRISMA flow diagram database results
- Figure 5.* Backward and forward citation search strategy
- Figure 6.* Heat map of geographical location of studies included in meta-analysis
- Figure 7.* Effect sizes by program type with overall STR as outcome
- Figure 8.* Effect sizes by program type with STR Closeness as the outcome variable
- Figure 9.* Effect sizes by program type with STR Conflict as the outcome variable
- Figure 10.* Publication bias when outcome is “Overall STR”
- Figure 11.* Publication bias when outcome is “STR Closeness”
- Figure 12.* Publication bias when outcome is “STR Conflict”

## CHAPTER 1

Teachers have reported increased prevalence of problematic student behaviors (Kauffman & Brigham, 2009; Scholastic, 2012), with the most common being hyperactivity, disruptive behavior, and distractibility (Harrison, Vannest, Davis, & Reynolds, 2015). In turn, teachers report feeling overwhelmed by these behaviors, in part, because of their unpreparedness to manage students' personal problems and classroom behavior (Begeny & Martens, 2006; Freeman, Simonsen Briere, 2013). One avenue for bolstering teachers' capacity to prevent and manage students' problematic behaviors is through positive, high quality student-teacher relationships (STRs). This dissertation has two purposes: (1) to identify the school- and class-wide factors related to the STR, and (2) to evaluate and distill school- and class-wide interventions that aim to improve STRs utilizing two procedures, meta-analysis (Cooper, Hedges, & Valentine, 2009) and the common elements approach (Chorpita, Daleiden, & Wiesz, 2005).

### **Background**

When students feel close with their classroom teachers, they are less likely to exhibit externalizing behaviors (Silver et al., 2005), be suspended (Green, 1998; Quin, 2016), or dropout (Cemalcilar & Goksen, 2012; Quin, 2016). Positive STRs can also serve as a protective factor for students who enter schools with more risk factors (Baker, 2006; Burchinal et al., 2002; Dearing et al., 2016), since strong STRs are also associated with better adjustment to school (Baker, 2006), engagement (Quin, 2016; Roorda et al., 2011), and academic achievement (Roorda et al., 2011). For teachers, positive STRs can reduce teacher stress and increase teacher well-being (Spilt, Koomen, & Thijs, 2012) and self-efficacy (Guerney & Flumen, 1970). Increased positive STRs are associated with

## STUDENT-TEACHER RELATIONSHIPS

better student engagement (Birch & Ladd, 1997; Pianta & Stuhlman, 2004), which is subsequently associated with an increase in teacher motivation (Hamre, Pianta, Bear, & Minke, 2006).

Given high quality STRs are beneficial to both students and teachers, implementing school- and class-wide interventions to improve STRs is pragmatic for a number of reasons. First, across fields and theories, relationships between students and school-based professionals are considered to be of great importance for development and resource allocation (Bandura, 1972; Pianta, 1999; Riley, 2010; Vygotsky, 1978). Second, research indicates all students can benefit from positive relationships at school, including students with the most significant needs (Baker, 2006; Dearing et al., 2016); thus, programs targeting STRs can be implemented school- and class-wide as a universal approach to enhance all students' educational experiences and outcomes. Relatedly, there is higher return of investment of government tax dollars with early intervention and prevention strategies (Currie, 2001; Heckman, 2011; Karoly, Kilburn, & Cannon, 2005; Temple & Reynolds, 2007). Thus, focusing on school- and class-wide (i.e., tier one) programs that enhance STRs may be an efficient investment in future student outcomes that helps maximize school personnel resources.

### **Rationale**

Numerous studies have demonstrated the positive effects of school- and class-wide interventions for STRs (e.g., Baroody et al., 2014; Bierman et al., 2017; McCormick et al., 2015), but this body of literature has not yet been subject to systematic synthesis, a critical element of the evidence-based practice movement (Davies, 1999; Evans, 2002;

## STUDENT-TEACHER RELATIONSHIPS

Petticrew & Roberts, 2006). Accordingly, this dissertation addresses the following research questions via two studies:

Study 1: What universal school- and classroom-level factors are associated with positive STRs?

Study 2:

1. Which school- and class-wide interventions are most effective at improving STRs?
2. What are the common practice elements of effective school- and class-wide interventions for improving STRs?

The two studies leveraged systematic review and meta-analytic methods to address these questions. In the hierarchy of research evidence, the function of a systematic review is to decrease bias by systematically identifying, appraising, and synthesizing all existing studies relevant to the research question (Petticrew & Roberts, 2006). The goals of systematic review include, but are not limited to, the following: (1) integration of past literature, (2) critical examination of extant literature, and (3) identification of central issues in the field (Cooper, Hedges, & Valentine, 2009). Systematic reviews and meta-analyses look at a body of literature collectively, thus decreasing the chance of bias or inaccurate results from one study. A specific subtype of systematic review, meta-analysis, statistically synthesizes comparable studies to create quantitative summaries of effects (Cooper et al., 2009).

**Study 1.** Earlier conceptual literature has posited factors affecting STRs, presented as the STR system model (Pianta et al., 2002). The STR system model outlines the components of the STR as (a) features of the two individuals, (b) each individual's perception of the relationship, (c) processes by which information is exchanged between

## STUDENT-TEACHER RELATIONSHIPS

the two individuals (i.e., interactions, language), and (d) external influences of the systems in which the relationship is embedded (Pianta et al., 2002). There currently exist no reviews that have systematically evaluated the research supporting the factors associated with the STR. Thus, Study 1 systematically reviewed the universal factors at school- and classroom-levels studied in previous literature as potential correlates with the STR. Study 1 served as a preliminary scoping search to outline the breadth and depth of extant research within this research area. The results of Study 1 delineated a variety of school- and class-wide factors related to the STR. Within those factors, various school- and class-wide programs and interventions emerged, suggesting a need for a meta-analysis to determine the effectiveness of programs in this area.

**Study 2.** Despite research demonstrating positive associations between school- and class-wide interventions and STRs, no reviews have systematically appraised and synthesized said interventions. Study 2 sought to further analyze school- and class-wide interventions and practices in extant research. More specifically, this study sought to identify effective school- and class-wide interventions for improving STRs. Meta-analytic and common element techniques were utilized to determine effect sizes for each program as well as common practice elements across effective interventions.

### **Summary**

Due to volume of studies that have examined the relationship between school- and class-wide programs and the STR (e.g., Baroody et al., 2014; Bierman et al., 2017; McCormick et al., 2015), high quality research synthesis is needed. This line of research contributes to the field through providing a summary and integration of diverse research findings as well as directions for future research. The meta-analytic aspect of this

## STUDENT-TEACHER RELATIONSHIPS

dissertation contributes information on the effectiveness of school- and class-wide programs at improving the STR. The common elements procedure contributes information on the specific practices most commonly observed among effective programs and interventions (Chorpita et al., 2005). This knowledge can inform resource allocation (i.e., time and money) to the practices most frequently seen across successful educational interventions.



## STUDENT-TEACHER RELATIONSHIPS

### Definition of Terms

- **Common elements analysis.** A research procedure analyzing specific practice elements most commonly seen across effective interventions (Chorpita et al., 2005).
- **Grey literature.** All documents except journal articles that appear in widely known, easily accessible electronic databases (Cooper et al., 2009, pg. 105)
- **Meta-analysis.** Statistical synthesis of data from separate, but similar (i.e., comparable) studies leading to a quantitative summary of the pooled results (Chalmers, Hedges, & Cooper, 2002).
- **Student-teacher relationship.** “Emotion-based experiences that emerge out of teachers’ on-going interactions with their students” (Pianta, 1999).
- **Systematic review.** The application of strategies that limit bias in the assembly, appraisal, and synthesis of all relevant studies on a specific topic (Chalmers et al., 2002).
- **Tier one programs (i.e., universal).** Core programs *all* students receive (Fuchs & Fuchs, 2006; Shapiro, n.d.). Within this dissertation, “*all*” is further defined as programs that are implemented school- or class-wide. Any program that included school- or class-wide practices that could be implemented in general education classes by the general education teacher with numerous students were considered.
- **Direct practices.** Intentional interactions aimed at improving aspects of the student-teacher relationship, including perceptions and feelings of trust, connection, belonging, respect, and care.

## STUDENT-TEACHER RELATIONSHIPS

- **Indirect practices.** Altering external, environmental influences (e.g., classroom management) and students' skills (e.g., emotion expression and understanding) to indirectly impact STRs through interactions.

# STUDENT-TEACHER RELATIONSHIPS

## CHAPTER 2

### Study 1: Systematic Review of Universal School- and Classroom-Level Factors Related to Student-Teacher Relationships

The student-teacher relationship (STR) is an important resource for students in schools which may promote or inhibit students' academic achievement, engagement, school adjustment, attendance, disruptive behaviors, suspension, and risk of dropping out (Cornelius-White, 2007; Quin, 2016; Roorda et al., 2011). As the STR is associated with student outcomes, it is necessary to examine the school- and classroom-level factors related to STRs. Past researchers presented factors associated with the STR in conceptual chapters (Pianta, Stuhlman, & Hamre, 2002); however, a systematic review that comprehensively captures the multitude of variables related to the STR at the school- and classroom-levels has not been conducted. This study includes a systematic literature review, which utilizes the conceptual framework presented by Pianta et al. (2002), to appraise and synthesize universal school- and classroom-level factors related to STRs.

#### **Student-Teacher Relationship Defined**

The STR has been conceptualized by numerous researchers (Creasey, Jarvis, Knapcik, 2009; Hughes, Bullock, & Coplan, 2014; Pianta, 2001); however, Pianta (2001) developed the dominant paradigm which characterizes much of the STR literature. Pianta (2001) conceptualized the STR in terms of three qualities, as reported from the teachers' perspectives: conflict, closeness, and dependency between the teacher and the student. Conflict encompasses the teacher's perspective of whether their relationship is negative, strenuous, and ineffective. Conversely, closeness is defined as whether the teacher perceives their relationship as warm, affectionate, and effective. The third component,

## STUDENT-TEACHER RELATIONSHIPS

dependency, can be conceptualized as the degree to which a student is over-reliant on a teacher, struggles with separation, and has inappropriate boundaries with asking questions (Pianta, 2001). Additional researchers using concepts derived from parent-child attachment research defined similar qualities of the STR: secure, avoidance, resistant/ambivalent (Howes & Hamilton, 1992) and optimal, deprived, disengaged, confused, and average (Lynch & Cicchetti, 1992).

Other researchers conceptualized the STR regarding instructor connectedness and instructor anxiety (Creasey et al., 2009); however, this student-instructor paradigm is still in research infancy and is not as comprehensive as Pianta's STR paradigm. Other researchers have critiqued Pianta's "variable-centered approach" to the STR and advocate, instead, for a "person-centered approach" (Hughes et al., 2014). Within a person-centered framework, individuals are grouped based on combinations of STR characteristics (i.e., "conflicted STR," "dependent STR," or "combined STR"). However, viewing STRs by profile utilizes Pianta's similar theoretical underpinnings (i.e., closeness, conflict, and dependency), changing Pianta's ordinal ranking into a categorical conceptualization. As Pianta's scale has been studied extensively in regard to reliability, validity, and its association with student outcomes (e.g., e.g., Settanni et al., 2015; Hamre & Pianta, 2001; Webb & Neuharth-Pritchett, 2011), this study utilized Pianta's conceptualization to define the STR.

### **Importance of the Student-Teacher Relationship**

The STR has shown to be related to a variety of student outcomes (Cornelius-White, 2007; Quin, 2016; Roorda et al., 2011). Past researchers demonstrated the importance of the STR with three separate meta-analyses that collectively included

## STUDENT-TEACHER RELATIONSHIPS

hundreds of studies (Cornelius-White, 2007; Quin, 2016; Roorda et al., 2011). These meta-analyses indicated the STR has the following effects on student outcomes: (a) small to large effect sizes and a positive relationship with academic achievement (English, math, social studies, science, and reading; Cornelius-White, 2007; Quin, 2016; Roorda et al., 2011); (b) medium to large effect sizes and a positive relationship on engagement and school adjustment (Quin, 2016; Roorda et al., 2011); and (c) a negative relationship with disruptive behavior, suspension, and school dropout (Quin, 2016).

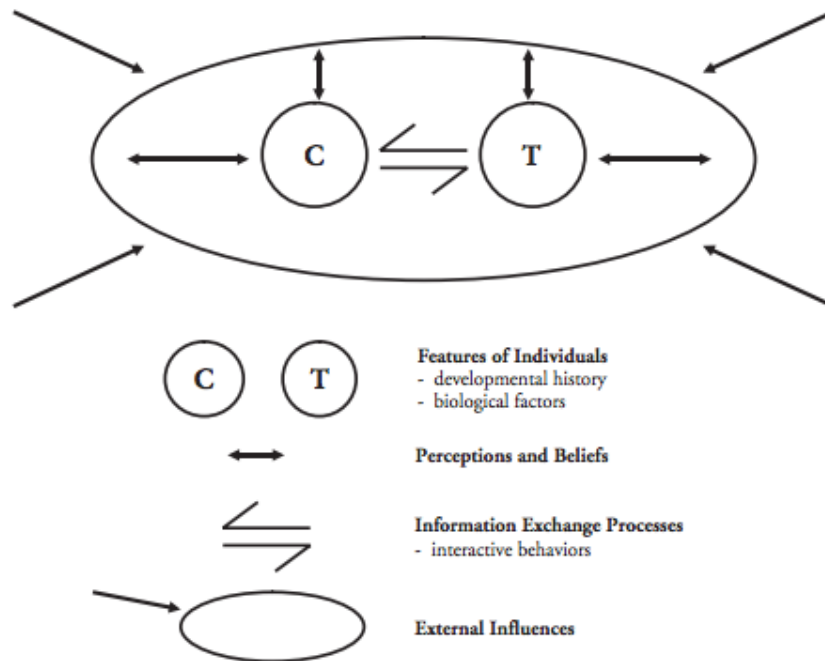
Three theoretical paradigms explain the importance of the STR: attachment theory (Bowlby, 1988), social learning theory (Bandura, 1989), and self-determination theory (Deci & Ryan, 2008). More specifically, relationships between children and prominent adults in their life allow children to feel safe and explore the world on their own (Bowlby, 1988), give children models for appropriate social behavior (e.g., positive communication strategies, active listening; Bandura, 1989), and can motivate children by instilling competence, autonomy, and relatedness (Deci, & Ryan, 2008). Moreover, teachers are capable of making school a positive environment where students feel welcomed, safe, and willing to explore new academic content and social experiences through positive relationships.

### **The Student-Teacher Relationship System**

In addition to all his other work, Pianta et al. (2002) addressed the complexity of the STR by outlining the STR system (see Figure 1). As a conceptual model, the STR is comprised of four primary components: (a) features of the two individuals, (b) each individual's perception of the relationship, (c) processes by which information is exchanged between the two individuals (i.e., interactions, language), and (d) external

## STUDENT-TEACHER RELATIONSHIPS

influences of the systems in which the relationship is embedded (p. 93). Each of these components can be the focus of assessment or intervention (Pianta, 1999). Additionally, three of the four components of the STR (“individual characteristics, perceptions, and information exchange processes”) influence each other and STR quality (p. 95). In addition, these three components of the STR system are also embedded within and related to external factors and larger systems (e.g., classrooms, schools, and communities). Although these components of the STR can be the primarily foci of assessment or intervention, they can also all be valued and viewed from a universal, systems perspective.



*Figure 1.* Conceptual model of the Student-Teacher Relationship System (Myers & Pianta, 2008, p. 602)

**Individual characteristics.** STRs are comprised of the features of both the student and teacher, which could include specific attributes like race, gender, and race-gender match between the teacher and student. Past research has demonstrated teachers rate their relationships with students more positively when there is a racial and cultural match between them (e.g., Saft & Pianta, 2001). Similar studies have also demonstrated teachers of color have strong connections with students of color (e.g., Warikoo, 2007). Additional within-person characteristics could influence the STR (e.g., temperament and personality). Rudasill, Rimm-Kaufman, Justice, and Pence (2006) found children with bold personalities and low language skills had higher ratings of conflict with their teachers. Students who had shy personalities and high language skills had more dependent relationships with their teachers. Another study found low levels of conflict between teachers and students could attenuate the effect of difficult temperament on negative behavioral outcomes (Griggs et al., 2009). Lastly, one dimension of temperament, effortful control, has been shown to influence the level of closeness or conflict between a teacher and student. Effortful control can be conceptualized as executive functioning skills to be able to regulate emotions and behavior. Silva et al. (2011) found effortful control was positively associated with STR closeness and negatively associated with STR conflict.

**Teacher's and student's perceptions.** The manner in which teachers and students perceive both one another and their relationship can shape their behaviors and interactions (Pianta et al., 2002). The value of STRs may erode when teachers hold negative perceptions of their students or their relationships with students (Pianta et al., 2002). Previous research demonstrates teachers' narratives of their relationship with

## STUDENT-TEACHER RELATIONSHIPS

students are related with how they behave with those students in the classroom (Stuhlman & Pianta, 2001). For example, Stuhlman and Pianta (2001) found teachers behaved more negatively towards a student if they talked more negatively about them in interviews. Similarly, the extent to which teachers perceive themselves as more similar to their students positively influences their ratings of relationships with those students (Gelbach et al, 2016).

**Student-teacher interactions (STIs).** The third component in Pianta and colleagues' STR system is the interactions between students and teachers, which encompass both verbal and non-verbal language as well as other behavior interactions (e.g., responsiveness; Pianta, 2002). STIs can also be conceptualized with the Teaching Through Interactions (TTI) framework, which describes STIs with three domains: emotional supports of teachers, instructional supports of teachers, and classroom organization (Pianta, Hamre, & Allen, 2012; Hamre et al., 2013). STIs can be further conceptualized within a transactional perspective of development, viewing the STR as a dyadic and dynamic system that involves reciprocal interactions (Sameroff, 2009). Although research has shown STIs may predict the quality of STRs (Hartz, Williford, & Koomen, 2017; Koles, O'Connor, & McCartney, 2009), there is additional evidence this relationship is more complex. Lippard and colleagues (2017) showed the STR was associated with children's development, even after taking classroom interactions into consideration. In other words, the STR can influence student outcomes beyond STIs. This finding aligns with Pianta and colleagues' framework, as they stated STIs are just one component of the STR (Pianta et al., 2002).



## STUDENT-TEACHER RELATIONSHIPS

Bronfenbrenner's ecological perspective is a second useful paradigm to conceptualize the relationship among STIs, STRs, and student outcomes. Within this perspective, child development is influenced by several levels of external systems (Bronfenbrenner, 1994). Conroy and Sutherland (2012) illustrated the ecological nature of STRs when they conceptualized STIs exist within STRs, which are nested within classrooms. Even though STIs are an important component of STRs, STIs can be understood and valued from an organizational or systems perspective (Pianta et al., 2002). The current review utilizes a systems prevention perspective with a detailed examination of universal school- and classroom-level factors related to the STR.

**External influences of educational systems/contexts on the STR.** The multitude of environments in which students and teachers interact is the last component of the STR system. The environment of schools and classrooms are inherently social and modifying these environments as a relational setting has the potential to enhance the social resources available to students (Pianta et al., 2012). Moreover, utilizing the framework presented by Pianta et al. (2002), it is important to recognize STRs do not operate in a vacuum. All three of the aforementioned components of the STR system may be enhanced or hindered by the environments in which they are embedded. Thus, looking at the effects of the STR as a separate entity from these larger systems—specifically, the classroom and school environments—is incomplete. There are specific external factors associated with positive STRs and understanding those factors can help create environments where STRs prosper. Considering factors at the school- and classroom-levels allows for a shift in thinking: from intervention with students who are at risk to

## STUDENT-TEACHER RELATIONSHIPS

promotion of development for all students through positive STRs (Battistich, Schaps, & Wilson, 2004).

*School- and classroom-level factors.* For this review, *school-factors* are defined as universal factors which extend throughout or involve the entire school. Thus, all individuals within a school including staff and/or students are influenced by these factors. Specific school-factors could include, but are not limited to, school-wide social emotional programs (e.g., Nix et al., 2016; McCormick et al., 2015), policies, values, and/or climate (e.g., Zullig, Huebner, & Patton, 2011), and workload stress on teachers (e.g., Whitaker et al., 2015; Yoon, 2002).

*Classroom-level factors*, on the other hand, are defined as universal factors which extend throughout or involve an entire classroom and impact students within classrooms. Classroom-level factors could include, but are not limited to, discipline strategies (e.g., Mitchell & Bradshaw, 2013), teaching strategies (e.g., Howes et al., 2013), classroom management (e.g., Baroody et al., 2014; Mitchell & Bradshaw, 2013; Rimm-Kaufman & Chiu, 2007), and emotional support (Hamre & Pianta, 2005).

### **Research Gap**

Both school- and classroom-factors can create environments where STRs are supported and thrive, or environments where STRs are more difficult to start, maintain, and restore. Because school- and classroom-level factors are associated with STRs, they are ultimately associated with student outcomes; yet, there are no extant systematic reviews which analyze how STRs are associated with universal school and classroom factors. Although, Pianta et al. (2002) addressed the importance of school- and classroom-level factors, presented the STR system perspective, and briefly discussed

## STUDENT-TEACHER RELATIONSHIPS

several studies supporting that framework, they did not find, evaluate, or interpret these studies in a systematic way.

