Arens, A. Katrin; Niepel, Christoph

School attitude and perceived teacher acceptance. Developmental trajectories, temporal relations, and gender differences

formal und inhaltlich überarbeitete Version der Originalveröffentlichung in:
formally and content revised edition of the original source in:
British journal of educational psychology 89 (2019) 4, S. 689-706, 10.1111/bjep.12252

Running head: SCHOOL ATTITUDE

School Attitude and Perceived Teacher Acceptance: Developmental Trajectories, Temporal Relations, and Gender Differences

A. Katrin Arens
German Institute for International Educational Research, Germany

Christoph Niepel
University of Luxembourg

Author Note

Preparation of this article was supported by a Heisenberg fellowship grant from the German Research Foundation to A.K. Arens (AR 877/3-1) and from a grant from the Luxembourg National Research Fund to C. Niepel (C16/SC/11333571).

Correspondence concerning this article should be addressed to A. Katrin Arens, Centre for Research on Education and Human Development and Centre for Research on Individual Development and Adaptive Education of Children at Risk (IDeA), German Institute for International Educational Research, Schloßstraße 29, D-60486 Frankfurt am Main, Germany, Telephone: + 49 69 24708 138, Email: arens@dipf.de.

This is the prepublication version of the following manuscript:

Arens, A.K., & Niepel, C. (2019). School attitude and perceived teacher acceptance: Developmental trajectories, temporal relations, and gender differences. *British Journal of Educational Psychology, 89,* 689–706. http://dx.doi.org/10.1111/bjep.12252

This paper is not the copy of record and may not exactly replicate the authoritative document published in *British Journal of Educational Psychology*.

Abstract

Background: Positive school attitudes defined as students' school liking and school attachment is positively related to many desirable outcomes. Student-teacher relations have often been considered to be an important determinant of school attitudes.

Aims: Students' perceived teacher acceptance was used as an indicator for student-teacher relations. Using a longitudinal data set, we studied the temporal relations between school attitudes and perceived teacher acceptance. In addition, we examined the developmental trajectories of both constructs. We also examined gender differences in the mean levels, mean level development, and relations of school attitudes and teacher acceptance.

Sample: The sample consisted of 2376 German elementary school students.

Methods: The students rated their school attitudes and perceived teacher acceptance three times across grade levels 3 to 4. Latent growth curve models were used to examine the developmental trajectory. Cross-lagged panel models were used to examine the temporal relations between both constructs.

Results: Positive school attitudes and perceived teacher acceptance declined across time. School attitudes and perceived teacher acceptance were positively and reciprocally related across the three waves. Boys and girls did not differ in their temporal relations between school attitudes and perceived teacher acceptance and in the developmental trajectories of both constructs. Girls were found to display higher mean levels of school attitudes and perceived teacher acceptance.

Conclusions: Research and practice should seek for effective means to counteract the decline of students' positive school attitudes and perceived teacher acceptance. Interventions to foster students' school attitudes might benefit from enhancing student-teacher relations, and vice versa.

Keywords: school attitudes; student-teacher relations; gender; elementary school

At school, students build relationships which can address the school as an institution in its own right as well as social partners. Students' relationship towards school is conceptualized as students' liking and feelings of belonging and being attached to their school; thus, this concept relates to students' positive affect or attitude towards school (McCoach & Siegle, 2003; Suldo, Shaffer, & Shaunessy, 2007). Students' social relationships can address the various social agents at school, but mostly concerns teachers and peers. Both concepts, that is, school attitude and teacher-student relations, are found to share important outcome relations. Positive school attitudes were found to be positively related to academic achievement (e.g., Eisele, Zand, & Thomson 2009; Hughes, Im, & Allee, 2015), self-esteem (e.g., Johnson, Crosnoe, & Thaden, 2006; Zand, & Thomson, 2005), and academic motivation (e.g., Gillen-O'Neel & Fuligni, 2013; Ireson & Hallam, 2005). Negative school attitudes were shown to be related with deviant and violent behavior (Liljeberg, Eklund, Fritz, & Klinteberg, 2011), social and emotional maladjustment (Murray & Greenberg, 2001), and even suicidality (Marraccini, & Brier, 2017). Positive student-teacher relations were found to enhance students' school engagement (e.g., Laet et al., 2015; Strati, Schmidt, & Maier, 2017), academic performance (e.g., O'Connor & McCartney, 2007; Spilt, Hughes, Wu, & Kwok, 2012), behavioural adjustment (e.g., Hamre & Pianta, 2001), and motivation including value, interest, and goal pursuit (e.g., Dietrich, Dicke, Kracke, & Noack, 2015; Ryan & Patrick, 2001; Wentzel, Battle, Russell, & Looney, 2010). Therefore, applied researchers and practitioners should endeavour to promote positive school attitudes and student-teacher relations. To inform about the timeframe as to when the enhancement of school attitudes and student-teacher relations is needed, the developmental trajectory of the constructs should be considered. In the present study, we examined the development of school attitude and perceived teacher acceptance, the latter serving as an indicator for good student-teacher relations, across the two final years of German elementary school.

