



Teacher-student relationship quality and academic achievement in elementary school: A longitudinal examination of gender differences[☆]



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ABSTRACT

Multiple group longitudinal cross-lagged panel models were implemented to understand the directional influences between teacher-student closeness and conflict and measured math and reading achievement across elementary grades and gender groups using the National Institute of Child Health and Human Development longitudinal sample ($N = 1133$). Specifically, after testing multiple group longitudinal measurement invariance to ensure consistent measurement across genders and time, and tests of equivalence of the latent parameters, we were interested in whether longitudinal changes in teacher-rated closeness and conflict explained longitudinal changes in achievement, and vice versa, and whether those longitudinal influences varied by gender. Latent teacher-student closeness decreased for both genders over time (Cohen's $d = -0.15$ to -0.32), but latent conflict increased for males (Cohen's $d = 0.16$). There was also increased heterogeneity in teacher-student relationship quality for males relative to females. Math and reading achievement had medium reciprocal effects ($\beta = 0.12$ to 0.23), and previous math achievement had small to medium effects on subsequent teacher-student closeness ($\beta = 0.08$ to 0.11) and conflict ($\beta = -0.07$ to -0.09). Teacher-student conflict and closeness did not influence subsequent levels of math or reading achievement once previous levels were controlled. Further, these influences were consistent across gender groups despite latent differences in teacher-student closeness and conflict with teachers reporting closer relationships with female students and more conflictual relationships with male students.

1. Introduction

As children transition from spending the majority of their day in home and childcare settings to primary and elementary classrooms, teachers engage in multiple roles that shape students' academic and social outcomes. Consequently, the quality of relationships with classroom teachers represents a critical, malleable variable of study for researchers focused on improving the academic trajectories of students. Teacher-student relationship quality (TSRQ) is typically conceptualized and measured as consisting of two separate but related dimensions – conflict and closeness (Rudasill, Reio, Stipanovic, & Taylor, 2010). Conflict represents the existing negativity between teacher and student, while closeness represents the level of support and warmth between teacher and

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student as well as the student's willingness to approach and engage the teacher (Ladd & Burgess, 2001). Moreover, both dimensions of TSRQ have been shown to be correlated with students' academic outcomes in meta-analyses of cross sectional and longitudinal research (Roorda, Koomen, Spilt, & Oort, 2011).

The nature of the relation between TSRQ and student achievement may be explained in one of four potential ways. The first and most commonly proposed explanation is that TSRQ impacts student achievement (Hamre & Pianta, 2001; McCormick & O'Connor, 2015). In this model, students benefit academically from more positive relationships with teachers and these influences are likely mediated by increased student engagement in the classroom setting (Hughes & Kwok, 2007). The second explanation is that students' academic skills drive changes in measured TSRQ, with more academically capable students benefiting from warmer and less conflictual teacher-student relationships and less capable students more likely to suffer from cold and contentious teacher-student interactions (Murray & Murray, 2004). The third explanation is that reciprocal relations are present, with achievement and TSRQ exerting bidirectional effects across time. In support of this explanation Hughes, Luo, Kwok, and Loyd (2008) identified reciprocal paths between achievement and TSRQ for a lower-achieving sample of 671 students that was mediated by student engagement. The fourth explanation suggests that a still undiscovered variable may explain the longitudinal relation between TSRQ and achievement. For instance, as measures of TSRQ are typically collected from teachers rather than students, it is possible that those students that are more responsive to teachers' relational cues are also more responsive to their academic ones, and this desire to please teachers (ostensibly through a higher quantity or quality of work) is the construct that drives achievement changes over time.

The pursuit of the most accurate model describing the relation between TSRQ and student achievement is complicated by issues of design, measurement, and sample. It would be unethical to randomly assign students into experimental conditions with negative teacher relationships, rendering direct tests of causality impossible (Shadish, Cook, & Campbell, 2002). Therefore, the relation between TSRQ and achievement must be assessed longitudinally for directionality to be considered. Analytically, the choice to employ multiple regression dictates the selection of a directional pathway at the outset, with TSRQ predicting changes in achievement serving as the most common decision and limiting results to either the predicted path or the null hypothesis. Only those designs that collect achievement and relational variables across all time points and analyze structural paths simultaneously may reach conclusions regarding directionality of associations (Selig & Little, 2012). Measurement decisions may also serve as a confounding variable, as measurement using course grades or indirect measures of student competence provided by teachers rather than standardized achievement scores introduce method effects due to teacher bias as well as differences in classroom, school, and district policy that complicate interpretation of results. As an example, Maldonado-Carreño and Votruba-Drzal (2011) found that measures of TSRQ collected from kindergarten to 5th grade predicted teacher-rated academic skills but not student achievement collected at 5th grade. Finally, sample characteristics impact study conclusions, with higher risk and geographically restricted samples often employed with limited investigation of how structural paths may differ across risk status, ethnicity, or gender.

1.1. Gender and TSRQ

It is well established that teachers report closer and less conflictual relationships with girls than with boys (Baker, 2006; Silver, Measelle, Armstrong, & Essex, 2005). Given the relation of positive TSRQ with improved academic achievement (Hamre & Pianta, 2001), language development (Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002), and social adjustment (Perry & Weinstein, 1998), it is possible relationship quality may contribute to short or long term educational benefits for female students. According to the academic risk hypothesis (Hamre & Pianta, 2001), the importance of TSRQ will increase for students at greater risk of school failure, and boys are at greater risk of academic and behavioral challenges in school, particularly during the early years of schooling (Finn & Rock, 1997; Matthews, Ponitz, & Morrison, 2009; McClelland, Morrison, & Holmes, 2000).

Surprisingly, males and females are only rarely analyzed separately to determine if the strength of associations vary and if reported results are strengthened or diminished by inclusion of both groups in one analytic pool. If relationship-achievement mechanisms differ across genders, interventions may demand modification in order to improve long-term social and academic outcomes for males and females. As an example, a modification might include stronger emphasis on initially improving the warmth of relationships with male students in order to maximize the efficacy of an intervention for math fluency. McCormick and O'Connor (2015) investigated differential gender relations between TSRQ and achievement. The authors employed hierarchical linear modeling (HLM) to investigate the between-subject and within-subject level effects of teacher-student conflict and closeness on math and reading achievement in a large, nationally representative sample of elementary students. The authors found between-subject effects of teacher-child conflict on reading achievement ($ES = 0.06$) and within-subject effects of teacher-child closeness on reading achievement ($ES = 0.09$) for the full sample. The between-subject and within-subject effects were not shown to differ between males and females except for the statistically significant negative between-subject effect of teacher-child conflict on math achievement for females relative to males ($ES = 0.12$). Additionally, they found that females with conflictual teacher-child relationships showed slower growth in math achievement compared to either females with nonconflictual teacher-child relationships or males with conflictual teacher-child relationships ($ES = 0.17$). However, as HLM is a predictive model with assumed directionality of measured variables, there was no opportunity to assess for reciprocal effects (or different unidirectional effects) for either the full sample or either gender, lending additional support for the current study.

1.2. Contribution of the current study

Few studies, if any, have investigated longitudinal reciprocal relations of TSRQ and academic achievement across gender using a large, elementary longitudinal sample. This study used multiple group, longitudinal panel models to investigate reciprocal relations

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