### **Purpose**

Therefore, the research question driving the purpose of this literature review is as follows: What universal school- and classroom-level factors are associated with student-teacher relationships as identified by the literature? The review's broad research question necessitates the inclusion of multiple study designs (e.g., observational, correlational, randomized control trials, quasi-experimental, etc.) as it appraises and synthesizes school- and classroom-level factors related to STRs in extant literature.

### **Method**

#### **Search Strategy**

The systematic review process included two online searches of educational research journals with three databases (Academic Search Premiere, PsychInfo, and ERIC) and utilized the following search terms within article abstracts:

Search 1:

1. (Student-teacher) OR (Teacher-student) OR (Teacher-child) OR (Child-teacher) OR (Student-instructor)
2. Relations\* OR interact\* OR conflict OR closeness OR connect\*
- 3(a). Predict\*, OR, associate\* OR correlate\*, OR mediat\*, OR moderat\*

Search 2:

1. (Student-teacher) OR (Teacher-student) OR (Teacher-child) OR (Child-teacher) OR (Student-instructor)
2. Relations\* OR interact\* OR conflict OR closeness OR connect\*

## STUDENT-TEACHER RELATIONSHIPS

3(b). Program\* OR \*interven\* OR train\* OR (Professional Development) OR (Professional Learning) OR workshop\*.

After search terms were entered, the initial stage (Stage 1) began by screening titles and abstracts to determine the purpose of the study. If the title and/or abstract matched the necessary independent (school- or classroom-level factors) and dependent variables (STR) of this systematic review, the study was kept for more in-depth evaluation. Moreover, the following components were screened to determine fit: independent variables, dependent variables, study findings, and key words. If there was uncertainty of fit, the article was retained for further review. Across all three databases (Academic Search Premiere, PsychInfo, and ERIC) and both searches, the total number of studies reviewed at the title and abstract level included 5,193 articles. Specific inclusion across databases can be seen in Figure 2. Of these 5,193 articles, 225 were retained for further consideration.

# STUDENT-TEACHER RELATIONSHIPS

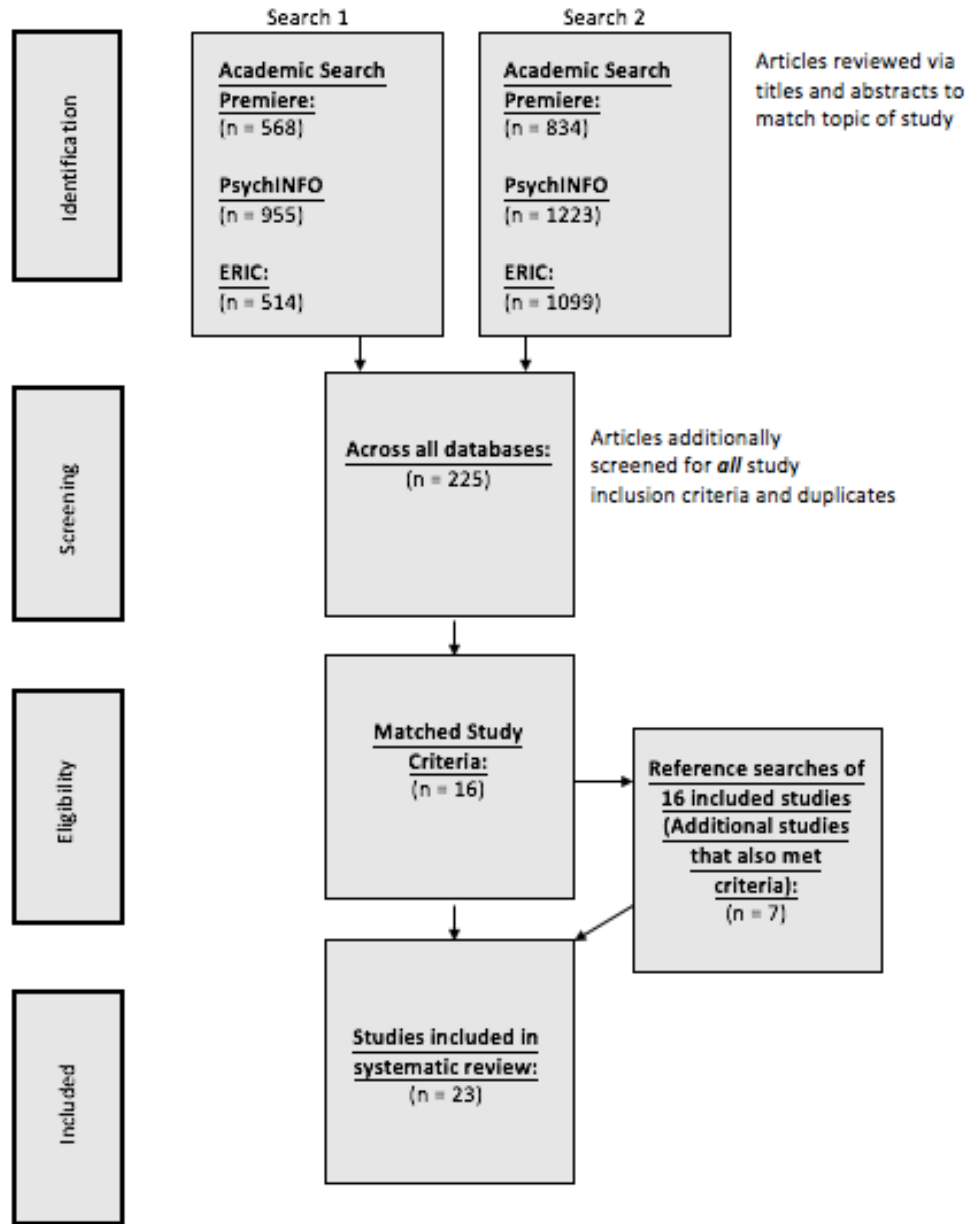


Figure 2. PRISMA chart: Systematic Review Process

## STUDENT-TEACHER RELATIONSHIPS

### **Inclusion Criteria**

Stage 2 included screening the articles captured from the initial search ( $n = 225$ ) for inclusion criteria. Articles included in this review met the following inclusion criteria: (a) published in a peer-reviewed journal (i.e., theses and dissertations were not included), (b) participants in grades pre-K-12, (c) primarily conducted in an educational setting, (d) included a comprehensive outcome measure of the STR, (e) written in the English language, (f) conducted in the United States, (g) and examined a universal school- and classroom-level factors related to the STR (i.e., child-level factors and within teacher characteristics were excluded). For further description of what constitutes a school- or classroom-level factor, please refer to definitions in introduction. The study excluded articles not completed in the US due to different federal and state educational law and policies across countries. In addition, studies that examined within child characteristics (e.g., temperament or gender) or within teacher characteristics (e.g., age) were also excluded. There were numerous tier 3 and tier 2 interventions found to be related to the STR: for example, mentoring programs (Stage & Galanti, 2017), SEL pull-out interventions (Leff, Waasdorp, & Paskewich, 2016; Thompson, 2014), and daily report cards for students with ADHD and IEPs (Fabiano et al., 2010); however, this review was focused on universal, tier 1 interventions and supports; thus, selective or pull-out interventions were excluded. Lastly, to help ensure a comprehensive perspective of the STR, studies that included minimal STR questions within school climate surveys, impairment surveys, or conceptual attitudinal surveys were excluded. Moreover, even though STIs are one component of the STR system, it is not a comprehensive measurement of the STR; therefore, the studies that had STIs as the outcome measure

## STUDENT-TEACHER RELATIONSHIPS

were excluded. STR outcome measures could include student perspectives, teacher perspectives, or both individuals' perspectives of the STR.

After analyzing the remaining 225 articles, the following number of studies were excluded: qualitative ( $n = 18$ ), different country ( $n = 36$ ), not pre-K-12 age range ( $n = 4$ ), not conducted primarily within an educational setting ( $n = 1$ ), not a universal school- or classroom-level variable ( $n = 6$ ; tier 2 or 3 intervention), duplicates across search engines ( $n = 38$ ), and did not include STR as an outcome variable ( $n = 106$ ). Further justification of exclusion of these 106 studies is as follows: studied the effect on student-teacher interactions ( $n = 38$ ), theoretical paper about STR ( $n = 27$ ), examined internal characteristics of teacher or student ( $n = 7$ ), included minimal student-teacher relationships questions embedded in other surveys, and/or not a comprehensive outcome measure of the STR (e.g., school climate survey,  $n = 7$ ), and/or other outcome variables ( $n = 27$ ). In total, 209 articles were excluded in the second stage of analysis.

Sixteen articles met full inclusion criteria for the current literature review. The reference lists of the 16 articles were analyzed to determine if any other studies were completed that matched this inclusion criteria. Seven additional articles were identified from reviewing these references.

### **Data Extraction/Coding**

The 23 texts that met inclusion criteria were further evaluated in regard to their purpose, methodology, participants, STR outcome measure, key findings (the school- or classroom-level factor related to the STR) and reported effects. These studies were organized in an Excel spreadsheet with these components organized in the columns. Commonalities across studies were noted and grouped together. For example, if

## STUDENT-TEACHER RELATIONSHIPS

numerous studies found a program targeting social emotional skills was associated with STRs, but the studies utilized different programs or definitions, they were coded as the same concept. These concepts were the main school- and classroom-level factors depicted in Table 1 and Table 2.

### **Quality Appraisal**

To evaluate the studies included in this systematic review, a quality appraisal tool, the Quality Assessment Tool for Quantitative Studies (QATQS; Effective Public Health Practice Project, 1998), was utilized to further analyze and code the texts included. The QATQS provides a range of strong to weak quality levels within the following areas: selection bias, study design, confounders, blinding, data collection methods, and withdrawals and dropouts (Effective Public Health Practice Project, 1998). The authors who created the QATQS defined various quality levels within their dictionary, and these definitions were utilized for this systematic review. A total score for each study was calculated by adding the number of strong and moderate quality indicators for each area described above. Each study could receive a total score of six, one point for each area. The tool's reliability and validity meet the standards of the National Collaborating Center for Methods and Tools (NCCMT; National Collaborating Centre for Methods & Tools, 2008). The NCCMT is a center housed in Canada that promotes evidence-informed decision making in public health and policy domains. It should also be noted the QATQS is best used with studies that manipulate the environment to determine subsequent effects; however, there were numerous observational and correlational studies included in this review; thus, there were some components of the QATQS irrelevant to those studies, which were denoted with a N/A (non-applicable) in Table 4. To help ensure observational



## STUDENT-TEACHER RELATIONSHIPS

and correlational studies were rated as lower quality compared to RCTs and quasi-experimental designs, N/A ratings were considered equivalent to weak ratings and did not contribute to the study's total score. The results section includes an overview of the quality levels of the texts used in this systematic review by factor. In addition, Table 4 summarizes the components evaluated in the QATQS by study.

### Results

#### Study Characteristics

This systematic literature review yielded 23 studies of school- and classroom-level factors related to the STR. The definitions of these factors are displayed in Table 1. The characteristics and findings of each study can be found in Table 2. The studies were published between 2005 and 2017. Total number of teachers and students included in each study ranged from 9 to 1,001 teachers and 36 to 2,487 students. Regarding student participant age/grade, the number of studies within each age/grade category is as follows: high school ( $n = 1$ ), middle school ( $n = 1$ ), elementary school ( $n = 7$ ), and preschool or kindergarten ( $n = 14$ ). Some studies focused on specific groups of students: students with autism (Caplan et al., 2016), students who were English language learners (Chang et al., 2007), and children/families eligible for Head Start (i.e., below US determined poverty line: 8 studies). Other studies had students who were predominately Latino and/or Black students (Capella et al., 2012; Giles et al., 2012; Howes et al., 2013; Jones et al., 2013). Otherwise, all other studies captured numerous races and ethnicities and/or matched their schools', districts, or countries census demographic information; these studies were denoted with the category "diverse" in Table 2. Participants were recruited from a variety of geographic areas: urban areas ( $n = 9$ ), rural areas ( $n = 0$ ), suburban areas ( $n = 1$ ), and

## STUDENT-TEACHER RELATIONSHIPS

both rural and urban areas ( $n = 3$ ); 10 studies did not report on geographical area. In total, five studies included nationally representative samples and the remainder were completed in the North-Eastern ( $n = 9$ ), Western ( $n = 3$ ), Central ( $n = 3$ ), and South-East ( $n = 1$ ) regions; Two studies did not report on state or region. Lastly, the designs utilized across studies varied, including randomized control trials ( $n = 11$ ), observational designs ( $n = 9$ ), quasi-experimental ( $n = 2$ ), and correlational ( $n = 1$ ).

### **Measurement Tools**

All studies were required to evaluate the STR as an outcome variable. The majority of studies ( $n = 21$ ) utilized the Student-Teacher Relationship Scale (STRS; Pianta, 2001). The STRS is a 28 item self-reported measure. It has 12 items related to conflict, 11 items related to closeness, and 5 items related to dependency (Pianta, 2001). There is also a shortened version of the STRS, which only includes 15 items from the original measure (Measures Developed, 2018). This shortened version only includes measures of closeness (8 items) and conflict (7 items). Seven of the studies utilized the full 28 item STRS, with others using the shortened 15 item version ( $n = 11$ ), further shortened versions to 14 items ( $n = 1$ ) and 8 items ( $n = 1$ ), or modified it to obtain aggregate class-wide relationship information ( $n = 1$ ). All versions of the STRS only measure the teachers' perspective of the STR.

Outside of the STRS, additional researchers created scales or did not report on the items' source ( $n = 2$ ). ( $n = 2$ ). Gelbach et al. (2016) utilized a 9-item student and teacher perspective scale and reported an alpha of .90 for those 9 items. Giles et al. (2012) utilized a 12-item student-perspective scale and reported an alpha of .95.

## STUDENT-TEACHER RELATIONSHIPS

The other important aspect of the STR measures is whether the studies utilized the teacher or student perspective of their relationship. A total of 21 studies used only the teachers' perspectives of their relationship, while one used only the students' perspectives of their relationship, and one used both the students' and teachers' perspectives of their relationship.

### **School- and Classroom Level Factors Related to the STR**

Analysis of the literature suggests four universal school- and classroom-level factors as potential correlates with the STR: (1) SEL programs/curriculums, (2) programs designed to impact STRs, (3) classroom management strategies, (4) student-teacher interactions. There were additional relationships captured with one study each worth exploring in future research: 1) instructional strategies, 2) emotional support of teacher, 3) consultation and coaching in regard to STIs, 4) workplace stress on teachers, 5) school-wide environment/logistics, and 6) leveraging similarities between teachers and students. These overall factors and relationships are outlined and defined in Table 1. Characteristics of each study are detailed in Table 2. An overview of each of these factors taking into consideration study quality and findings is described below.

**SEL curricula/programs.** Based on the studies captured, the factor addressed in the most studies was some type of social-emotional program or curriculum implemented at the school- or classroom-level. Seven total studies analyzed the relationship between a program or curriculum focused on improving the social or emotional skills of students and the STR. All seven studies that analyzed the relationship between SEL programs and STRs found significant results, and when effect sizes were reported, they were small to medium ( $d = .12 - .45$ ). Six of the seven studies (86%) used randomized control trials.

## STUDENT-TEACHER RELATIONSHIPS

Utilizing the QATQS, the overall quality ratings of studies in this factor were strong. The reason a majority of the studies in this factor did not receive the full six points was because of inappropriate selection of participants, which impacts external validity of the results (see Table 4).

Three studies within the SEL curriculum/program factor (Bierman et al., 2017; Lipscomb et al., 2013; Nix et al., 2016) analyzed how Head Start, or specific components of Head Start, were associated with the STR. The SEL component within Head Start REDI (research-based, developmentally informed) is the implementation of the PATHs curriculum, which is a lesson-based program that introduces social-emotional skills such as cooperation, emotional understanding, and self-control. Two studies investigated the relationship between Head Start REDI and STRs (Bierman et al., 2017; Nix et al., 2016), while the third study addressed only Head Start (Lipscomb et al., 2013). All three studies found being in Head Start had associations with STRs, with slightly varied findings. One study showed Head Start had significant, positive effects on the entire STR in 2<sup>nd</sup> grade (i.e., closeness and conflict, Bierman et al., 2017); one found students were more likely to have a continuously high, stable, close relationship trajectory with teachers if in Head Start (Nix et al., 2016); and the last study found being in Head Start significantly predicted STRs at the end of the Head Start year, but not one year later (Lipscomb et al., 2013).

Another three studies examined the effects of other kindergarten readiness programs on the STR (Hart et al., 2016; Jones et al., 2013; Zhai et al., 2015). The two programs evaluated across these studies were the Chicago School Readiness Project Intervention (CSRP) and the Kindergarten Summer Readiness Classroom (KSRC). Both programs

## STUDENT-TEACHER RELATIONSHIPS

focused on social-emotional and behavioral components such as reinforcement tokens, social skills training, and self-regulation. All three studies found being in these programs was significantly associated with STRs, with varied findings. Hart et al. (2016) found the KSRC significantly, and negatively, predicted STR conflict at the end of fall kindergarten year. Jones et al. (2013) found the CSRP predicted the STR in the spring of the students' Head Start year. Lastly, Zhai et al. (2015) investigated longitudinal data from the CSRP and found additional SEL activities in 3<sup>rd</sup> grade were significantly related to STR ratings in 3<sup>rd</sup> grade ( $d = .12 - .16$  for each SEL activity).

Lastly, there was one other program that was evaluated in this systematic review with one study, INSIGHTS program (McCormick et al., 2015). The control groups and INSIGHTS intervention groups showed significant differences in STR ratings (see Table 2).

**Programs designed to improve STRs.** In addition to SEL programs, this review also yielded three studies of programs with their main objective to improve relations between teachers and students (Driscoll & Pianta, 2010; Driscoll et al., 2011; Eisenhower et al., 2016). All three studies showed a significant association with STRs. Two studies tested the effects of Banking Time (Driscoll & Pianta, 2010; Driscoll et al., 2011), while the other study tested the effects of Starting Strong. Starting Strong did not show significant effects on STR closeness ( $ES = .10, p = .27$ ) or conflict ( $ES = -.02, p = .81$ ). However, Starting Strong did have an impact on STR through an interaction based on pre-program STR quality. Children who began with good relations displayed no difference between the intervention and control group for total STR scores, but children who began with poor relationships showed significant improvement. For Banking Time,

## STUDENT-TEACHER RELATIONSHIPS

there were statistically significant differences in STR closeness ratings between Banking Time students and the control groups ( $d = .33, \eta^2 = .08$ ), but not conflict ratings. Using the QATQS components, all three of these studies were docked points for a variety of reasons; however, a commonality in study quality across all three studies was inappropriate participant selection (see Table 4). In addition, two of the three studies did not describe withdrawal/dropout reasons and percentages.

**Student-teacher interactions (STIs).** Four studies examined the effects of STIs on the STR (Chang et al., 2007; Giles et al., 2012; Hartz et al., 2017; Koles et al., 2009). One study examined the sheer frequency of interactions between students and teachers and found frequency of interactions alone did not predict the STR ( $p < .10$ ; Koles et al., 2009). Hartz et al. (2017) further analyzed student-teacher interactions and found students who had more negative interactions were associated with conflicting STRs and positive interactions were associated with close STRs at the end of the year. An additional study found authoritarian communication style of the teacher was significantly, and negatively, associated with STRs (Giles et al., 2012). Lastly, STIs may be important for students who are ELLs. Chang et al. (2007) found Spanish-language interactions were significantly correlated to STR closeness ( $\beta = .16, p < .05$ ), and English-language interactions were significantly correlated to STR conflict ( $\beta = .18, p < .01$ ). Taken together, this shows characteristics of interactions between students and teachers may be related to teacher's ratings of their STRs. However, it is important to consider all studies utilized observational designs; they observed STIs and associated STIs with STR ratings by teachers. Using the QATQS components, none of the studies utilized strong participant selection procedures and none of them had strong control over confounding

## STUDENT-TEACHER RELATIONSHIPS

variables. Taken together, a factor comprised of observational studies suggests weaker empirical evidence and lacks internal validity.

***Consultation and coaching in regard to STIs.*** Another study (Cappella et al. (2012) examined the effects of the BRIDGE program, which included three components: Links to Learning, MyTeachingPartner, and consultation/coaching in regard to those strategies. This intervention was found to be effective, with an effect size for STR closeness of .47. This intervention did not show a significant relationship with STR conflict. This was a randomized control trial that was only docked points for their participant selection procedures through self-referral of participants (i.e., lacks external validity).

**Classroom management of teachers.** Two studies examined the effects of classroom management and discipline strategies of teachers on the STR (Baroody et al., 2014; Rimm-Kaufman & Chiu, 2007). Both suggested classroom management strategies (i.e., Responsive classroom intervention) were positively associated with STR closeness ratings. When effect sizes were reported, they were small (ES = .27, path coefficient = .28). Using the QATQS components, both studies did not have strong participant selection ratings. In addition, Rimm-Kaufman & Chiu (2007) utilized teacher report of implementation of the RC approach instead of randomly assigning teachers to intervention and control groups; this decision coupled with only moderate control for confounding variables makes it difficult to attribute changes in the dependent variable to the RC approach.

**Additional relationships.** The rest of the relationships captured from this review were comprised of only one study each; thus, the findings from these additional studies

## STUDENT-TEACHER RELATIONSHIPS

lack strong empirical support and could be potential avenues for future research:

Workplace stress on teachers was found to be positively associated with STR conflict (Whitaker et al., 2015); Instructional strategies (e.g., scaffolding, didactic instruction, quality feedback, and productivity) were associated with closeness ratings by teachers at the end of the year (Howes et al., 2013); Emotional support did not have a main effect on the STR; however, emotional support moderated the effect between social and academic risk and the STR (Pianta & Hamre, 2005); Making teachers deliberately aware of similarities between themselves and their students was significantly, and positively, related to their STR ratings (Gelbach et al., 2016); Lastly, school length was significantly associated with STR conflict, and student-teacher ratio was not significantly related (Mashburn et al., 2006); The majority of these studies were observational and lacked appropriate participant selection procedures.



Table 1  
*Themes That Emerged Related to the STR and Their Definitions*

Characteristic	<i>N</i> (# of studies)	Definition
SEL curricula/programs	7	Students acquire and effectively apply the knowledge and skills to understand and manage emotions, set/achieve goals, feel/show empathy, establish positive relationships, and make responsible decisions (CASEL)
Programs designed to impact STRs	3	Programs main goal is to improve relationships between teachers and students
Classroom management strategies	2	Strategies teachers use to gain control of classroom, including but not limited to positive class-wide rules, routines, transitions, positively stated behaviors
Student-teacher interactions	4	Verbal and non-verbal information exchange processes between the student and the teacher (e.g., frequency, type or authoritarian communication style; Pianta, 1999)
*Instructional strategies	1	Four types of instructional strategies found in this systematic review: scaffolding, didactic instruction, quality feedback, and productivity (Howes et al., 2013)
*Emotional support of teacher	1	Teacher's sensitivity, intrusiveness, attachment, classroom climate, and control (Hamre & Pianta, 2005, p. 957)
*Consultation and coaching in regard to STIs	1	Individualized support to implement class-wide and target strategies aligned with CLASS observations (Capella et al., 2012)
*School-wide environment/logistics	2	Includes length of school day, child-teacher ratio, and special education vs. general education classroom for students who have ASD
*Workplace stress on teachers	1	Workplace stress consists of the demands on teachers, control teachers have, and support teachers have in their jobs (Whitaker et al., 2015)
*Leveraging similarities between teachers & students	1	Being deliberately aware of similarities between teacher and student

*Note.* \* The asterisk denotes themes that were captured by one study each; thus, there are limitations of inference. However, these areas may be worth exploring in future research.

Table 2  
*Study Characteristics*

<b>Factor</b> Author (Year)	N (T/S)	Population	Age	Design	Independent Variable	Measure	Analysis
<b>SEL Programs</b>							
Bierman et al. (2017)	NR/556	Head Start	Pre – K	RCT	REDI Head Start	T – STRS	Multivariate Regression
Nix et al. (2016)	NR/356	Head Start	Pre – K	RCT	REDI Head Start	T – STRS	Latent Class Growth
Lipscomb et al. (2013)	NR/253	Head Start & NPC	Pre – K	RCT	Head Start	T – STRS	Path Analysis
Jones et al. (2013)	87/543	Head Start, Black/Latino	Pre- K	B-RCT	CSRP	T – STRS	Structural Equation Modeling
Zhai et al. (2015)	NR/414	Prior Head Start	Elem. School	Observational	CSRP (SEL activities)	T – STRS	HLM
Hart et al. (2016)	NR/50	Head Start	K	RCT	Kindergarten Summer Readiness Classroom	T – STRS	GLM Repeated Measures
McCormick et al. (2015)	122/435	Mostly Black	K – 1	RCT	INSIGHTS Program	T – STRS	Treatment-Control Comparison
<b>Programs to Improve STR</b>							
Driscoll & Pianta (2010)	29/116	Head Start	Pre – K	RCT	Banking Time	T – STRS	ANCOVA Repeated Measures
Driscoll et al. (2011)	252/1064	Social/Economic Risk	Pre – K	Quasi-Experimental	Banking Time	T – STRS	Hierarchical Linear Modeling

## STUDENT-TEACHER RELATIONSHIPS

<b>Factor Author (Year)</b>	<b>N (T/S)</b>	<b>Population</b>	<b>Age</b>	<b>Design</b>	<b>Independent Variable</b>	<b>Measure</b>	<b>Analysis</b>
Eisenhower et al. (2016)	33/97	Diverse	K	B-RCT	Starting Strong	T – STRS	Hierarchical Linear Modeling
<b>Classroom Management Strategies</b>							
Baroody et al. (2014)	63/387	Diverse	Elem. School	RCT	Responsive Classroom (use of RC Practices)	T – STRS	HLM and Path Models
Rimm-Kaufman & Chiu (2007)	62/157	Diverse	Elem. School	Quasi-Experimental	Responsive Classroom	T – STRS	Four-Step Hierarchical Regression
<b>Student-Teacher Interactions</b>							
Hartz et al. (2017)	223/895	Diverse	Pre – K	Observational	Negative and Positive Interactions	T – STRS	HLM
Koles et al. (2009)	9/36	Diverse	Pre – K	Observational	# of Interactions	T – STRS	HLM
Chang et al. (2007)	~700/2,487	ELL	Pre – K	Correlational	Speaking Spanish or English to ELLs	T – STRS	Partial Correlations
Giles et al. (2012)	48/2,240	Mostly Black/His	Middle School	Observational	Authoritarian	S – Au. Created	Linear Mixed Regression Model
<b>Instructional Strategies</b>							
Howes et al. (2013)	34/118	Mostly Latino	Pre – K	Observational	Scaffolding, Didactic,	T– STRS & Observ	HLM

STUDENT-TEACHER RELATIONSHIPS

Factor Author (Year)	N (T/S)	Population	Age	Design	Independent Variable	Measure	Analysis
<b>Emotional Support</b>					Productivity Feedback		
Hamre & Pianta (2005)	NR/910	Mostly White; At Risk	Elem. School	Observational	Emotional support of teacher	T – STRS	ANCOVA
<b>Consultation/Coaching with STIs</b>							
Cappella et al. (2012)	36/364	Mostly Latino /Black	Elem. School	RCT	BRIDGE program	T – STRS	HLM
<b>Teacher Stress</b>							
Whitaker et al. (2015)	1001/NR	Head Start Teachers	Pre – K	Observational	Workplace stress: demands, control, and support	T – CW STRS	Multivariate Regression
<b>School-Wide Environ.</b>							
Mashburn et al. (2006)	210/711	Diverse	Pre – K	Observational	Length of school day Child/Teacher Ratio	T – STRS	HLM
Caplan et al. (2016)	154/162	Autism	Pre – K – 2 <sup>nd</sup>	Observational	ASD: Classroom Setting	T – STRS	t-test comparisons

## STUDENT-TEACHER RELATIONSHIPS

Factor Author (Year)	N (T/S)	Population	Age	Design	Independent Variable	Measure	Analysis
<b>Leveraging Similarities Between Teacher and Student</b>							
Gelbach et al. (2016)	25/315	Diverse	High School	RCT	Aware of similarities between T/S	S & T – Au. Created	WLSMV- complex regression

*Note.* NR = Not Reported. ELL = English Language Learner. EBD = Emotional or Behavioral Disorder. ADHD = Attention Deficit and Hyperactivity Disorder. Diverse = the participant pool did not focus on one specific population and typically race/ethnicity data matched school or census population percentages. NPC = Non-parental care. Study Designs: RCT: randomized control trail; B-RCT: Block randomized control trial. CSRP = Chicago School Readiness Project. Dependent variables: T – (teacher perception), S – (student perception). STRS: Student-Teacher Relationship Scale (Pianta, 2001); ESSP: Student Who Cares Subscale; TSRQ: Teacher-Student Relationship Questionnaire; T – CWSTRS: Teacher perceptive of class-wide STRS; Analyses: GLM: General Linear Model; ANCOVA: Analysis of covariance; WLSMV: Weight Lease Squares with Mean and Variance Adjustment estimation. Findings: SSMD: Strictly standardized mean difference. *d* = Cohen’s *d* effect size. *ns* = no significant findings. Bolded findings denote that the STR also served as a mediator or moderator between the factor and student outcome variables.

†*p*<.10, \**p*<.05, \*\**p*<.01, \*\*\**p*<.00

STUDENT-TEACHER RELATIONSHIPS

Table 3  
Study Findings

Factor Author (Year)	Independent Variable	Findings (Closeness)	Findings (Conflict)	Findings (Overall STRS)
<b>SEL Curricula/Programs</b>				
Bierman et al. (2017)	REDI Head Start			SSMD = .39**
Nix et al. (2016)	REDI Head Start			Odds = 1.72*
Lipscomb et al. (2013)	Head Start			Same year: $\beta = .30^{**}$ <b><math>\beta = .16^{**}</math></b>
Jones et al. (2013)	CSRP			<b><math>\beta = .16^{**}</math></b>
Zhai et al. (2015)	CSRP (SEL activities)	$d = .16$	<i>ns</i>	$d = .12$
Hart et al. (2016)	Kindergarten Summer Readiness Classroom		Fall: $d = -.45^{**}$ Spring: $d = -.37$	
McCormick et al. (2015)	INSIGHTS Program			$p < .01$
<b>Programs Designed to Improve the STR</b>				
Driscoll & Pianta (2010)	Banking Time	$\eta^2 = .08^*$	<i>ns</i>	
Driscoll et al. (2011)	Banking Time	$d = .33^*$	<i>ns</i>	
Eisenhower et al. (2016)	Starting Strong	<i>ns</i>	<i>ns</i>	Interaction = $b = -.13^*$
<b>Classroom Management Strategies</b>				
Baroody et al. (2014)	Responsive Classroom (use of RC Practices)	$\beta = .41^*$	<i>ns</i>	
Rimm-Kaufman & Chiu (2007)	Responsive Classroom	$\Delta R^2 = .06^{***}$	<i>ns</i>	
<b>Student-Teacher Interactions</b>				
Hartz et al. (2017)	Negative Interactions Positive	$\beta = .07^*$	$\beta = .23^{***}$	

## STUDENT-TEACHER RELATIONSHIPS

<b>Factor</b> Author (Year)	Independent Variable	Findings (Closeness)	Findings (Conflict)	Findings (Overall STRS)
Koles et al. (2009)	# of Interactions		$\beta = .05\dagger$	
Chang et al. (2007)	Speaking Spanish or English to ELLs	Spanish = $r = .16^*$	English = $r = .18^{**}$	
Giles et al. (2012)	Authoritarian			$\beta = -.29^*$
<b>Instructional Strategies</b>				
Howes et al. (2013)	Scaffolding, Didactic, Productivity Feedback	$\beta = 1.24^{**}$ $\beta = 1.86^*$ $\beta = .38^*$ $\beta = .23^{**}$		
<b>Emotional Support</b>				
Hamre & Pianta (2005)	Emotional support of teacher		Main Effect = <i>ns</i> Moderation = $\eta^2 = .01$	
<b>Consultation and Coaching in regard to STIs</b>				
Cappella et al. (2012)	BRIDGE program	SSMD = $.47^*$	<i>ns</i>	
<b>Workload stress on teachers</b>				
Whitaker et al. (2015)	Workplace stress: demands, control, and support	<i>ns</i>	$\beta = .53^{**}$	
<b>School-Wide Envirn./Log.</b>				
Mashburn et al. (2006)	Length of school day Child/Teacher Ratio	<i>ns</i> <i>ns</i>	$\beta = .03^*$ <i>ns</i>	
Caplan et al. (2016)	ASD: Classroom Setting	<i>ns</i>	<i>ns</i>	

## STUDENT-TEACHER RELATIONSHIPS

<b>Factor</b> Author (Year)	Independent Variable	Findings (Closeness)	Findings (Conflict)	Findings (Overall STRS)
<b>Leveraging Similarities Between Teacher and Student</b>				
Gelbach et al. (2016)	Aware of similarities between T/S			S = <i>ns</i> T = $\beta = .21^*$

*Note.* S = Student, T = Teacher



## STUDENT-TEACHER RELATIONSHIPS

Table 4

*Quality Appraisal Tool of Quantitative Studies Findings*

<b>Factor</b>	<b>Author (Year)</b>	<b>Selection</b>	<b>Design</b>	<b>Confounders</b>	<b>Blinding</b>	<b>Measures</b>	<b>Withdrawals</b>	<b>Total</b>
<b>Social Emotional Learning Programs</b>								
	Bierman et al. (2017)	2	1	1	1	1	1	<b>6</b>
	Nix et al. (2016)	3	1	1	2	1	1	<b>5</b>
	Lipscomb et al. (2013)	2	1	1	2	1	3	<b>5</b>
	Jones et al. (2013)	1	1	1	2	1	1	<b>6</b>
	Zhai et al. (2015)	3	2	2	N/A	1	N/A	<b>3</b>
	Hart et al. (2016)	3	1	1	2	1	2	<b>5</b>
	McCormick et al. (2015)	3	1	1	2	1	1	<b>5</b>
<b>Programs Designed to Improve the STR</b>								
	Driscoll & Pianta (2010)	2	1	2	1	1	3	<b>5</b>
	Driscoll et al. (2011)	2	2	2	2	1	3	<b>5</b>
	Eisenhower et al. (2016)	3	1	1	2	1	1	<b>5</b>
<b>Classroom Management Strategies</b>								
	Baroody et al. (2014)	2	1	1	2	1	1	<b>6</b>
	Rimm-Kaufman & Chiu (2007)	3	2	2	2	1	3	<b>4</b>
<b>Student-Teacher Interactions</b>								
	Chang et al. (2007)	2	3	2	N/A	1	N/A	<b>3</b>
	Hartz et al. (2017)	2	2	2	N/A	1	N/A	<b>4</b>
	Koles et al. (2009)	2	2	3	N/A	1	N/A	<b>3</b>
	Giles et al. (2012)	3	2	2	N/A	3	N/A	<b>2</b>
<b>Instructional Strategies</b>								
	Howes et al. (2013)	2	2	1	N/A	1	N/A	<b>4</b>
<b>Emotional Support of Teachers</b>								
	Hamre & Pianta (2005)	1	2	3	N/A	1	N/A	<b>3</b>
<b>Consultation in regard to STIs</b>								
	Cappella et al. (2012)	3	1	1	2	1	1	<b>5</b>
<b>Workload Stress on Teachers</b>								
	Whitaker et al. (2015)	3	2	1	N/A	1	N/A	<b>3</b>
<b>School-Wide Environment/Logistics</b>								
	Mashburn et al. (2006)	2	2	3	N/A	1	N/A	<b>3</b>
	Caplan et al. (2016)	3	2	3	N/A	1	N/A	<b>2</b>
<b>Leveraging Similarities Between T &amp; S</b>								
	Gelbach et al. (2016)	3	1	1	1	3	1	<b>4</b>

## Discussion

The purpose of this study was to identify the universal school- and classroom-level factors associated with STRs. Analysis of the literature suggests four school-level and classroom-level factors that may be related to the STR: (1) SEL programs/curriculums, (2) programs designed to impact STRs, (3) classroom management strategies, and (4) student-teacher interactions. There were additional relationships with the STR captured with one study each worth exploring in future research: (1) instructional strategies, (2) emotional support of teacher, (3) consultation and coaching in regard to STIs, (4) workplace stress on teachers, (5) school-wide environment/logistics, and (6) leveraging similarities between teachers and students. Overall, research support for these factors varied, taking into consideration methodological rigor of the studies and strength of the relationship; however, the findings suggest school- or classroom-level factors may be related to positive STRs.

One of the most notable findings was the quantity of studies evaluating the relationship between SEL programs and the STR. The SEL programs showed the most consistent relationship with STRs across seven studies that included six randomized control trials and one observational design. Effect sizes were small to medium ( $d = .12 - .45$ ), suggesting when students were explicitly taught social and/or emotional skills, this had a positive association with quality STRs. As Fan et al. (2011) stated, behavior problems in school predict STRs; SEL programs are one way to address behavior problems in schools, and by extension, potentially facilitate positive STRs. Other research demonstrates STRs predict social emotional and behavioral problems for students (Cornelius-White, 2007; Quin, 2016); thus, this systematic review, coupled with

## STUDENT-TEACHER RELATIONSHIPS

previous literature, suggests a positive bidirectional relationship between social, emotional, and behavioral (SEB) skills of students and STRs. One limitation of the studies included in this factor was the overall lack of external validity given the participant selection procedures, as only one out of seven studies included in this factor had strong participant selection procedures. Moreover, the majority of studies evaluating the relationship between SEL programs and the STR were Head Start or prior Head Start students, which can only be generalized to students from low-income households.

Another strong finding was the association between programs designed to improve the STR. Banking time and Starting Strong were studied across three studies, one quasi-experimental study and two randomized control trials. The effects of these programs, when reported, were within the small ( $d = .33$ ) to medium ( $\eta^2 = .08$ ) range. Given these programs utilized direct practices for improving relationships between teachers and students (e.g., spending 1:1 time with students, positive to negative interaction ratios, etc.), it is not surprising they demonstrated positive effects. However, these studies also lacked appropriate participant selection procedures; thus, the external validity of these findings is not strong. In addition, the researchers who analyzed Banking Time failed to address study participant withdrawal/drop-out, which may introduce bias in the results. Interpreting these results in light of the methodological rigor suggests these programs have promise for enhancing STRs.

An additional notable finding was the positive relationship between classroom management strategies (e.g., class-wide rules, positively stated behaviors and interactions, routines, collaborative problem solving, and role-playing) and STR closeness. This was found in two studies, one randomized control trial and one quasi-

## STUDENT-TEACHER RELATIONSHIPS

experimental study. This finding is similar to previous systematic reviews (Korpershoek et al., 2016; Pianta, 2006). Korpershoek et al. (2016) stated, “to attain high-quality classroom management, teachers must develop caring supportive relationships with and among students” (p. 644). This also aligns with Pianta’s chapter that discussed classroom management by embedding it within a STR perspective (Pianta, 2006). Through high-quality, well-managed classrooms, students know what to expect and what is expected of them. This tier 1 approach may prevent problematic interactions between students and teachers, which subsequently may improve the STR (Hartz et al., 2017).

### **STR System Components**

Taken together, these findings offer support for Pianta’s conceptualization of the STR system model. As a reminder, Pianta’s STR system model includes the following components of a relationship: (a) features of the two individuals, (b) each individual’s perception of the relationship, (c) processes by which information is exchanged between the two individuals, and (d) external influences of the systems in which the relationship is embedded (p. 93). One study in this systematic review, Gelbach et al. (2016), intentionally leveraged similarities between students and teachers to improve their perceptions of the relationship. An additional study found the types of interactions between students and teachers may be related to STR quality (Hartz et al., 2017). Hamre et al. (2013) further described student-teacher interactions into three domains: emotional support, instructional support, and classroom organization. These three domains emerged from studies captured in this systematic review. Although emotional support did not demonstrate a significant main effect on STRs, there was some evidence for its importance in STRs through moderation (Howes et al., 2013; Pianta & Hamre, 2005).

## STUDENT-TEACHER RELATIONSHIPS

Instructional strategies (Howes et al., 2013) and classroom organization (Baroody et al., 2014; Rimm-Kaufman & Chiu, 2007) may also be related to the STR.

### **Finding Across Age Ranges**

It is notable all studies included in the factors with the most research support were completed within Pre-K and elementary school settings. In addition, some studies found interventions in PreK and K had significant effects on later elementary school outcomes (Bierman et al., 2017; Hart et al., 2016); this suggests the investment benefits of early intervention programs (Hart et al., 2016). There are numerous limitations of the lack of research in the middle- and high-school settings. As Pianta (1999) stated, relationships are complex systems more accurately conceptualized through patterns of interactions over time, across situations, and from multiple modes of analysis. Understanding how relationships change throughout development in K-12 should be studied with longitudinal research designs. In addition, numerous studies did not address carryover of effects to the next year with a different teacher (for an exception, see Mashburn et al., 2006). Looking at STRs in early and later years, and how those relationships impact student outcomes, should be studied in future research. Lastly, understanding the importance of these STRs for adolescents and how to best improve them should be addressed in future studies.

### **Methodological Rigor of Studies Captured**

There were additional associations supported with only one study each: workplace stress on teachers, length of school-day, instructional strategies, emotional support of the teacher, mentoring programs, and leveraging similarities. In addition, given the inclusion criteria for this scoping literature search, most of the studies included in this review were observational designs. Although these studies provided initial evidence for associations,

## STUDENT-TEACHER RELATIONSHIPS

causal relationships cannot be inferred. One exception was Gelbach et al. (2016), who reported a randomized control trial leveraging similarity between teachers and students; however, they did not utilize validated measures of the STR. Thus, future research may consider further analyzing the relationships between these independent variables and STRs.

There were limitations to the studies captured in this review. First, multi-informant outcome measures of the STR were lacking. Studies have demonstrated the importance of the student perception of the STR (Rey et al., 2007). In fact, one of the studies in this review (Mashburn et al., 2006) indicated solely using teachers' ratings provided biased estimates of the STR. Future studies should address this gap with multi-informant measurement. This limitation can be further understood by addressing the availability of current STR assessment tools. The dominant STR assessment tool is the STRS, which only offers the teacher perspective. This calls for the creation of additional validated, standardized, STR assessment tools that address both the student and teacher perspectives. However, the complexity of validating a student-perspective rating scale across children with different ages should be considered. Similarly, most of the studies utilized self-report surveys of the STR, which introduces bias. Understanding the STR through multi-modal measurement would be a more comprehensive, reliable, and valid conceptualization of the STR. Researchers could further assess the STR with observations, interviews (e.g., Teacher Relationship Interview), and questionnaires (e.g., SPARTS). Additional limitations across studies were lack of external validity and consistency of reporting effects. Numerous researchers utilized recruitment methods that allowed participants to self-refer for programs or interventions, introducing bias. Lastly,

## STUDENT-TEACHER RELATIONSHIPS

the lack of researchers who reported effect sizes or enough information to calculate effect sizes impacts the quality of this systematic review. Nine of the 23 studies reported effect sizes, and the effect sizes varied (e.g., Cohen's *d*, and eta-squared, R-squared), making it difficult to directly compare findings.

### **Limitations and Directions for Future Research**

The results of this systematic review need to be considered in the context of its limitations. Because the STR is conceptualized and defined in numerous ways, the keywords utilized to capture studies may not have been comprehensive. This was offset by doing extensive reading before the systematic review to identify as many as possible of the phrases researchers utilize to describe the STR; however, it is possible studies were missed because of omitted phrases. In addition, dissertations and theses were not included in this review. Due to publication bias in favor of significant results, there may be unpublished findings of null or negative effects of these factors or other factors.

Another limitation of the systematic review itself is studies conducted outside of the US were not included. There has been extensive research outside of the US that supports the relationships between school- and classroom-level factors and the STR in the US. International research has shown the following factors to be associated with the STR: behavior management and student-teacher interactions (Vancraeyveldt et al., 2015), teacher feedback (Skipper & Douglas, 2015), and teacher perceived stress (Bi, Ma, Yuan, & Zhang, 2016), along with other factors not included in this review, such as teachers humor (Van Praag, Stevens, & Houtte, 2017). However, due to the differences between countries in their educational systems and policy, these types of studies cannot be directly compared.

## STUDENT-TEACHER RELATIONSHIPS

Lastly, the QATQS was chosen to attempt to compare quality of studies across a variety of research designs; however, this tool is better designed to evaluate RCTs and quasi-experimental designs. Thus, evaluating quality indicators that were non-applicable to some of the observational and correlational designs made it difficult to compare quality across studies. In addition, this is a public health quality appraisal tool. Although it can be argued education is related to public health, the quality level standards needed to be considered strong within this appraisal tool may lack feasibility in schools due to a multitude of constraints.

Given the limitations of this systematic review in addition to the current existing literature, future research should address improving STRs between middle and high school students and teachers, taking into consideration how STRs change year after year within educational settings, focusing on both the student and teacher perception of the STR, and further analyzing all of the school- and classroom-level factors that can impact the STR. Considering factors such as district-wide policies, educational law, and school-home variables (e.g., neighborhood poverty; McCoy et al., 2015) that may impact the STR could be additional avenues for future research. In addition, given the large amount of literature that demonstrated school- and class-wide SEL programs can impact STRs, future research may explore the mechanisms for this relationship; i.e., do SEL programs directly improve the STR or do SEL programs improve the STR through other mediating variables (e.g., interactions, engagement)? Similarly, because a variety of school- and class-wide programs were captured in this systematic review, a meta-analysis of said programs to determine which programs are most effective at improving STRs is needed.



## STUDENT-TEACHER RELATIONSHIPS

A common elements procedure to determine the specific practices commonly seen across efficacious programs could also be informative.

### **Implication for Practice**

Despite the aforementioned limitations, given the findings of this systematic review, SEL programs and programs designed to improve the STR show promise. School psychologists can serve as consultants in implementing these programs school-wide. Utilizing a systems lens, multiple interdependent teams can be created to contribute to the common goal of implementing these programs and subsequently improving STRs school-wide. School psychologists can help create and serve on multiple school-wide teams (e.g., data management, school leadership, school-climate, grade-level teacher). A year-long plan can be created with short- and long-term goals, analyzed via progress monitoring. School psychologists can serve as experts for professional development and continuous implementation support.

These findings also indicate classroom management strategies may boost STRs. However, research has shown teacher preparation programs do not focus on specific classroom management skills and strategies for increasing or decreasing student behaviors (Flower, McKenna, & Haring, 2017). Therefore, school psychologists can serve as consultants for teachers, offering them the positive classroom management strategies suggested in this literature review (e.g., Responsive Classroom intervention).

Relatedly, school psychologists are encouraged to serve as consultants for improving STRs. Utilizing a multitier support framework, school psychologists can assess STRs school-wide or class-wide with, for example, the STRS short form (Pianta, 1999). The data can be used to identify trends. For example, if one teacher rated the

## STUDENT-TEACHER RELATIONSHIPS

majority of their relationships as conflicting, this teacher may need additional consultation and strategies. An additional example could include a teacher who rated the majority of their relationships with students as close, warm, and positive, but one STR seems to be severely conflicting and negative. This teacher may need support in repairing and maintaining that relationship. This process could coincide with the Behavioral Consultation Model through problem identification, analysis, implementation and evaluation (Kratochwill & Bergen, 1990). For example, school psychologists could meet with teachers, understand their perspective, and observe their interactions. They could operationally define the problem, determine hypotheses as to why it is happening, and follow-up with recommendations (e.g., classroom management strategies, strategies to improve relationships). School psychologists should also consider ongoing coaching and consultation, as some educational professionals may need additional support (Joyce & Showers, 2002).

More broadly, the relationship between school-and classroom-level factors and the STR found in this systematic review has significant implications for school psychologists as school psychologists are encouraged to be systems-level advocates. Policy makers, school leaders, and mental health professionals should think about how federal and school policy speaks to values, priorities, and expectations and how those entities are then presented to and consumed by students. To better promote child wellbeing, policy makers, school leaders, and mental health professionals can view the school, and learning, as a social context embedded within daily interactions between adults, students, and peers (Pianta et al., 2012). Further understanding how to utilize the

## STUDENT-TEACHER RELATIONSHIPS

social resources within schools to promote STRs and child well-being is a valuable target for school- and class-wide prevention and intervention.

### **Conclusion**

To appropriately analyze the STR, researchers need to consider the environments in which the STR exist. To consider this perspective, utilizing the framework of Pianta et al. (2002), this study analyzed how universal school- and classroom-level factors are associated with the STR. The findings of this study provide support for intervening to improve STRs at the school- or classroom-level. In addition, it provides promising practices most supported by the literature for enhancing STRs via universal influences: SEL curriculums/programs, specific programs designed to improve the STR, and classroom management programs or strategies. This information can inform school leaders' and mental health professionals' efforts to bolster STRs, and by extension, students' overall health and well-being.

## CHAPTER 3

### Study 2: Meta-Analysis and Common Elements of Evidence-Based Interventions to

#### Improve Student Teacher Relationships at Tier 1

Schools are inherently social environments with a myriad of opportunities to build relationships. Past research has shown student-teacher relationships (STRs) are associated with a variety of positive and negative student-outcomes including in academic achievement, engagement, school adjustment, attendance, disruptive behaviors, suspension, and risk of dropping out (Cornelius-White, 2007; Quin, 2016; Roorda, Koomen, Spilt, & Oort, 2011). Schools can support student-teacher relationships universally and systematically by implementing school- and class-wide programs and practices that facilitate positive, high-quality STRs. These universal interventions can leverage preventative practices that foster positive STRs instead of relying on reactive strategies targeting poor STRs. Moreover, evidence-based practice should be informed by the highest level of research: synthesis and meta-analytic procedures (Gersten et al., 2005). This study systematically analyzed school- and class-wide interventions that aim to improve STRs utilizing two procedures, meta-analysis (Cooper, Hedges, & Valentine, 2009) and the common elements approach (Chorpita, Daleiden, & Wiesz, 2007), to evaluate and distill universal evidence-based practices to improve STRs.

#### **The Student-Teacher Relationship: Conceptualizations and Theoretical**

#### **Underpinnings**

The dominant paradigm utilized to conceptualize the STR is grounded in attachment theory (Pianta, 2001). Much of the research on attachment has focused on caregiver-child relationships (CCRs; Bowlby, 1988; Ainsworth, 1989). Bowlby posited

## STUDENT-TEACHER RELATIONSHIPS

these early relationships between caregivers and children inform subsequent relationships, including STRs (Pianta, 1999; Riley, 2010). Other researchers argue these inner working models of relationships are dynamic and subject to change throughout the lifespan (Fonagy et al., 1996; Fraley & Shaver, 2000; Riley, 2010). For teachers, school psychologists, and other educational professionals, this idea attachment is not static is preferred, as teachers and professionals in schools can provide security and trust in their relationships with students to adapt their internal working models. Other researchers have built on this work showing STRs can attenuate the effects of insecure parent-child attachment on students' academic achievement (O'Connor & McCartney, 2007), attenuate the effects of risk factors and behavioral and academic outcomes (Baker, 2006), and serve as an extension of the parent-child relationship (Davis, 2003). Collectively, this research substantiates the main attachment-driven dimensions of the STR scale: closeness, conflict, and dependency (Pianta, 2001), and the importance of STRs in child development. As conceptualized by Pianta (2001), conflict encompasses the teacher's perspective of whether their relationship is negative, strenuous, and ineffective. Conversely, closeness is defined as whether the teacher perceives their relationship as warm, affectionate, and effective. The third component, dependency, can be conceptualized as the degree to which a student is over-reliant on a teacher, struggles with separation, and has inappropriate boundaries with asking questions (Pianta, 2001).

Self-determination theory (also known as self-motivation theory or self-systems theory) offers an additional perspective on the importance of STRs. Student engagement in classrooms has been linked to higher academic achievement and social outcomes (e.g., Dogan, 2017). Self-determination theory, grounded in basic needs theory, assumes three

## STUDENT-TEACHER RELATIONSHIPS

psychological needs must be addressed for a person to be intrinsically motivated to engage in a task: (1) autonomy, (2) competence, and (3) relatedness (Niemic & Ryan, 2009; Reeve, 2012). The component most closely related to the STR, relatedness, has also been proposed by Pianta as a critical component of student engagement (Pianta, 1999). Moreover, researchers have theorized the association between STRs and student outcomes is mediated by student engagement (Appleton et al., 2008; Diperna, 2006) and student engagement is inherently a relational process (Pianta et al., 2012).

### **Outcomes Associated with Student-Teacher Relationships**

The importance of the STR in impacting student outcomes has been demonstrated across dozens of studies synthesized within three meta-analyses (Cornelius-White, 2007; Quin, 2016; Roorda et al., 2011). High quality positive STRs were found to have medium to large positive relationships with student engagement, small to medium positive relationships with academic achievement (Roorda et al., 2011), a positive relationship with students' sense of belonging (e.g., Birch & Ladd, 1997), and a positive relationship with students' self-esteem and social skills (Cornelius-White, 2007). High quality positive STRs are also inversely related to students' problematic behavior (Brewster & Bowen, 2004; Silver et al., 2005; Quin, 2016), dropout (Cemalcilar & Goksen, 2012; Quin, 2016), and suspension (Green, 1998; Quin, 2016).

The relationships between STR and student outcomes were established across numerous demographic groups and contexts including early childhood (e.g., Pianta, & Stuhlman, 2004) and adolescents and young adults in high school (Roorda et al., 2011; Wang, Brinkworth, & Eccles, 2013). Even though these results were corroborated across age groups, establishing close relationships between students and their teachers at a

## STUDENT-TEACHER RELATIONSHIPS

young age (i.e., kindergarten or early primary school) is preferred because it can impact future student outcomes (e.g., social skills, academic achievement; Hamre & Pianta, 2001; Pianta & Stuhlman, 2004) and can serve as a protective factor for students who are at risk academically or behaviorally (Baker, 2006; Burchinal et al., 2002; Dearing et al., 2016). These results were also confirmed across cultures (e.g., United States, Australia, Singapore, Italy, Turkey) and across longitudinal and cross-sectional studies (Dearing et al., 2016; Roorda et al., 2011; Quin, 2016).

However, as Pianta et al. (2002) stated, “efforts to understand and improve relationships between students and teachers must attend to various component processes as well as ways in which these processes interact with one another and with external conditions” (p. 95). Thus, as educational professionals, we must understand STRs exist within a variety of different systems (e.g., classrooms, schools), and schools can put programs and practices in place that support and impact STRs in a proactive, universal way.

### **Importance of Prevention**

With state and federal education spending continuing to be a point of concern and debate, efficient resource allocation for educational initiatives is increasingly important (Brown, Strauss, & Douglas, 2017; Ladson-Billings, 2006). Higher return of investment of government tax dollars is seen with early intervention and prevention strategies (Currie, 2001; Farkas et al., 2012; Heckman, 2011; Puma et al., 2010). The public health model of prevention can be utilized to frame schools’ instructional resources (Strein, Hoagwood, & Cohn, 2003). Interventions and supports are distributed into three primary tiers: (1) core curriculum and prevention service, (2) small group intervention, and (3)

## STUDENT-TEACHER RELATIONSHIPS

more intensive 1:1 intervention (see Figure 3 below). The general idea is intensive services are costlier per student, and by investing in prevention (i.e., tier one services), school leaders can limit the number of students who need intensive, costly services. As stated previously, high quality strong STRs have been shown to predict later academic, social, emotional, and behavioral adjustment in school (Birch & Ladd, 1997; Cornelius-White, 2007; Hamre & Pianta, 2001; Pianta & Stuhlman, 2004; Quin, 2016; Roorda et al., 2011). Therefore, schools can consider universal interventions that aim to build and maintain strong STRs as an investment in positive student outcomes.

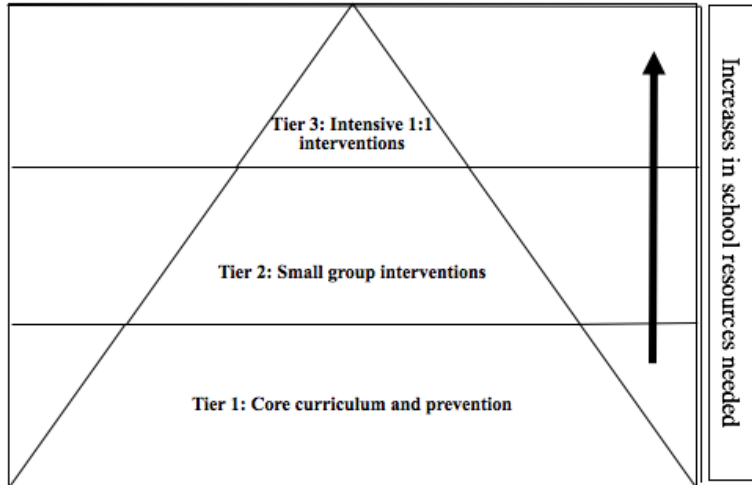


Figure 3. Response to intervention approach with resource allocation

### Hierarchy of Research Evidence

The impact of intervention programs on STRs has been studied in numerous investigations but has yet to be synthesized (e.g., Driscoll, Wang, Mashburn, & Pianta, 2011; Jones, Bub, & Raver, 2013). Previous conceptual chapters have overviewed factors related to STRs (Pianta et al., 2002). These lower levels of research evidence are important building blocks of evidence-based practice; however, it is also necessary to look at research collectively and systematically.



## STUDENT-TEACHER RELATIONSHIPS

**Meta-analysis.** As the quantity of primary research studies in the fields of education and psychology increases, so does the importance of high-quality research synthesis. Numerous disciplines, including medicine, education, and clinical psychology, propose research supporting interventions falls on a quality continuum otherwise known as the hierarchy of evidence (Evans, 2002; Petticrew & Roberts, 2006). The lowest levels of evidence start with case reports and are followed by cross sectional studies, case-control studies, and cohort studies and move into the more robust, high quality randomized controlled trials, systematic reviews, and meta-analyses (Evans, 2002). Although individual studies can provide answers to important questions, poor methods, bias results, or incorrect conclusions are sometimes published. Systematic reviews and meta-analyses look at a body of literature collectively, thus decreasing the chance of one poor study clouding a conclusion. A specific subtype of systematic review, meta-analysis, aggregates results with quantitative statistics (Cooper, Hedges, & Valentine, 2009). The advantages of meta-analysis include, but are not limited to, the following: (1) increased sample sizes, with a subsequent increase in precision around the overall mean effect, (2) a more comprehensive research model, looking at variance explained between studies and accounting for it (i.e., between study moderators), and (3) an explanation of where the research field has been, the summation of extant literature findings, and suggestions of directions for future research (Chan & Arvey, 2012). Therefore, whenever possible, methodologically sound meta-analyses should be used to inform evidence-based practices implemented in schools.

**Common elements.** Another procedure used across disciplines is the common elements approach (Chorpita, Becker, & Daleiden, 2007; Chorpita, Daleiden, & Wiesz,

## STUDENT-TEACHER RELATIONSHIPS

2005). This approach was originally created and tested within clinical psychology to identify appropriate evidence-based practices for clients struggling with specific mental health problems. With practitioners having access to numerous interventions and treatment manuals, it can be difficult to determine which manual to utilize or which practices to focus on. The common elements approach was proposed to look for commonalities in techniques and procedures across manuals (Chorpita et al., 2007; Chorpita et al., 2005). In other words, evidence-based interventions can be distilled down to a smaller number of specific practice elements (Chorpita et al., 2007; Chorpita et al., 2005). This allows professionals to understand and utilize the practice elements more common across effective interventions. The benefits of understanding and using specific practice elements, instead of using full manualized interventions, includes the following: (1) researchers gain understanding of the practice elements most commonly seen across effective interventions, (2) practitioners can understand and implement practice elements if implementation barriers exist for expensive and extensive manualized interventions, (3) researchers and practitioners can glean if specific practice elements are more effective for specific populations, and relatedly, (4) using practice element profiles, practitioners can compare their school demographics to specific practice element profiles and choose manualized interventions that include the most relevant practice elements. This common elements approach can also be applied to educational interventions (Barth et al., 2013). This allows educational professionals and school leaders to understand the common elements across effective, evidence-based interventions. This knowledge can inform resource allocation (i.e., time and money) to the practices most frequently seen across successful educational interventions.

## STUDENT-TEACHER RELATIONSHIPS

### **Gaps in Literature and Purpose**

Numerous studies have analyzed the relationship between school- and class-wide interventions and STRs (e.g., Baroody et al., 2014; Bierman et al., 2017; McCormick et al., 2015). Yet, there are no extant studies that utilize meta-analytic or common element procedures to determine which interventions are most effective *and* which practice elements are most common across effective, evidence-based interventions. Therefore, the research questions driving the purpose of this literature review are as follows:

1. Which school- and class-wide interventions are most effective at improving STRs?
2. What are the common practice elements of effective school- and class-wide interventions for improving STRs?

### **Method**

#### **Search Strategy**

A multi-modal search strategy was utilized to collect published literature, theses, and dissertations, utilizing the following techniques: (1) searches in databases utilizing a combination of key terms, (2) consultation of experts in the field, (3) ancestral search (i.e., footnote chasing), (4) forward citation searching. More specifically, the process of collecting articles began with four database searches, three within EBSCOhost (Academic Search Premier, Educational Source, and ERIC), and PsycInfo via Ovid using search terms within article titles, abstracts, and search headings particular to each database (see Appendix A for search terms utilized in each database). An additional

## STUDENT-TEACHER RELATIONSHIPS

database was searched using similar search terms to include a comprehensive search of theses and dissertations, ProQuest Dissertations and Theses.

Search terms were first identified through a scoping literature search. A librarian specializing in educational psychology was consulted to determine search terms to capture relevant literature. Articles found in the databases were screened at the title and abstract level to determine if the purpose of the study matches the independent (school- and class-wide intervention) and dependent (STR) variables of this meta-analysis. Across all five search engines, 10,229 articles were identified. Forty articles were not available online and were requested through the university's inter-library loan service. Across all search engines, 768 articles were retained at the title and abstract level. There were 2,771 duplicates across search engines. The rest of the articles ( $n = 6,690$ ) were excluded at the title and abstract level because they were not relevant to this study. The 768 articles retained at the title and abstract level were further examined for inclusion criteria (see Figures 4 and 5 for PRISMA charts).

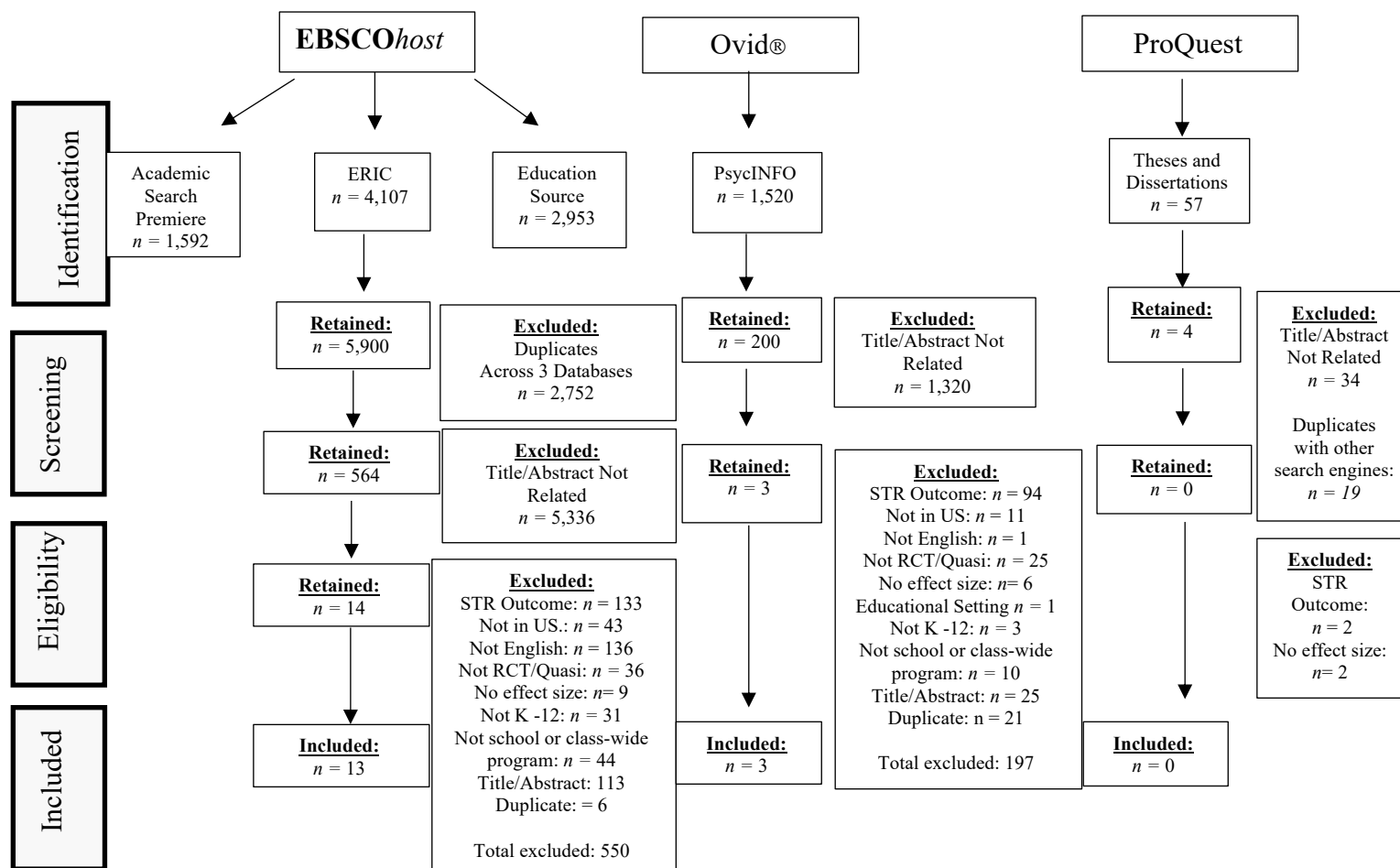


Figure 4. PRISMA Flow Diagram Database Results

STUDENT-TEACHER RELATIONSHIPS

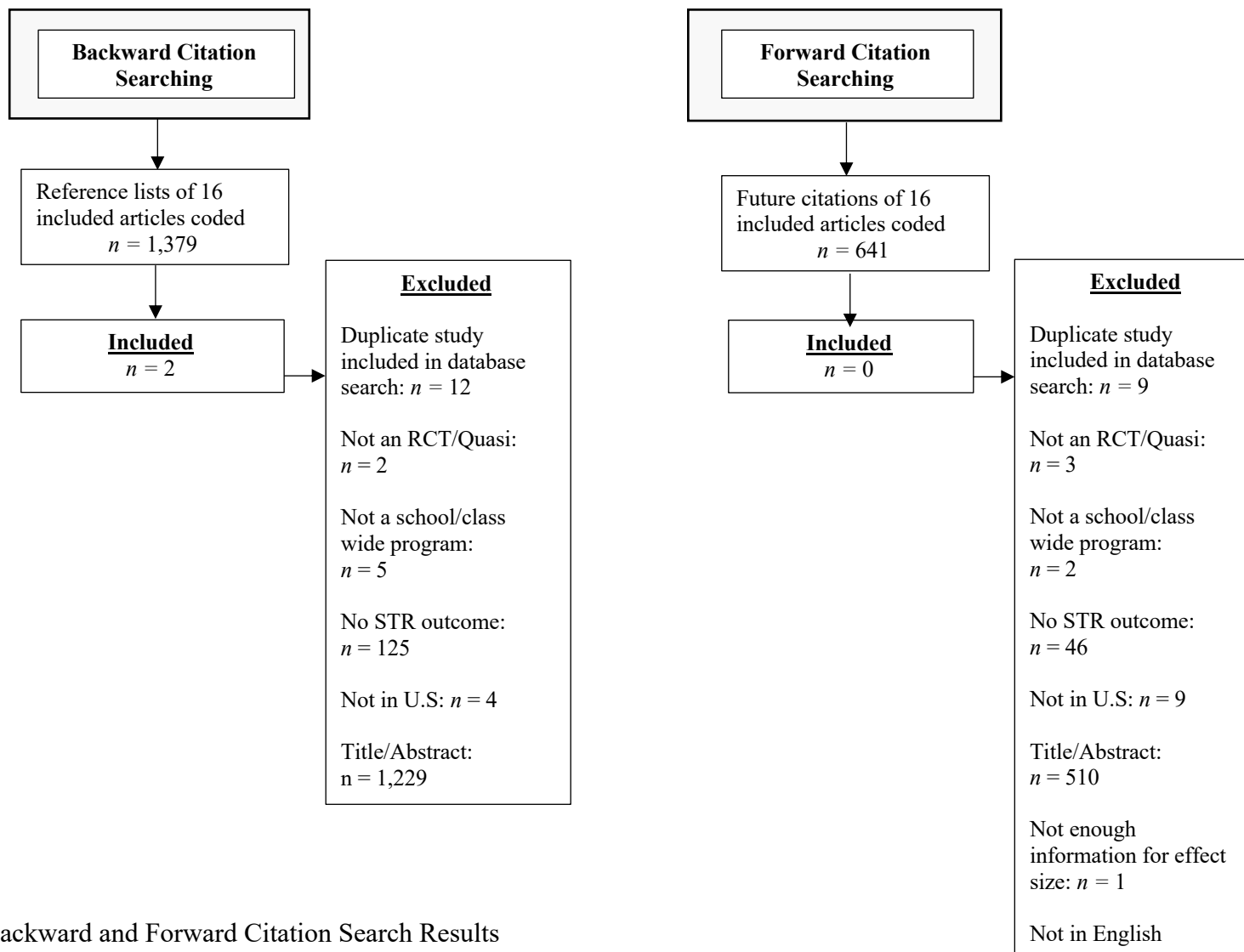


Figure 5. Backward and Forward Citation Search Results

### **Inclusion Criteria**

The inclusion criteria for these articles were as follows: (a) participants in grades pre-K-12, (b) primarily conducted in an educational setting (public, private, and charter schools included), (c) included a comprehensive outcome measure of the STR, (d) written in the English language, (e) conducted in the United States, (f) examined a school- or class-wide program or intervention that aims to improve STRs, (g) included an effect size or enough information to calculate an effect size, and (h) utilized a randomized control trial or quasi-experimental design. The study excluded articles not completed in the US due to different federal educational law and policies across countries. Therefore, the universe of generalization only includes schools in the United States. The study included theses and dissertations to help combat publication bias. More specifically, any reporting of an experimental or quasi-experimental study of a tier 1 intervention with the STR as a dependent variable was considered.

Tier 1 programs have been previously defined as core programs all students receive (Fuchs & Fuchs, 2006; Shapiro, n.d.). Within this study, *all* was further defined as programs implemented with students school- or class-wide; therefore, if programs could not be used at a school or class-wide level, they were excluded (e.g., pull out programs for small groups of students). For the purpose of this study, any program that included school- or class-wide practices that could be implemented in general education classes by the general education teacher with numerous students was considered. The STR as the dependent variable was defined as teachers' and/or students' perspectives of the quality of their relationships. Quality can be defined numerous ways with different components of the STR based on different theories, and this review did not exclude

## STUDENT-TEACHER RELATIONSHIPS

specific measures based on underlying components. However, to help ensure a comprehensive perspective of the STR, studies including minimal STR questions within school climate surveys, impairment surveys, or conceptual attitudinal surveys were excluded. In other words, a comprehensive measurement tool of the STR is a tool that measures multiple components of a relationship based on Pianta's STR conceptualization (i.e., features of the individuals, perceptions, and interactions; Pianta et al., 2002). Moreover, even though student-teacher interactions (STIs) are one component of the STR system, it is not a comprehensive measurement of the STR (Lippard et al., 2017; Pianta et al., 2002); therefore, the studies having STIs as the outcome measure were excluded. STR outcome measures could include student perspectives, teacher perspectives, or both individuals' perspectives of the STR.

A total of 16 studies met these inclusion criteria. The other 752 studies retained at the title and abstract level were excluded for the following reasons: lacked a student-teacher relationship outcome variable ( $n = 229$ ), not conducted in the United States ( $n = 54$ ), not written in English ( $n = 137$ ), not an RCT or quasi-experimental design ( $n = 61$ ), didn't provide enough information to calculate an effect size ( $n = 17$ ), age range of participants was not preK-12 ( $n = 34$ ), did not include a school- or class-wide program ( $n = 54$ ; excluded if just a practice *or* if tier 2/3 program), not implemented in an educational setting ( $n = 1$ ), should have been excluded at title/abstract level ( $n = 138$ ), and duplicates within database searches ( $n = 27$ ).

The 16 studies that matched inclusion criteria were "snowballed" by searching the reference lists in these publications to find studies previous search techniques may have missed. In addition, any later studies that cited the included studies were also searched



## STUDENT-TEACHER RELATIONSHIPS

utilizing Google scholar's "cited by" operation. Authors continued with forward and backward citation searching within all articles that matched inclusion criteria until no new studies emerge. Utilizing backward search technique, an additional 1,379 were identified. After considering inclusion criteria, 2 were retained (see Figure 5 for exclusion reasons). Utilizing the forward search technique, 741 articles were identified. After considering inclusion criteria, 0 were retained (see Figure 5 for exclusion reasons). Altogether, 18 articles were included in this study.

Lastly, professionals and experts that emerged within the 18 included studies were contacted via email to inquire about any unpublished results (see Appendix B). The professionals emailed are outlined in Appendix C. One new article was captured via this search strategy; however, this article lacked enough information to calculate an effect size.

For the meta-analysis, articles were coded twice, first by the main author and second by a school psychology graduate student. Disagreements were handled by double checking the codes within articles for consensus. For the common elements procedure, programs were coded for practices similarly, first by the main author and second by a school psychology graduate student. Any disagreements on how practices should be coded were discussed in person until consensus occurred. There was a total of 16 practice elements whose codes were reversed after discussions with a second coded. Given there were 11 programs coded for a total of 44 practice elements, there was potential of disagreements across 484 codes. Therefore, this equates to only 3% disagreement/changes with the original coding completed by the first author.

## STUDENT-TEACHER RELATIONSHIPS

### Meta-Analysis

The 18 included articles were coded. A study-by-study data-set was created (see Appendix D: *Codebook of Study Data Set*). Effect sizes were coded for each study, along with a variety of potential moderator variables (e.g., student age, teacher education/experience). A statistician assisted with every step of the meta-analysis including coding, converting effect sizes, and reporting/interpreting findings.

**Converting and reporting effect sizes.** If available, Cohen's *d* effect sizes were coded as the effect sizes. If means, standard deviations, and sample sizes were given at post-test, these were utilized to calculate effect sizes to increase the ability to compare effect sizes across studies. Some studies reported their own effect sizes (e.g., Hedges *g*); however, different studies controlled for different covariates, which makes it challenging to compare effects across studies. Moreover, most of the studies included in this meta-analysis were RCTs ( $n = 16$ ; 89%); thus, utilizing means and standard deviations at post-test to directly compare raw effects was utilized. When means and pooled standard deviations were reported, the following equation was utilized (Cohen, 1988):

$$d = \frac{M_1 - M_2}{SD_{pooled}},$$

where  $M_1$  represents the mean for sample one,  $M_2$  represents the mean for sample two, and  $SD_{pooled}$  represents the pooled standard deviations for both samples.  $SD_{pooled}$  was calculated with the following formula:

$$\sqrt{\frac{(n_1 - 1) * S^2 + (n_2 - 1) * S^2}{(n_1 + n_2 - 2)}}.$$

If means and standard deviations were not reported ( $n = 2$ ), other effects were converted to Cohen's *d* effect sizes. The following equation was utilized to convert correlation coefficients to Cohen's *d* effect sizes (Borenstein, Hedges, Higgins, & Rothstein, 2009):

## STUDENT-TEACHER RELATIONSHIPS

$$d = \frac{2r}{\sqrt{1-r^2}},$$

where  $r$  represents the correlation reported between the implemented program and STR outcome variable. The variance of  $d$  when converting from a correlation coefficient was calculated with the following formula (Borenstein et al., 2009):

$$V_d = \frac{4V_r}{(1-r^2)^3}$$

Only one study (Rimm-Kaufman et al., 2007) reported correlation coefficients as their effect size between program practices and the STR. Converting log odds ratios to Cohen's  $d$  utilized the following equation (Borenstein et al., 2009):

$$d = \text{Log Odds Ratio} \times \frac{\sqrt{3}}{\pi}$$

where  $\pi$  is the mathematical constant (3.14159). The variance of  $d$  when converting from log odds ratios was calculated utilizing the following equation:

$$V_d = V_{\text{Log Odds Ratio}} \times \frac{3}{\pi^2}$$

However, one study (Nix et al., 2016) reported effects with odds did not report an odds ratio; thus, an odds ratio of being from the REDI intervention group and having a high-stable STR was calculated utilizing the following procedure:

		REDI Intervention		
		Yes	No	Total
STR High Stability Group	Yes	49	25	74
	No	42	28	80
		91	63	154

## STUDENT-TEACHER RELATIONSHIPS

The log odds ratio and variance of the REDI intervention group having a high-stable STR compared to the control group having a high-stable STR was calculated. This log odds ratio was converted to Cohen's  $d$  utilizing the equation above. Lastly, Hedges  $g$  was converted utilizing the following equation (Borenstein et al., 2009):

$$d = \frac{g}{J}, \text{ with } J = 1 - \frac{3}{4df-1}$$

For all effect sizes, the standard error of the effect size was calculated utilizing the following formula:

$$SE_D = \sqrt{V_D}$$

All effect sizes were separated based on the outcome variable reported: STR closeness, STR conflict, and overall STR. Excel version 16.2 was utilized to create forest plots of the three outcome variables (see Results section Figures 7 through 9).

**Weighting effect sizes.** After effect sizes were obtained for every study, careful consideration was needed to determine which effect sizes to combine and which effect sizes to keep separate. There were some programs analyzed across numerous studies. These studies were aggregated to determine an average effect size for each program only if they utilized the same outcome variable and analyzed the same program. This was because different programs, even though they serve the same purpose of improving the STR, are not comparable and should not be averaged. When aggregating studies, studies with more precision were weighted more highly utilizing the following weight (Cooper et al., 2009; Lipsey & Wilson, 2001):  $w = \frac{1}{v}$ , with  $w$  being the weight and  $v$  being the variance of each individual study. Studies were aggregated utilizing the following formula (Lipsey & Wilson, 2001):

## STUDENT-TEACHER RELATIONSHIPS

$$\overline{ES} = \frac{\sum(w \times ES)}{\sum w}, \text{ and } se_{\overline{ES}} = \sqrt{\frac{1}{\sum w}};$$

thus, all weights were multiplied by each effect size for each study and added together. This number was divided by the sum of all the individual study weights. The combined effects are provided in the results section in Table 6. Other variables including teacher characteristics, student characteristics, and intervention components were considered as moderator variables; however, there were not enough studies retained in this meta-analysis to complete moderator analyses.

**Publication bias.** Funnel plots were created utilizing Excel version 16.2 with a template developed by researchers in the Netherlands (Van Rhee & Suurmond, 2015). This template included Egger's test of asymmetry; however, readers are urged to examine the results of the Egger's test with caution; given the small sample size of this meta-analysis, the probability of receiving a significant Egger's test (signifying publication bias) is low.

### **Common Elements Data Extraction/Coding**

The studies that demonstrated significant, positive results were further analyzed for common practices. The first step included searching for descriptions of the intervention within each included manuscript. The manuscript sections describing the intervention components were copy and pasted into a Word document for each study. All authors were contacted to obtain the manual for their program/intervention ( $n = 14$  researchers). Manuals not obtained from authors were searched via Google and reviewed as well. Only 3 manuals (Establish Maintain Restore, BRIDGE, and Banking Time) were obtained. Other program practices were gathered from the description of the intervention within the published manuscript. After all relevant sections of the studies were compiled,

## STUDENT-TEACHER RELATIONSHIPS

each practice was highlighted from these sections. These highlighted practices were compared across interventions to create a greater list of all practices. Similar to previous studies, a practice was defined as “a specific behavior or action of a teacher that manipulates features of the physical, interactional, or instructional environment to promote child outcomes” (McLeod et al., 2017, p. 207).

The total list of practices was distilled. Distillation refers to “the reduction of data to a simpler, smaller data set of meaningful units” (Chorpita et al., 2005, p. 13). The practices coded for each program were distilled down to this simpler data-set. First and foremost, comprehensive programs that included multiple programmatic components not related to improving STRs were treated differently. More specifically, Pianta et al. (2002) outlined four components of the STR system: (a) features of the two individuals, (b) each individual’s perception of the relationship, (c) processes by which information is exchanged between the two individuals (i.e., interactions, language), and (d) external influences of the systems in which the relationship is embedded (p. 93). Only program components related to social, emotional, behavioral and/or relational development were included. This was determined because social, emotional, behavioral and relational development can impact interactions between teachers and students (e.g., Conroy et al., 2015), and positive STIs can impact the STR (Hartz et al., 2017).

In addition, similar practices were combined to create practice elements. This was done by grouping practices that utilized the same mechanism (i.e., teacher behavior) to achieve similar goals into discrete practice elements. For example, “behavior specific praise” and “effective use of praise” were combined for the practice element, “praise.” At the beginning of the distillation process, numerous practices could fall within numerous

## STUDENT-TEACHER RELATIONSHIPS

codes; however, the distillation process distills the practice elements down to distinct, mutually exclusive practices. Therefore, each practice element could only fall within one code.

After this first distillation phase, the practice elements were designated in a 2x3 organizational scheme: (1) directly or indirectly impacting the STR and (2) proactive, teaching content, or reactive strategy. This organizational scheme was developed from the theoretical underpinnings of the STR system (Pianta et al., 2002), the STRS (Pianta, 2001), and the developmental perspective of STRs that focuses on the transactional nature of relationships (Sameroff, 2009). *Direct practices* were defined as intentional interactions aimed at improving aspects of the student-teacher relationship, including perceptions and feelings of trust, connection, belonging, respect, and care. For example, if a teacher greets their children at the door every day expressing care, this could be a direct practice. Likewise, if a teacher asks students personal questions to build their relationship with and understanding of that student, this would be a direct practice. *Indirect practices* include altering external, environmental influences (e.g., classroom management) and students' skills (e.g., emotion expression and understanding) to indirectly impact STRs through interactions. For example, if classroom rules and expectations are stated clearly and explicitly, student's behavior may improve, which could impact the interactions between students and teachers, which could ultimately improve relationships. Likewise, if students learn how to appropriately express their emotions through curriculum, this could improve communication during interpersonal conflict between teachers and students, which could ultimately improve relationships.

## STUDENT-TEACHER RELATIONSHIPS

Lastly, this organizational scheme differentiates between proactive and reactive strategies. This organization is based on applied behavior analysis and is defined by when the teaching practice occurs in relation to a child's problematic behavior: before (proactive) or after (reactive) a child's problematic behavior. Moreover, proactive strategies were teaching practices that aimed to prevent problematic behaviors while reactive strategies were teaching practices that happened after a child exhibited a problematic behavior. Once the practice elements were grouped, three expert consultants in the field specializing in programs designed to improve STRs reviewed the organization of practice elements. In addition, two graduate students who do not specialize in this research were also queried about the organizational scheme. Any disagreements were discussed until consensus occurred. Operational definitions of these groupings can be found in Appendix E.

The final list of organized practice elements was then utilized to code the specific programs. Thus, the end product was a program-by-program data-set with each practice element coded 1 (present) or 0 (not present). Each practice element emphasized a specific behavior a teacher should engage in to achieve a specific *purpose*. The purpose of that behavior was utilized to determine which code took priority. For example, in Establish Maintain Restore, there is a practice element of gathering, reviewing and acknowledging personal information about a student. This could potentially be coded as 1:1 time with a student (because typically you receive this type of information in a 1:1 setting), or expressing care for a student (because getting to know your students shows you care about them); however, this manual emphasized the specific purpose of this behavior is to gather personal information about a student; therefore, that code was prioritized for that



## STUDENT-TEACHER RELATIONSHIPS

practice. This entire procedure allows the researchers to determine frequency counts of each practice element across effective interventions. This does not allow researchers to determine which practice elements are active ingredients; rather, it informs researchers of overall patterns of practice elements most common across effective interventions.

Next, the study data-set and the procedures data-set were merged in SPSS (IBM Corp. Released 2017. IBM SPSS Statistics for Macintosh, Version 25.0. Armonk, NY: IBM Corp). The key variable utilized to merge the data-sets is the program/intervention ID variable. Using the demographic information from the study data-set, merged together with the practice element information from the procedure data-set, allows researchers to compare frequency counts of practice elements across demographic variables to determine if specific practice elements are more common across specific populations. This specific procedure allows us to answer the question of *what works, for whom, and under what conditions* (Chorpita et al., 2007; Chorpita et al., 2005).

## Results

### Meta-Analysis

**Study characteristics.** There were 18 studies included in our meta-analysis. Ranges of the number of schools, teachers, and students included in each of the studies were as follows: schools: 1-78 ( $M = 17.4$ ,  $n = 14$ ), teachers: 10-252 ( $M = 85.4$ ,  $n = 14$ ), students: 50-1,064 ( $M = 384.7$ ,  $n = 18$ ). The grades of participants included in studies were as follows: Pre-K ( $n = 9$ ), early elementary (grades K-2;  $n = 4$ ), upper elementary (grades 3-5;  $n = 2$ ), mixed elementary school (grades K – 5;  $n = 2$ ), and middle school (grades 6-8;  $n = 1$ ). Of the seven studies that reported urbanicity, five were urban and two

## STUDENT-TEACHER RELATIONSHIPS

were mixed (urban, rural, suburban). Of the 13 studies that reported U.S. region, the majority of the studies were completed in the northeast region of the US. The rest of the geographical regions included are depicted in Figure 6. The demographic variables across studies for students and teachers can be found in Table 5. A limited number of studies reported teacher education, and each study reported slightly different information (e.g., percentage undergraduate, percentage master's, number of years of education, etc.); thus, education of teachers was not aggregated or reported. Lastly, the study designs that were utilized were 16 randomized control trials and 2 quasi-experimental designs. Both quasi-experimental designs had teachers report on program usage and predicted their student-teacher relationships based on the dichotomous variable (yes/no) of whether they utilized the program/practices. Lastly, 12 of the studies mentioned the consideration of treatment integrity, and only 7 studies reported actual percentages of adherence, ranging from 50% to 96.5%. No studies reported on the cost of their program.

**Measurement tools.** Of the 18 studies captured in the meta-analysis, all of them utilized the Student Teacher Relationship Scale (STRS; Pianta, 2001). The STRS is a 28 item self-reported measure. It has 12 items related to conflict, 11 items related to closeness, and 5 items related to dependency (Pianta, 2001). There is also a shortened version of the STRS, which only includes 15 items from the original measure (Measures Developed, 2018). This shortened version only includes measures of closeness (8 items) and conflict (7 items). Of the 18 who utilized the STRS, 6 utilized the full version and 12 utilized the short version. One hundred percent of studies reported internal consistency, which ranged across studies:  $\alpha = .62 - .95$ . Only one study reported moderate validity of

## STUDENT-TEACHER RELATIONSHIPS

the STRS. All other studies lacked information on any types of outcome measure validity.

**Effects.** Effect sizes of programs were separated based on outcome variable reported: closeness, conflict, and overall STR. Some studies reported only one outcome, while others reported all three (see Table 6). Combined effect sizes for programs analyzed by numerous studies can be seen in Table 6. As a general guideline, Cohen's  $d$  effect sizes fall within the following categories: small: 0.2 to 0.5, medium: 0.5 to 0.8, and large: 0.8 (Cohen, 1997). The ranges of the three program effect sizes were as follows: closeness:  $d = -.07$  to  $.65$  conflict:  $-.56$  to  $.06$ ; and overall STR:  $d = -.11$  to  $.65$

**Publication bias.** Publication bias was evaluated through the visual analysis of funnel plots along with an Egger's test of asymmetry. Through visual analysis of the funnel plots for conflict and overall STR, it appears studies with large standard errors and small effects are missing from this meta-analysis, indicating publication bias (see Figures 10-12). However, the Egger's tests of symmetry for the three funnel plots were not statistically significant: closeness:  $t = -.02, p = .99$ ; conflict:  $t = -.73, p = .49$ ; overall STR:  $t = 1.62, p = .15$ . The power of the Egger's test to detect bias is low with the small amount of studies captured in this meta-analysis, especially after splitting the studies based on reported outcome variables. Thus, results should be interpreted with caution because the true program effect sizes may be lower. To help combat this issue, theses and dissertations were included in this meta-analysis.

### Common Elements Results

As stated previously, only the programs that demonstrated statistically significant, positive results were included in the common elements procedure. This is because this

## STUDENT-TEACHER RELATIONSHIPS

study is interested in determining the most common practices elements across effective interventions. There were 11 programs coded for practice elements: Establish Maintain Restore, Banking time, Responsive Classroom, Head Start (REDI/HS), Tools of the Mind, Best in Class, Starting Strong, Kindergarten Summer Readiness Classroom, BRIDGE, Incredible Years Teacher Management Program, and INSIGHTS. There were 44 total practices coded across all organizational categories (see Table 7), with this study particularly interested in the 14 proactive teaching strategies that directly impact STRs in the top left corner.

Of the proactive direct practices, the most common practices seen across effective interventions were praise ( $n = 7$ ), teachers demonstrating respect ( $n = 5$ ), spending 1:1 time with students to build relationships ( $n = 4$ ), coaching and validating emotions ( $n = 4$ ), objective observations to change teachers' internal representations of STRs ( $n = 4$ ), getting to know students personally ( $n = 4$ ), positive to negative ratio of interactions ( $n = 3$ ), check-ins throughout the day ( $n = 3$ ), positive greetings at the door ( $n = 2$ ), reflective and supportive listening ( $n = 2$ ), and expressing care ( $n = 2$ ). The definitions of these direct proactive practices can be referenced in Appendix E. Moreover, of the studies that demonstrated some of the largest effect sizes for creating close positive STRs ( $d = .50$  or greater for closeness and overall STR), these programs also exhibited higher frequencies of proactive direct practices within their programs (see Table 8). Another noteworthy finding is the percentage of practices within each program that proactively and directly impacted the STR. Sixty five percent and 89% of practices within EMR and BT proactively and directly impacted the relationship, compared to 26% and 17% for BRIDGE and IY-TCM (see Table 8). The last noteworthy finding is when looking at the

## STUDENT-TEACHER RELATIONSHIPS

total practices across effective interventions, the majority of the practices fell within two domains: Proactive/Direct: 31% and Proactive/Indirect: 27%. This suggests out of the programs that had significant results, the majority of the practices embedded in those interventions were preventative in nature.

Table 5  
*Demographic Variables (total N = 18 studies)*

Demographic Variable	Percentage	Mean Years
Student race/ethnicity ( <i>n</i> = 17 studies)		
Caucasian	39	
Black/African American	30	
Hispanic/Latino	22	
Asian/Pacific Islander	5	
Native American	0	
Other	4	
Multiracial	0	
Student gender ( <i>n</i> = 17 studies)		
Female	45	
Male	54	
Teacher race/ethnicity ( <i>n</i> = 9 studies)		
Caucasian	68	
Black/African American	16	
Hispanic/Latino	10	
Asian/Pacific Islander	5	
Native American	.5	
Other	1	
Multiracial	.5	
Teacher gender ( <i>n</i> = 10 studies)		
Female	94	
Male	6	
Teacher age in years ( <i>n</i> = 5 studies)		38
Teacher experience in years ( <i>n</i> = 10 studies)		10

## STUDENT-TEACHER RELATIONSHIPS

Table 6  
*Effect Sizes (Cohen's D) of Program on STR Across Studies*

Program Study	N (students in analyses)	Design	Closeness <i>d</i> ( <i>SE</i> )	Conflict <i>d</i> ( <i>SE</i> )	Overall STRS <i>d</i> ( <i>SE</i> )
Establish Maintain Restore					
Cook et al. (2018)	220	RCT	-	-	.65 (.14)
Duong et al. (2018)	190	RCT	-	-	.61(.20)
Combined effect					<b>.64(11)</b>
BRIDGE Program					
Cappella et al. (2012)	347	RCT	.65(.11)	.31(.11)	-
Banking Time					
LoCasale-Crouch et al. (2018)	311	RCT	-.07(.11)	.06(.11)	-
Driscoll et al. (2011)	839	Quasi	.33(.08)	-.16(.08)	-
Driscoll et al. (2010)	116	RCT	.52(.19)	-.29(.19)	-
Combined effect			<b>.23(.06)</b>	<b>-.10(.06)</b>	
Incredible Years TCM					
Rappuhn (2015)	69	RCT	.02(.24)	-.56(.25)	.49(.25)
Starting Strong Program					
Eisenhower et al. (2016)	194	RCT	.25(.21)	-.04(.20)	.16(.20)
Responsive Classroom					
Barody et al. (2014)	354	RCT	.19(.11)	.02(.11)	-
Rimm-Kaufman et al. (2007)	157	Quasi	.63(.16)	-.16(.15)	-
Combined effect			<b>.33(.09)</b>	<b>-.04(.09)</b>	
BEST in CLASS					
Sutherland et al. (2018)	451	RCT	.24(.10)	-.27(.10)	-
Head Start REDI/Head Start					
Bierman et al. (2017)	356	RCT	-	-	.39(.11)
Nix et al. (2016)	154	RCT	.12(.16)	-	-
Lipscomb et al. (2013)*	254	RCT	-	-	.30(.09)
Combined effect					<b>.34(.07)</b>
INSIGHTS					
McCormick et al. (2015)	435	RCT	-	-	.42(.1)
Kindergarten Summer Readiness Classroom					
Hart et al. (2016)	46	RCT	-	-.36(.3)	-
Tools of the Mind					
Blair et al. (2018)	534	RCT	-	-	.14(.08)
Chicago School Readiness Project					
Jones et al. (2013)	468	RCT	-	-	-.11(.09)

\*denotes studies that computed a standardized mean difference based on dichotomous regression coefficients.

Table 7  
*Organizational Scheme of Practices Components and Frequencies Across Effective Interventions*

		Type of Practice					
		Proactive		Teaching Content		Consequent	
			Freq.		Freq.		Freq.
Focus of Practice	Direct	1. Praise	7	1. Social Skills	5	1. Positive Discipline Strategies	6
		2. Respect	5			2. Repairing Relationships	2
		3. 1:1 Time	4				
		4. Coaching Emotions	4				
		5. Objective Observations	4				
		6. Getting to Know Your Students	4				
		7. Positive/Negative Ratio	3				
		8. Check-Ins	3				
		9. Positive Greetings	2				
		10. Reflective & Supportive Listening	2				
		11. Expressing Care	2				
		12. Child-Led Activities	1				
		13. Positive Farewells	1				
		14. Home Visits	1				
	Indirect	1. Establish Clear, Predictable Classroom Rules and Routines	7	1. Collaborative Problem-Solving	8	1. Feedback	6
		2. Parental Involvement	5	2. Self-Regulation/Control	5	2. Incentives/Rewards	5
		3. Student Choice/Empowerment	4	3. Emotion Understanding	4	3. Time-Out	3
		4. Transitions and Down Time	3	4. Emotion Expression	3	4. Daily Report Cards*	3
		5. PALS	3	5. Self-monitoring	2	5. Behavior Contract*	2
		6. Positive Note Home	2	6. Self-Esteem/Self-Confidence	2	6. Response Cost	1
		7. Sense of Responsibility	2	7. Goal-Setting	2		
		8. Scaffolding	2				
		9. Class-wide Meetings	2				
		10. Classroom Organization	2				
		11. High/Achievable Expectations	1				
		12. Opportunities to Respond	1				
		13. Teacher Mindfulness	1				
		14. Move Around Breaks	1				

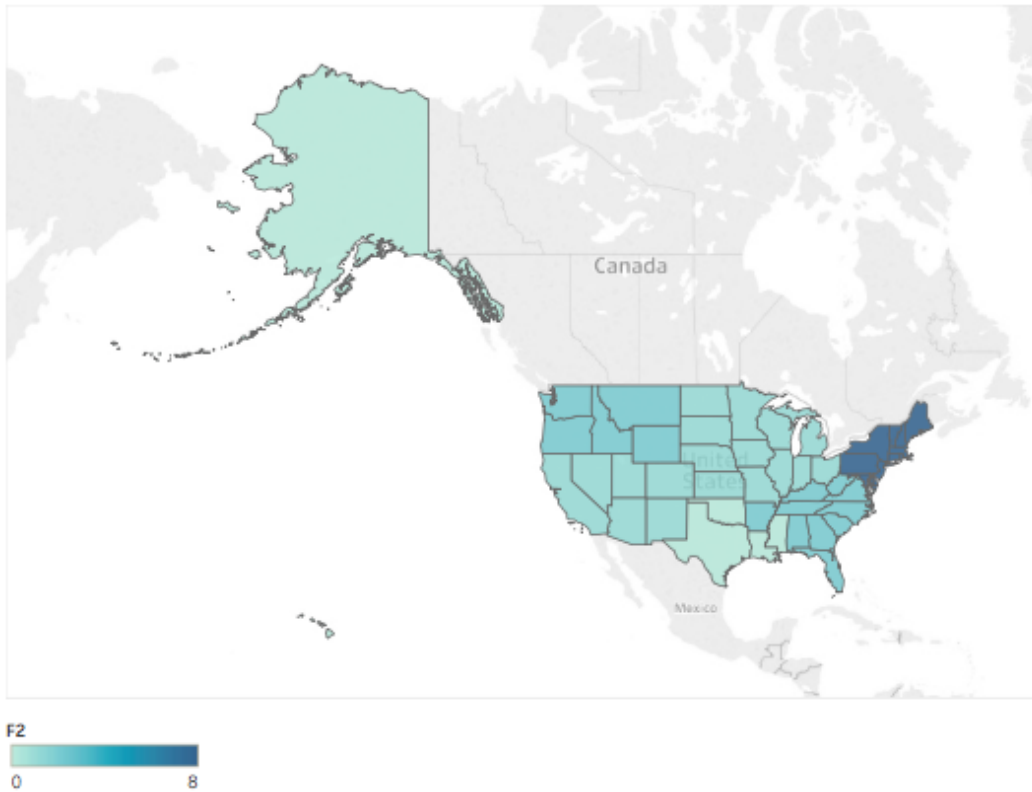


## STUDENT-TEACHER RELATIONSHIPS

Table 8  
*Frequency of practice components and proportions across programs*

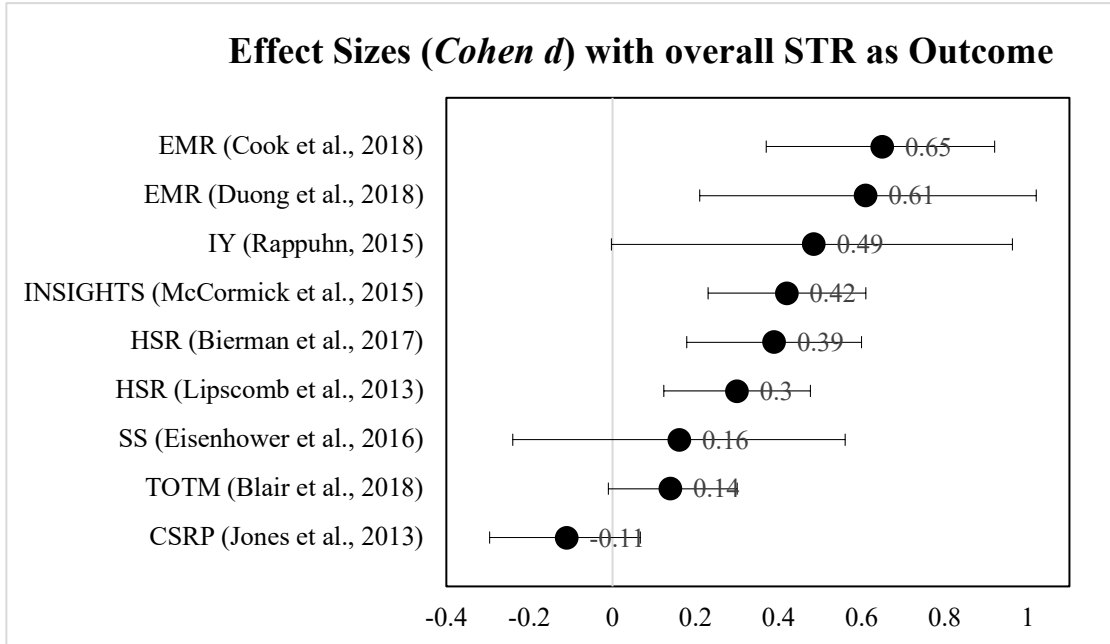
Program	Proactive/ Direct (%)	Teaching/ Direct (%)	Consequent/ Direct (%)	Proactive/ Indirect (%)	Teaching/ Indirect (%)	Consequent/ Indirect (%)	<b>Total</b>
EMR	13 (65)	0 (0)	1 (5)	3 (15)	1 (5)	2 (10)	20
BT	8 (89)	0 (0)	0 (0)	0 (0)	0 (0)	1 (11)	9
BRIDGE	6 (26)	0 (0)	1 (4)	10 (43)	2 (9)	4 (17)	23
RC	4 (33)	0 (0)	1 (8)	5 (42)	1 (8)	1 (8)	12
IY_TCM	3 (17)	1 (6)	1 (6)	6 (33)	5 (28)	2 (11)	18
TOTM	2 (18)	1 (9)	0 (0)	3 (27)	4 (36)	1 (9)	11
SS	2 (15)	0 (0)	2 (15)	2 (15)	4 (31)	3 (23)	13
KSRC	2 (18)	1 (9)	0 (0)	4 (36)	0 (0)	4 (36)	11
HSR	1 (13)	1 (13)	1 (13)	0 (0)	5 (63)	0 (0)	8
BC	1 (20)	0 (0)	0 (0)	3 (60)	0 (0)	1 (20)	5
INSIGHTS	1 (11)	1 (11)	1 (11)	1 (11)	4 (44)	1 (11)	9
<b>Total</b>	43 (31)	5 (4)	8 (6)	37 (27)	26 (19)	20 (14)	139

*Note.* EMR = Establish Maintain Restore, BT = Banking Time, RC = Responsive Classroom, HSR = Head Start (REDI), TOTM = Tools of the Mind, BC = BEST in CLASS, SS = Starting Strong, KSRC = Kindergarten School Readiness Classroom, IY-TCM = Incredible Years Teacher Management Program

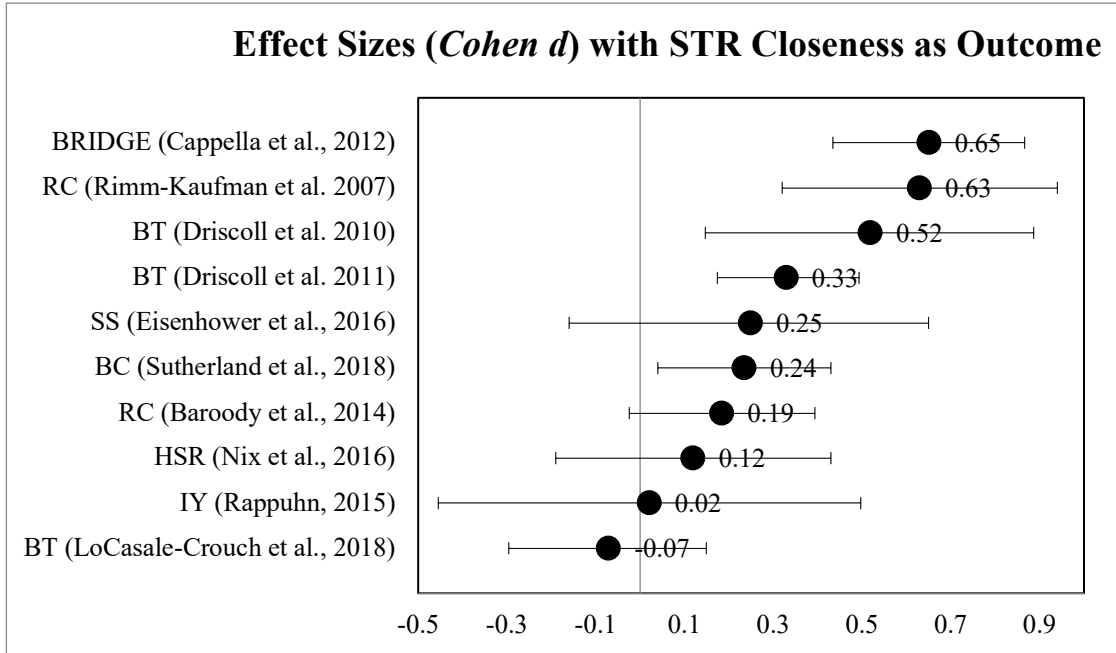


*Figure 6.* Heat map of geographical location of studies included in meta-analysis.

## STUDENT-TEACHER RELATIONSHIPS

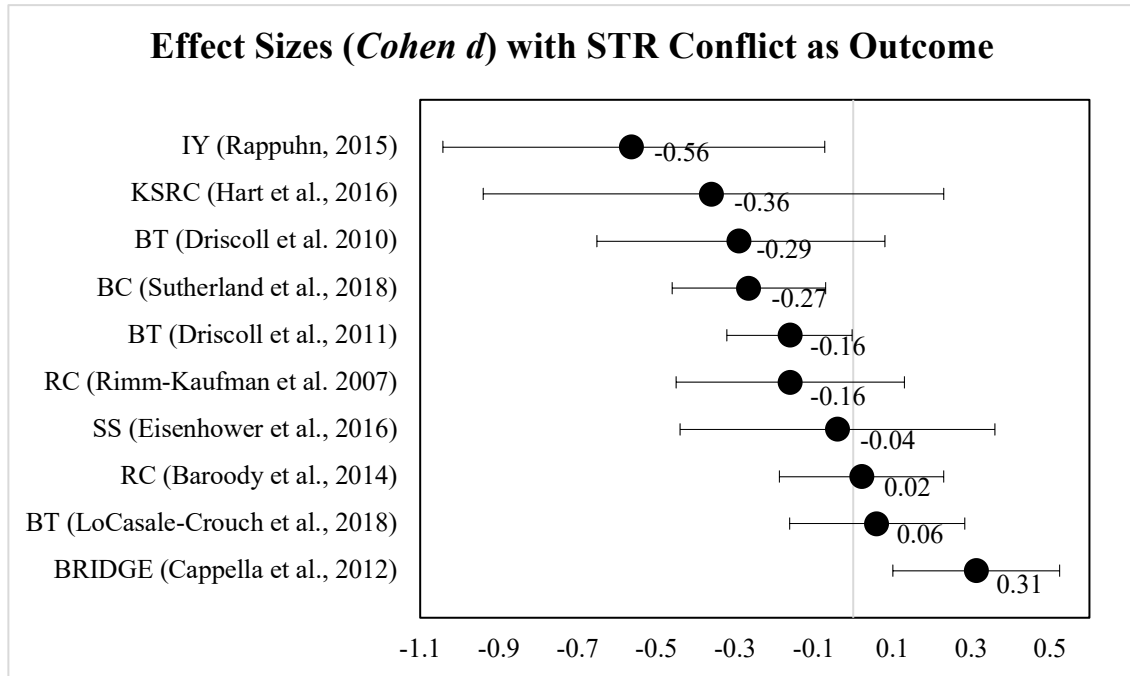


*Figure 7.* Effect sizes by program type with overall STR as outcome. EMR = Establish Maintain Restore; HSR = Head Start REDI; IY=Incredible Years; TOTM = Tools of the Mind; SS = Starting Strong; CSRP = Chicago School Readiness Project.



*Figure 8.* Effect sizes by program type with STR Closeness as the outcome variable. RC = Responsive Classroom; BT = Banking Time; SS = Starting Strong, BC = Best in Class; HSR = Head Start REDI; IY = Incredible Years.

## STUDENT-TEACHER RELATIONSHIPS



*Figure 9.* Effect sizes by program with STR Conflict as outcome variable. IY = Incredible Years; KSRC = Kindergarten School Readiness Classroom; BT = Banking Time; BC = Best in Class; RC = Responsive Classroom; SS = Starting Strong.

# STUDENT-TEACHER RELATIONSHIPS

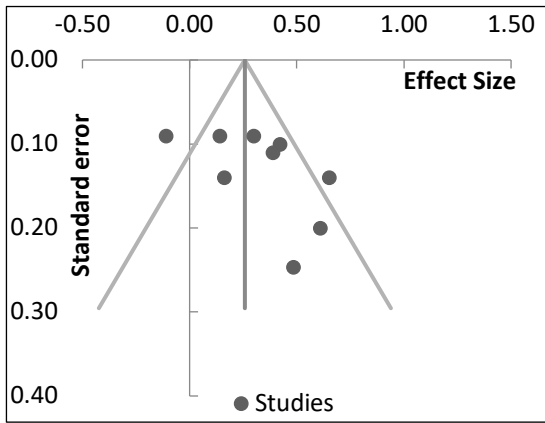


Figure 10. Publication bias for "Overall STR."

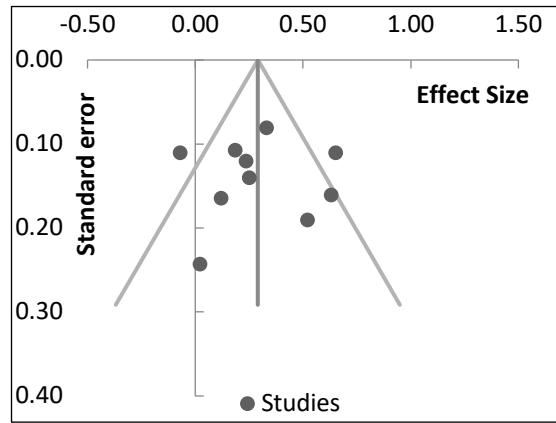


Figure 11. Publication bias for "STR Closeness."

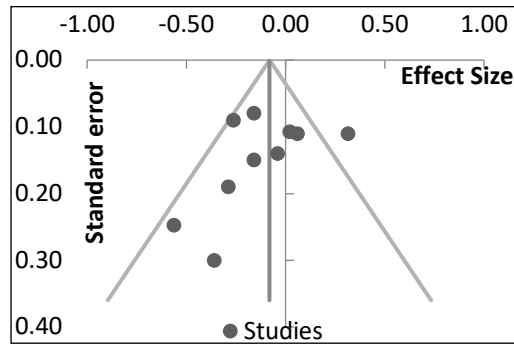


Figure 12. Publication bias for "STR Conflict."

## STUDENT-TEACHER RELATIONSHIPS

### Discussion

The purposes of this study were to (1) determine which interventions were most effective at improving student-teacher relationships in extant literature, and (2) determine the common practice elements that exist among effective interventions. Results indicated the programs with the largest effects sizes were Establish-Maintain-Restore (EMR; combined effect size  $d = .64$ ) and BRIDGE ( $d = .65$ ). Other programs demonstrated larger effect sizes in one study (Banking Time  $d = .52$ ; Responsive Classroom  $d = .63$ ); however, their overall combined effect size revealed a smaller effect (see Table 6).

Once effective interventions were identified, we identified 44 total practices across all organizational categories (see Table 6) teachers can use to promote positive STRs. This list of 44 practices provides an initial step for the field to consider how teachers can implement specific practices to enhance their relationships with students. Moreover, given the organizational scheme presented in this study, researchers and professionals can compare proactive strategies that directly impact relationships vs. reactive strategies or strategies that may indirectly impact STRs. Below, we highlight noteworthy findings, contrast our findings with previous work, and describe the utility, implications, and limitations of these findings.

There are two noteworthy findings that will be described. First and foremost, the studies that demonstrated effect sizes of medium or greater ( $\geq d = .50$ ) for creating close, positive STRs (closeness and overall STR) exhibited higher frequencies of proactive, direct practices within their programs. These results do not provide a definitive list of active ingredients of these programs; rather, it provides the field with an understanding across the most efficacious programs for improving STRs, the practices most commonly

## STUDENT-TEACHER RELATIONSHIPS

seen proactively and directly impacted relationships between students and teachers. The second noteworthy finding was the percentage of practices within each program that proactively and directly impacted the STR. In other words, it is important to compare effective programs whose main purpose is to improve relationship (e.g., EMR and BT) compared to others that have proactive and direct practice components, but they also include numerous practices that indirectly influence the STR (e.g., BRIDGE and IY-TCM). For example, 65% and 89% of practices within EMR and BT proactively and directly impacted the relationship, compared to 26% and 17% for BRIDGE and IY-TCM. This isn't arguing other practices within BRIDGE and IY-TCM are not important. It suggests if practitioners are interested in improving relationships between students and teachers, they may not need to buy expensive "kitchen sink" programs that include dozens of indirect practices. It may be more cost effective to focus on easy, cheap preventative practices that directly impact interactions and relationships between students and teachers.

It is important to mention just because practices appeared most frequently across efficacious programs does not mean those practices were the most effective. It could mean those practices are easier to implement in schools, cost less, or use less resources. For example, across the proactive and direct practices, praise was most commonly seen across efficacious studies ( $n = 7$ ) compared to home visits, which was witnessed less often ( $n = 1$ ). This study is not proposing praise is more effective compared to home visits. It is simply suggesting the practice of teachers praising children's behavior was more commonly seen across efficacious programs. There are a variety of reasons as to



## STUDENT-TEACHER RELATIONSHIPS

why some practices might be observed more frequently, such as ease of implementation, cost, and effectiveness of the practice.

### **Characteristics of Studies Captured in Meta-Analysis**

There are also notable findings about the demographics and characteristics of the studies captured in this meta-analysis. First, all but one study analyzed programs for improving STRs for students in Pre-K or elementary school, with the majority of studies looking at relationships for children in Pre-K ( $n=9$ ). A notable research gap was the lack of research in the middle- and high-school settings. STRs still remain important throughout secondary school (Wang et al., 2010).

Understanding the importance of these STRs for adolescents and how to best improve them could be addressed in future studies. In addition, as Pianta (1999) mentioned, relationships are complex systems more accurately conceptualized through patterns of interactions over time, across situations, and from multiple modes of analysis. Analyzing STRs through longitudinal research designs to more accurately capture the complexity of STRs could be addressed in future studies.

All the studies captured in this meta-analysis utilized the same outcome measure, the Student Teacher Relationship Scale (STRS: Pianta, 2001). Although this measure has demonstrated to be psychometrically sound across numerous studies, languages, and cultures (e.g., Settanni et al., 2015), it lacks the student perspective of STRs, which is arguably the most important. This suggests a need for the creation of additional validated, standardized, STR assessment tools that address the teacher *and* student perspective. Utilizing a multi-modal, multi-informant measurement process for analyzing STRs (e.g., interviews, observations, scales, etc.) should be the gold standard moving forward.

## STUDENT-TEACHER RELATIONSHIPS

### **Findings Compared to Previous Studies**

Other researchers have completed common elements procedures with social emotional learning programs (e.g., McLeod et al., 2017; Sutherland et al., 2018). McLeod et al. (2017) and Sutherland et al. (2018) analyzed common practice elements across efficacious SEL programs for improving a variety of outcome variables, one of them being STRs. There is considerable overlap among the practices found in these previous studies and ours (see Sutherland et al., 2018, p. 6-7; McLeod et al., 2017, p. 208), suggesting some of the practice elements captured in this review have support for improving not only STRs but other student outcomes as well (e.g., engagement, social problem solving, problem behaviors: Sutherland et al., 2018). In regard to the meta-analytic findings, no previous published meta-analysis have synthesized the effects of programs for improving STRs, but an unpublished systematic review (e.g., Weiers, 2017) captured many of the same studies and came to similar conclusions.

### **Limitations and Future Directions**

The findings of this study should be tempered by its limitations. The search terms, databases, and inclusion criteria utilized in this study may not have yielded all relevant studies. We attempted to minimize the number of studies missed through use of a scoping search, an extensive application of terms in different fields and databases, consultation with a library science expert to create a comprehensive search strategy that includes all relevant search terms and databases, and inclusion of dissertations and theses to help combat publication bias. Although visual analysis suggests publication bias included in this meta-analysis, Egger's test of symmetry was not significant but this does not rule out bias given the relatively small number of studies in this meta-analysis. Thus, results

## STUDENT-TEACHER RELATIONSHIPS

should be interpreted with caution because the true program effect sizes may be lower than is reported in the published studies in this meta-analysis.

Another limitation is the subjectivity of the common elements procedure distillation process. The 2x3 organizational scheme was created by the authors of this paper to help the field conceptualize and utilize these practices; however, it is possible other experts would group and define these practices differently. This limitation was addressed by having two other experts in the field consult on the organization of these practices. In addition, all of the codes were double coded by an additional school psychology graduate student.

### **Implications for Practice**

The practice elements captured in this study may inform practice and can be addressed in professional learning. Given teachers have reported feeling overwhelmed and unprepared to handle problematic behavior and classroom management (Begeny & Martens, 2006; Freeman, Simonsen Briere, 2013), targeted training could fill that gap of knowledge. Simply training teachers on these practices may not lead to sustained implementation (e.g., Collier-Meek et al., 2018). School psychologists can provide additional consultation supports to help ensure adequate implementation and sustainability of these practices in schools.

If manualized programs or interventions cannot be utilized due to implementation barriers (e.g., cost, resources), school leaders and educational professionals can utilize a selective (i.e., modular) approach. Schools need not train teachers on expensive, manualized programs; rather, teachers could utilize a more individualized, modular approach to address their specific classroom needs and relationships, which may also

## STUDENT-TEACHER RELATIONSHIPS

increase buy-in, a common implementation barrier. It is imperative the field consider teacher buy-in as a potential implementation barrier of these practices. Some of the practices depicted in this study are easy and cheap to implement (e.g., praise). These researchers hypothesize there may be implementation barriers, such as teacher buy-in or workload stress, that are impacting whether teachers choose to implement these practices.

Moreover, this study provides a list of potential practice elements that could be implemented at a universal tier within multi-tiered systems of support (MTSS). These practices are cheap, easy universal practices that could supplement other universal strategies (e.g., social emotional learning curricula [SEL], positive behavioral interventions and supports [PBIS]). Given these practices are evidence-based, they can be selected to build positive STRs, which can potentially prevent need for more costly, intensive services because positive STRs are inversely related to a variety of negative outcomes for students later on, including problem behavior, suspension, and drop out (e.g., Cemalcilar & Goksen, 2012; Silver et al., 2005; Quin, 2016). Therefore, implementing evidence-based, universal practices to build high quality STRs can serve as a protective factor for students and a cost-effective investment of school resources.

### **Conclusion**

In summary, we completed a meta-analytic and common elements procedure to (1) evaluate the programs that are most effective at improving STRs and (2) identify which practices are commonly seen across efficacious programs. This study identified 44 potential practices across evidence-based programs (EBPs) for improving STRs, with 14 practices that directly and proactively impact STRs school- and class-wide. A large percentage of the practices delineated from this study overlap with previous studies who

## STUDENT-TEACHER RELATIONSHIPS

sought to find common practices across EBPs. School leaders and educational professionals can take this information to inform teachers' practices. Specific practices seen across EBPs can help school services become more efficient, effective, and sustainable. Researchers and policy makers can utilize this information as they search for the best ways to make children feel socially connected to school and their teachers.

## CHAPTER 4

The results of this dissertation underscore the importance of conceptualizing and improving school-based relationships school- and class-wide. The first study was a scoping systemic literature search that analyzed school- and class-wide factors found to be associated with STRs. Study two analyzed school- and class-wide programs to determine which programs were most effective at improving STRs and which practices were most frequently seen across efficacious programs. Together, the results of these studies accentuate the value of universally and proactively creating schools and classrooms that facilitate meaningful connections for *all* students.

### **Implications for Research and Practice**

**Research.** Previous researchers have written conceptual papers on school- and class-wide factors that may be associated with STRs (Pianta et al., 2002). Yet, this body of literature has not been subject to systematic synthesis, a critical element of the evidence-based practice movement (Davies, 1999; Evans, 2002; Petticrew & Roberts, 2006). The main research implication of this dissertation is filling this gap in the literature by consolidating and comparing programs and practices to determine which have the most evidence for improving STRs.

Through the synthesis of this body of literature, multiple themes emerged for researchers to consider. The importance of preventative, tier one services that proactively and directly impact STRs are among the most well supported for improving STRs. Future research might include: (1) replication of this meta-analysis and the common elements procedure, (2) additional randomized control trials looking at the effect of school- and class-wide programs on STRs, and (3) individual studies looking at the effect of

## STUDENT-TEACHER RELATIONSHIPS

implementing single practices (e.g., morning greetings at the door) for improving STRs. After the replication and validation of these practices is complete, this list of practices could also help inform the development of school- and class-wide quality indicator measures. These measures are standardized and comprised of evidence-based indicators that can be utilized to monitor quality and track outcomes (Mayer et al., 2000). Past research has developed indicators to measure school- and class-wide quality in a variety of different areas. For example, Mashburn et al. (2008) tested the classroom environment for quality indicators (e.g., teachers' emotional and instructional interactions with students) related to students' academic, language, and social skill development. Relational climate, and the practices found in this dissertation, are important components for future researchers to consider including in these quality measures.

This dissertation also suggests a need for development of additional tools to measure STRs. Across both studies, the primary tool utilized to measure STRs was the Student Teacher Relationship Scale (STRS; Pianta, 2001). Although this measure has demonstrated to be psychometrically sound across numerous studies, languages (e.g., Seven & Ogelman, 2014), and cultures (e.g., Settanni et al., 2015), it lacks the student perspective of STRs, which is arguably the most important. This calls for the creation of additional validated, standardized, STR assessment tools that address the teacher *and* student perspective. STRs are a complex structure to measure, and therefore should be analyzed utilizing a multi-modal, multi-informant measurement process. This could include interviews with both the student and teacher, assessments to determine their perception of the relationship, and observations to analyze their daily interactions.

## STUDENT-TEACHER RELATIONSHIPS

The students captured across the studies in this dissertation were predominately in PreK and elementary school (exception of 3 studies that included middle schoolers). Therefore, the factors, programs, and practices delineated from these studies should only be generalized to this age group. With the relationships in high school and middle school potentially serving a different purpose for students, the programs and practices analyzed across this dissertation may not be appropriate or effective in middle or high school settings. Relationships in elementary school may be easier to build because students spend the majority of their day in one classroom with one teacher. Compared to middle and high schools where the opportunities for the development of STRs decreases as students move from classroom to classroom for different content. Moreover, as peers become the primary social outlet for middle and high-schoolers, the types of statements and interactions yearned by adolescents change (Sprick, 1985). Future research needs to make a concerted effort to analyze programs and practices at the middle and high-school level for improving relationships, and then take similar steps in consolidating and appraising said findings.

Lastly, meta-analysis and systematic review help the field generate new hypotheses. There are two major hypotheses delineated from these studies that can be analyzed in future research. First, some of the largest effect sizes were associated with programs that utilized more proactive and direct strategies for improving positive STRs. This leads to the hypothesis proactive and direct strategies may be more effective for improving STRs, and this hypothesis can be directly tested in future research. The second hypothesis is other indirect practices impact STRs through the mediator of student-teacher interactions (STIs). More specifically, if we can improve classroom management



## STUDENT-TEACHER RELATIONSHIPS

strategies or students' social, emotional, and behavioral skills, this can potentially improve STIs, which ultimately improves STRs. Past research has shown social, emotional, and behavioral development can impact interactions between teachers and students (e.g., Conroy et al., 2015), and positive STIs can impact the STR (e.g., Hartz et al., 2017). This mediation relationship could be confirmed in future research.

**Practice.** Schools are inherently social environments and learning is inherently interactional. Because relationships are at the core of learning and schools, it is not surprising positive STRs increase students' engagement (Quin, 2016; Roorda et al., 2011), social skills (Cornelius-White, 2007), academic achievement (Roorda et al., 2011), and so much more. As Rimm-Kaufman stated, "Positive teacher-student relationships draw students into the process of learning and promote their desire to learn (assuming the content material of the class is engaging, age-appropriate, and well matched to the student's skills)" (2019). Past researchers have emphasized positive STRs can have positive and long-term effects on students' social and academic development (see Roorda et al., 2011 or Pianta, 1999 for examples).

As such, schools are encouraged to conceptualize how to address STRs within universal practices. The results from this dissertation specifically underscore the importance of focusing on tier one services that facilitate strong school-based connections. Study one highlights numerous factors that could be considered by school leaders that may be associated with positive STRs. The factors with the most support were social-emotional learning programs, programs designed to improve STRs, classroom management strategies, and student-teacher interactions. Other factors with less support, (e.g., length of the school day or teacher stress), may also be related to STRs

## STUDENT-TEACHER RELATIONSHIPS

and could be studied in future research. Study two provides school leaders and educational professionals with an appraisal of school- and class-wide programs and practices to improve STRs. The programs with the largest effect sizes were Establish-Maintain-Restore (EMR) and BRIDGE. Other programs demonstrated larger effect sizes in one study (Banking Time and Responsive Classroom); however, their overall combined effect size revealed a smaller effect. A common elements methodology delineated 44 specific practice elements that may be related to STRs. This study may help to address implementation barriers because if schools are unable to implement expensive, manualized programs, they can utilize a more individualized, modular approach by selecting cheap, easy, evidence-based practices to address their specific needs. Together, these studies offer a list of potential factors, programs, and practices that can be utilized at a school- or class-wide level to improve relationships between teachers and students.

### **Conclusion**

This dissertation provides evidence for the factors and practices associated with improved STRs, which past research has established are positively associated with a myriad of student outcomes (e.g., Quin, 2016; Roorda et al., 2011). For that reason, it is important that we conceptualize schools as inherent social environments where we can motivate and engage students through high quality relationships. This dissertation synthesizes research that researchers, practitioners, and policy leaders can utilize to create welcoming, caring educational environments for *every* student.

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## STUDENT-TEACHER RELATIONSHIPS

### Appendix A

#### *Search Terms Across Databases*

#### 1. Academic Search Premiere, ERIC, and Education Source

Search string(s):

TI ( ("Student-teacher") OR ("Teacher-student") OR ("Teacher-child") OR ("Child-teacher") OR ("Student-instructor") ) OR SU ( "teacher student relationship" OR "student teacher relationship" ) AND TI ( (Relations\* OR interact\* OR conflict OR closeness OR connect\* OR attach\* OR relate\* OR warmth OR trust\* OR affect\* ) ) AND TI ( ( Program\* OR \*interven\* OR train\* OR ("Professional Development") OR ("Professional Learning") OR workshop\* ) )

OR

AB ( ("Student-teacher") OR ("Teacher-student") OR ("Teacher-child") OR ("Child-teacher") OR ("Student-instructor") ) AND AB ( Relations\* OR interact\* OR conflict OR closeness OR connect\* OR attach\* OR relate\* OR warmth OR trust\* OR affect\* ) AND AB ( Program\* OR \*interven\* OR train\* OR ("Professional Development") OR ("Professional Learning") OR workshop\* )

**Total results:** 8,652

- **ERIC:** 4,107
- **Education Source:** 2,953
- **Academic Search Premiere:** 1,592

**Timestamp:** December 17<sup>th</sup>, 2019 - January 26<sup>th</sup>, 2019

*Note.* When exact duplicates removed from results: **Total results:** 5,900

#### 2. PsycInfo

Search string(s):

((("Student-teacher" or "Teacher-student" or "Teacher-child" or "Child-teacher" or "Student-instructor") and (Relations\* or interact\* or conflict\* or closeness or connect\* or attach\* or relate\* or warmth or trust\* or affect\*)) and (Program\* or interven\* or train\* or "Professional Development" or "Professional Learning" or workshop\*)).ab. or ((("Student-teacher" or "Teacher-student" or "Teacher-child" or "Child-teacher" or "Student-instructor") and (Relations\* or interact\* or conflict\* or closeness or connect\* or attach\* or relate\* or warmth or trust\* or affect\*)) and (Program\* or interven\* or train\* or "Professional Development" or "Professional Learning" or workshop\*)).ti. or (((("Student-teacher" or "Teacher-student" or "Teacher-child" or "Child-teacher" or "Student-instructor") and (Relations\* or interact\* or conflict\* or closeness or connect\* or attach\* or relate\* or warmth or trust\* or affect\*))).ab,ti. and ("school based intervention" or "educational intervention" or "educational programs")).sh.

**Total results:** 1,520

**Timestamp:** January 26<sup>th</sup>, 2019 - January 29<sup>th</sup>, 2019

## STUDENT-TEACHER RELATIONSHIPS

### 3. ProQuest Theses and Dissertations

Search string(s):

Abstract:

((("Student-teacher") OR ("Teacher-student") OR ("Teacher-child") OR ("Child-teacher") OR ("Student-instructor"))) AND (Relations\* OR interact\* OR conflict OR closeness OR connect\* OR attach\* OR relate\* OR warmth OR trust\* OR affect\*) AND ((Program\* OR interven\* OR train\* OR ("Professional Development") OR ("Professional Learning") OR workshop\*))

OR

Title:

((("Student-teacher") OR ("Teacher-student") OR ("Teacher-child") OR ("Child-teacher") OR ("Student-instructor"))) AND (Relations\* OR interact\* OR conflict OR closeness OR connect\* OR attach\* OR relate\* OR warmth OR trust\* OR affect\*) AND ((Program\* OR interven\* OR train\* OR ("Professional Development") OR ("Professional Learning") OR workshop\*))

**Total results:** 57

**Timestamp:** February 19<sup>th</sup>, 2019

## STUDENT-TEACHER RELATIONSHIPS

### Appendix B

#### *Email Template for Consultation Search Strategy*

Dear \_\_\_\_\_,

I am a School Psychology doctoral candidate at the University of Minnesota conducting a dissertation that includes meta-analysis of school-based interventions to improve the student-teacher relationship. I'm sending this message in order to make sure I'm capturing all of the grey literature that might not typically be indexed in databases of published studies. Your name emerged in my database search with published work that matched my meta-analysis inclusion criteria.

If you have any unpublished work that you are willing to share, that would be appreciated. If you have any published work not captured in the studies listed above and are willing to share, that would also be appreciated.

Thank you very much for your time and consideration. If you have any questions or concerns, please do not hesitate to ask.

Best,

Laurie Kincade

# STUDENT-TEACHER RELATIONSHIPS

## Appendix C

### *E-mail Consultation Search Strategy Results*

The following individuals were e-mailed at the following dates and times. Individuals who responded are indicated with bold text:

Name	E-mail	Date Sent	Articles Mentioned	Included Y/N	Reason
<b>Clayton Cook</b>	<b><u>crcook@umn.edu</u></b>	2/19/19	--		
<b>Clancy Blair</b>	<b><u>clancy.blair@nyu.edu</u></b>	2/19/19	--		
<b>Karen Bierman</b>	<b><u>kb2@psu.edu</u></b>	2/19/19	--		
<b>Kevin Sutherland</b>	<b><u>kssuther@vcu.edu</u></b>	2/19/19	--		
<b>Abbey Eisenhower</b>	<b><u>abbey.eisenhower@umb.edu</u></b>	2/19/19	Eisenhower et al. (2015). Starting strong: A school-based indicated prevention program during the transition to kindergarten	Y	*Exclusion criteria: Lacking means and standard deviations to calculate differences
<b>Katie Hart</b>	<b><u>khart@fiu.edu</u></b>	2/19/19	Graziano, P. A., Garb, L. R., Ros, R., Hart, K., & Garcia, A. (2016). Executive functioning and school readiness among preschoolers with externalizing problems: The moderating role of the student-teacher relationship.	N	*Exclusion criteria: Independent variable – executive functioning  *Exclusion criteria: school- or class-wide program
Robert Nix	<u>robert.nix@wisc.edu</u>	2/19/19			
Alison Baroody	<u>abarood@sfu.edu</u>	2/19/19			

## STUDENT-TEACHER RELATIONSHIPS

Stephanie Jones	<a href="mailto:stephanie_m_jones@gs.e.harvard.edu">stephanie_m_jones@gs.e.harvard.edu</a>	2/19/19			
Elise Cappella	<a href="mailto:elise.cappella@nyu.edu">elise.cappella@nyu.edu</a>	2/19/19			
<b>Katherine Driscoll</b>	<b><a href="mailto:katherine.driscoll@childrens.harvard.edu">katherine.driscoll@childrens.harvard.edu</a></b>	2/19/19	--		
Robert Pianta	<a href="mailto:pianta@virginia.edu">pianta@virginia.edu</a>	2/19/19			
<b>Sara Rimm-Kaufman</b>	<b><a href="mailto:serk@virginia.edu">serk@virginia.edu</a></b>	2/19/19	Baroody et al. (2014). The link between Responsive Classroom training and student-teacher relationship quality in the fifth grade: A study of fidelity of implementation	Y	*Exclusion criteria: Duplicate of included study found in database search
Meghan McCormick	<a href="mailto:meghan.mccormick@mrc.org">meghan.mccormick@mrc.org</a>	2/19/19			

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**Appendix D***Codebook of Study Data Set*

Variable Name	Definition	Values
STUDY number	The specific study that is included in this data-set.	1 – Study #1: authors 2 – Study #2: authors 3 – Study #3: authors 4 – Study #4: authors 5 – Study #5: authors  Etc.
AUTHOR	Open-ended variable for authors names	
YEAR	Open-ended variable for year study was completed	
TITLE	Open-ended variable for title of study	
JOURNAL_NAME	Open-ended variable for journal name	
PUBLICATION_TYPE	Type of publication	0 – Journal article (published) 1 – Journal article (non-published) 2 – Thesis/Dissertation 3 – Report 4 – Book chapter
SEARCH_STRATEGY	Which strategy was used to find this study	0 – Database search 1 – Backward citation searching



STUDENT-TEACHER RELATIONSHIPS

Variable Name	Definition	Values
		2 – forward citation searching 3 – Google 4 – Consultation 5 – Hand search
N_TEACHERS	Number of teachers in study	Continuous number
N_STUDENTS	Number of students in study	Continuous number
PROG_INT	The program or intervention studied in this study.	1 – intervention #1: _____ 2 – intervention #2: _____ 3 – intervention #3: _____ 4 – intervention #4: _____
GRADE	Grade of students and teachers involved in study	0 – Pre-K 1 – Early elementary (K – 2) 2 – Upper elementary (3 - 5) 3 – Middle school (6-8) 4 – High school (9 -12) 5 – Mixed elementary 6 – Mixed Middle/High 7 – Mixed across all levels
AGE_RANGE	Age range of students involved in study	Number range
URBANICITY	Whether school(s) is/are located within an urban or rural area	0 – Urban 1 – Suburban 2 – Rural 3 – Mixed
US_REGION	U.S. region the study was conducted in	1 – West 2 – South

STUDENT-TEACHER RELATIONSHIPS

Variable Name	Definition	Values
		3 – East 4 – Midwest 5 – Southwest 6 – Northeast
SCH_TYP	The type of school	0 – Public 1 – Private 2 – Other (e.g., charter)
PERC_FRL	The percent of families/students that have free and reduced lunch	Continuous number: percentage
S_PERC_WHITE	Percentage of students in study that are white	Continuous number: percentage
S_PERC_BLACK	Percentage of students in study that are black	Continuous number: percentage
S_PERC_HISPANIC	Percentage of students in study that are Hispanic	Continuous number: percentage
S_PERC_ASIAN	Percentage of students in study that are Asian	Continuous number: percentage
S_PERC_NATIVEAM	Percentage of students in study that are Native American	Continuous number: percentage
S_PERC_O	Percentage of students in study reported “Other” as race/ethnicity	Continuous number: percentage
S_PERC_M	Percentage of students in study reported multiple races/ethnicities	Continuous number: percentage
T_PERC_WHITE	Percentage of teachers in study that are white	Continuous number: percentage
T_PERC_BLACK	Percentage of teachers in study that are Black	Continuous number: percentage
T_PERC_HISPANIC	Percentage of teachers in study that are Hispanic	Continuous number: percentage
T_PERC_ASIAN	Percentage of teachers in study that are Asian	Continuous number: percentage

STUDENT-TEACHER RELATIONSHIPS

Variable Name	Definition	Values
T_PERC_NATIVEAM	Percentage of teachers in study that are Native American	Continuous number: percentage
S_PERC_FEMALE	Percentage of students that are female	Continuous number: percentage
S_PERC_MALE	Percentage of students that are male	Continuous number: percentage
T_PERC_FEMALE	Percentage of teachers that are female	Continuous number: percentage
T_PERC_MALE	Percentage of teachers that are male	Continuous number: percentage
AGE_TEACHER	Average age of teachers in study	Continuous number
EDUC_TEACHER	Average years of teacher education	Continuous number
EXP_TEACHER	Average years of working experience of teachers in study	Continuous number
DESIGN	Design of study	0 – Quasi-experimental 1 – RTC
SELECTION_BIAS	How the researchers selected participants	0 – Self-referred 1 – Non-randomly (e.g., from a referral source) 2 – Randomly
BASELINE_EQUIVALENCE	Were participants in different groups equivalent at baseline?	0 – No 1 – Yes
BLIND	Whether the researchers collecting data were blind to condition	0 – No 1 – Yes
ATTRITION	Percentage of participants that did not finish study (e.g., drop out)	Continuous number
OUTCOME	Measurement tool used as an outcome variable to measure STR	0 – Other 1 – STRS

STUDENT-TEACHER RELATIONSHIPS

Variable Name	Definition	Values
OUTCOME_OTHER	Open-ended item to enter "other measure" from OUTCOME variable.	Names of other measures
VALIDITY_EVIDENCE	Type of validity evidence for the outcome measure	0 – Not reported 1 – Construct 2 – Criterion 3 – Internal
VALIDITY_COEFFICIENT	Validity evidence coefficient.	Continuous number between 0 and 1
RELIABILITY_EVIDENCE	Type of reliability evidence for the outcome measure	0 – Not reported 1 – Test-re-test 2 – Internal consistency 3 – Inter-rater
RELIABILITY_COEFFICIENT	Reliability evidence coefficient	Continuous number between 0 and 1
ANALYSIS	Analysis used in study	0 – Multi-variate Regression 1 – Latent Class Growth Analysis 2 – SEM 3 – HLM 4 – ANCOVA
ES_TYPE	Type of effect size	0 – Cohen's d 1 – Odd's ratio 2 – R-squared 3 – Regression coefficient 4 – Eta-squared
R_COEFFICIENT	If a regression coefficient is reported for their effect size, is it standardized or un-standardize?	0 – unstandardized 1 – standardized
ES_CL	Effect size numerical value with closeness as outcome variable	Continuous number

STUDENT-TEACHER RELATIONSHIPS

Variable Name	Definition	Values
ES_CO	Effect size numerical value with conflict as outcome variable	Continuous number
ES_OVERALL	Effect size numerical value with overall STRS as outcome variable	Continuous number
SE	Standard error of the effect size estimate	Continuous number
STATISTIC	“t” “z” or “F” value of effect size	Continuous number
P-VALUE	P value of effect size	Continuous number
OTHER_VARIABLES	Open-ended item to enter “Other variables” included in the model	Names of other variables in model
SS_TREATMENT	Sample size of treatment group	Continuous number
MEAN_TREATMENT	Mean of the treatment group	Continuous number
SE_MEAN_TREATMENT	Standard error of the treatment group mean	Continuous number
SS_CONTROL	Sample size of control group	Continuous number
MEAN_CONTROL	Mean of the control group	Continuous number
SE_MEAN_CONTROL	Standard error of the control group mean	Continuous number
INT_T	Target of the intervention	0 – Teacher 1 – Student 2 – Teacher and Student
INT_L	Length of intervention	Length of intervention in weeks
INT_N_SESSIONS	Number of sessions of intervention	Continuous number
INT_TR	Training required for intervention	0 – Professional development 1 – Ongoing coaching/consultation 2 – Professional development + Ongoing

## STUDENT-TEACHER RELATIONSHIPS

Variable Name	Definition	Values
		coaching/consultation 3 – Other
INT_CLASS	Does the intervention include a class-wide component?	0 – No 1 – Yes
INT_SCHOOL	Does the intervention include a school-wide component?	0 – No 1 – Yes
INT_PARENT	Does the intervention include a parent component?	0 – No 1 – Yes
INT_TI	Whether treatment integrity is reported	0 – No 1 – Yes
INT_TI_V	If treatment integrity is reported, the percentage of treatment integrity.	Continuous number: percentage
INT_COST	Cost of intervention per student	Continuous number: dollar amount

## Appendix E

### *Definitions of practices*

**Direct - Proactive:** A teacher behavior that utilizes proactive techniques to directly impact the student-teacher relationship.

1. **Praise:** Teachers effectively use praise in the classroom, which includes behavior specific praise (e.g., “Thank you for sitting in your seat with your feet on the ground” or “Thank you for helping hand out those papers”). Praise can include focusing on the end product (e.g., “You did a great job with your math assignment”) or the process (e.g., “I love how hard you studied for this exam. Your hard work paid off”). Teachers can praise a classroom or an individual for academic and/or social behavior.
2. **Positive/Negative Ratio of Interactions:** Positive student-teacher interactions (STIs) should outweigh negative STIs for every student. Some studies define this as a 5:1 positive to negative interactions and others define it as a 3:1 positive to negative interactions. Regardless, these interactions could include gratitude comments (e.g., I’m so thankful you are here today), checking in, asking about interests, joining in activities with students, laughing together, behavior specific praise, going on fun outings, positive greetings or farewells, growth mindset comments, acknowledgement of strengths, encouragement, appreciation, etc.
3. **1:1 Time:** Teachers spend 1:1 time during their day connecting with a student for the sole purpose to build their relationship.
4. **Coaching Emotions:** Teachers validate (e.g., “I understand you are angry”) and label (e.g., “Your body is telling me you are upset right now”) emotions for the student.
5. **Expressing Care:** Teachers express genuine care for the student (e.g., “I am so glad you are here today” or “I really missed you yesterday when you were gone” or “You contribute so much to my class”).
6. **Respect:** Teachers model verbal and nonverbal respect for the child through eye contact, warm and calm voice, and good manners (e.g., “Please” and “Thank You”).
7. **Child-Led Activities:** Teacher engages in child-led activities while narrating, validating, and labeling student’s behaviors (e.g., Make-believe play).
8. **Getting to Know Your Students:** Teacher inquiries about students’ interests, reviews information to combat forgetfulness and then finds opportunities to reference that information. This should also include the teacher sharing information about him/herself.
9. **Reflective & Supportive Listening:** Teachers provide reflective and supportive listening to their students. Reflective listening includes paraphrasing the students’ message back to them to clarify understanding. Supportive listening includes teacher involvement and attunement as the student speaks.
10. **Check-Ins:** Teachers, throughout the day, check in with students (e.g., “I noticed we had some hard conversations yesterday. I wanted to check-in and make sure we were okay” or “I wanted to check in to see how you were doing”).
11. **Objective Observation:** Teacher objectively observes the student to learn more about them and their behavior, as well as check the assumptions/biases of the teacher.
12. **Positive Greetings:** Teachers positively greet students every morning, which includes welcoming students and showing they value their presence.
13. **Positive Farewells:** Teachers send students positive farewells at the end of the day, which includes thanking students for their hard work and showing they valued their presence throughout the day.
14. **Home Visits:** Teachers visit the home of their student for the sole purpose to build relationships and get to know their students personally.

**Direct - Teaching:** A teacher instructs/informs students about social skills that can directly impact the student-teacher relationship.

## STUDENT-TEACHER RELATIONSHIPS

1. **Social Skills:** Teacher educates students about appropriate “friendship making” skills (e.g., conflict resolution skills, compliment, praise, perspective-taking, empathy, offering apologies, asking for help, sharing ideas, cooperation, listening skills).

**Direct - Consequent:** A teacher behavior that is directly aimed at improving student-teacher relationships, but it occurs after an interpersonal conflict between the teacher and the student.

1. **Positive Discipline Strategies:** Teachers utilize positive discipline strategies following students’ negative behavior (e.g., redirection, ignoring, verbal/nonverbal cues to re-engage off-task behavior, debriefing students after negative behavior, empathetically validating emotions and the students’ perspective).
2. **Repairing relationships:** Teachers utilize skills to repair relationships with students with whom they’ve experienced conflict (e.g., ownership of the problem, working together to find a win-win solution, showing effort to understand the student’s perspective, suggesting a “fresh start” and/or stating care for the student).

**Indirect - Proactive:** A teacher behavior that is designed to prevent potential problems from occurring. These behaviors may indirectly impact the teacher-student relationship through classroom environments and teaching practices.

1. **Establish Clear, Predictable Classroom Rules and Routines:** Teachers establish rules in the classroom that are short, and simply and positively worded (“Do rules” instead of “don’t rules”). Rules are explicitly taught modeled, and pre-corrected by the teacher. When clear and predictable rules exist, consistent routines and structures in the classroom are in place.
2. **Student Choice and Empowerment:** Teacher gives students choices whenever possible. Teachers empower students by making their voice feel valued (e.g., Empower students to ask questions, student-driven content/instruction).
3. **Parental Involvement:** Teachers empower parents and involve them in behavior management systems (e.g., incentive programs, daily report cards) to increase consistency across environments.
4. **Transitions and Down Time:** Teachers prepare children adequately for transitions: give warnings, give helpful reminders, and provide clear and explicit transition rules. For transitions, teachers intentionally decrease down time where students do not have tasks or time spent on managerial tasks (e.g., attendance).
5. **Peer-Assisted Learning Strategies** Teachers implement practices that include peers monitoring and responding to other peers’ behavior (e.g., peer positive reporting: “tootling” where peers try to “catch other students being good or peers taking turns teaching each other content).
6. **Positive Note Home:** Teachers sending positive notes home to parents to outline appropriate and correct behaviors their child exhibited in school (e.g., “Good News Notes”).
7. **Ample Opportunities to Respond:** Teachers use questions or prompts to allow students to respond in the classroom (e.g., Think-Pair-Share).
8. **Sense of Responsibility:** Teachers give students a sense of responsibility in the classroom (e.g., handing out materials, line-leader, organizing materials).
9. **Scaffolding:** Teachers scaffold students’ development when he/she encounters challenging situations or tasks. This means the teacher first models or demonstrates how to complete a task and then steps back, offering support as needed.
10. **Class-wide Meetings:** Teachers start and/or end their day as a class to discuss plan for the day, expectations, sharing personal news (e.g., monthly “share” time), student news board, and other community building activities.
11. **Physical Classroom Organization:** Teachers’ classrooms are organized so students know where to find things and what to expect (e.g., desks are arranged for peer collaboration, pathways are not clogged, materials are labeled well).



## STUDENT-TEACHER RELATIONSHIPS

12. **High and Achievable Expectations:** Teachers communicate high expectations and assure the student they are capable of meeting those expectations (e.g., “I believe in you. I know you can do this math assignment”).
13. **Teacher Mindfulness:** Teachers integrate mindful moments for themselves throughout their day: stop what they are doing, take intentional deep breaths, focus on how they are feeling/thinking, and proceed. This helps teachers to be present with their students in the moment.
14. **Move Around Breaks:** Teachers allow time for students to get up and move their bodies.

**Indirect - Teaching:** A teacher instructs/informs students about social, emotional, and behavioral content that indirectly impacts the student-teacher relationship.

1. **Collaborative Problem-Solving:** Teacher educates students, and works with them together, to identify a problem, generate possible solutions, anticipate different consequences, and evaluate most effective solutions.
2. **Self-regulation/Control:** Teacher educates students about how to recognize different emotions and how to manage them successfully. (e.g., practicing real-life dilemmas with puppets using self-calming strategies).
3. **Emotion Understanding:** Teacher educates students about different emotions, how your body feels when you experience those emotions, and typical facial expressions. This content is focused on building emotional vocabulary and self-awareness.
4. **Emotion Expression:** Teacher educates students about how to appropriately express specific emotions (verbally and nonverbally).
5. **Self-monitoring:** Teachers educate students about how to plan and monitor their own performance, how to determine if they acted the way they planned, and how to self-correct if needed.
6. **Self-Esteem/Self-Confidence:** Teacher educates students on how to build their self-esteem/self-confidence and promotes positive self-talk.
7. **Goal Setting:** Teachers educate students about and assist students with goal setting.

**Indirect - Consequent:** A teacher behavior that is done in reaction to a child’s behavior that indirectly impacts the student-teacher relationship.

1. **Feedback:** Teacher provides positive, immediate feedback following a correct response or appropriate behavior and immediate corrective feedback following an incorrect or inappropriate behavior.
2. **Incentives/Rewards:** Teacher giving a classroom or particular child a reward contingent on desired behavior.
3. **Time-Out:** Teacher removes a student from a preferred activity for a period of time following a problematic behavior.
4. **Daily Report Cards\*:** Teacher selects positive, desirable student behavior and creates a daily report card that monitors and reinforces said behavior.
5. **Behavior Contract\*:** Teachers implement a contract between the student and the teacher that outlines the expectations of both the teacher and the student in carrying out the positive, behavioral intervention plan, as well as rewards for the student if they follow through.
6. **Response Cost:** Teacher removes reinforcers (e.g., tokens) from the student if he/she exhibits undesirable behavior.

*Note.* Practices denoted with an asterisk (\*) can be considered proactive and reactive. These practices are set up to emphasize expectations and negotiate if-then arrangement; however, there are also inherent consequent strategies embedded including feedback and incentives/rewards.