Since positive school attitudes and perceived teacher acceptance address students' various relationships at school and constitute two facets of school bonding (Cernkovich & Giordano, 1992; Murray & Greenberg, 2000), we can theoretically expect the constructs to be related. This has been empirically documented in cross-sectional studies (e.g., Erkman, Caner, Hande Sart, Börkan, & Şahan, 2010; Gest, Welsh, & Domitrovich, 2005; Roeser, Midgley, & Urdan, 1996; Stanley, Comello, Edwards, & Marquart, 2008). We examined the temporal relations between school attitude and perceived teacher acceptance whereby we considered both directions of influence (i.e., school attitude as a determinant and outcome of teacher acceptance). For both research questions, we probed for gender differences; hence, we examined gender differences in the mean level development of, and in the temporal relations between, school attitudes and teacher acceptance.

Developmental Trajectories

According to the stage-environment fit model (Eccles et al., 1993; see also Barber & Olsen, 2004), as students get older, there is an increasing mismatch between the school environment and students' needs. While the students strive for more autonomy and independent decision-making in adolescence, the school environment gets more prescriptive with fewer opportunities for student decisions and self-management. The school environment becomes focused on the learning content, more anonymous, more achievement-orientated, and more geared toward social comparisons. All this might negatively impact upon students' school attitude and the quality of student-teacher relations.

Empirical studies have indeed documented declining levels of students' positive school attitudes and declines in the quality of students-teacher relations with increasing grade levels. For instance, with regard to school attitudes, Oelsner, Lippold, and Greenberg (2011) showed that students' mean level of school bonding declined between grades 6 and 8. Others (e.g., Perry & McIntire, 2001; Stanley et al., 2008; Witherspoon & Ennett, 2011) also

documented declining mean levels of positive school attitudes during secondary school years. Yet, so far, research has barely focused on the development of school attitude in elementary school years, which is considered in the present study.

With regard to student-teacher relations, with increasing grade levels, teachers are perceived as less caring and supporting. Respective findings apply to secondary school years (Lynch & Cicchetti, 1997; Reddy, Rhodes, & Mulhall, 2003; Spilt et al., 2012), but also to elementary school years. In the study by Jerome, Hamre, and Pianta (2008), the level of conflict in student-teacher relations increased, while closeness decreased, from kindergarten to sixth grade. Hajovsky, Mason, and McCune (2017) documented that across grades 1 to 5, closeness to the teacher declined, while conflict increased (see also Gasser, Grütter, Buholzer, & Wettstein, 2018; O'Connor, 2010; O'Connor & McCartney, 2007)

Student-Teacher Relations and School Attitudes

Indicators of positive school attitudes and a high quality of student-teacher relations are positively related. As such, students' feeling of school belonging was found to be positively related to students' perception of teacher support (Goodenow, 1993) and the quality of teacher-student relations (Roeser et al., 1996). In addition, students' reported teacher conflict in grade 3 was found to have a negative relation with students' feelings of school belonging in grade 4, while former teacher support was found to have a positive relation (Hughes, 2011). Birch and Ladd (1997) demonstrated that closeness in student-teacher relations was positively associated with teacher-reported and student-reported school liking, while dependency and conflict showed negative relations (see also Erkman et al., 2010; Gest et al., 2005; Samdal, Nutbeam,Wold, & Kannas, 1998; Stanley et al., 2008; Suldo et al., 2007).

Various theoretical approaches can serve to explain the found positive relations between school attitudes and teacher relations (for overviews see Davis, 2003; Martin &

Dowson, 2009). These theories commonly emphasize the role of positive social interactions and relationships with significant others for students' adaptive functioning within and outside of academic contexts. According to attachment theory (e.g., Bowlby, 1988), the quality of student-teacher relations forms a working model which is fundamental in exploring the environment and shaping one's experiences. Self-Determination Theory (Deci & Ryan, 2000) states that sense of relatedness is one of the three basic needs affecting motivation and engagement. The need for belongingness hypothesis (Baumeister & Leary, 1995) assumes that the satisfaction of the need for belongingness invokes positive consequences in a wide range of life domains. In more general terms, positive social relations within a specific environment or context (e.g., student-teacher relations at school) might lead to an overall positive evaluation of this context (e.g., positive school attitudes).

The mentioned theoretical frameworks particularly assume a unidirectional relation, that is, the quality of student-teacher relationships is assumed to operate as a determinant or predictor of school attitudes. Students' school attitude might yet also impact upon their perceived relations to their teachers. A more positive attitude towards school in general might help establish more positive relations with the school staff including teachers. Midgley, Feldlaufer, and Eccles (1989, p. 989) discussed that "children who are becoming more negative toward school (…) perceive their teachers as less warm (….)", but realised the need for further respective research. Yet, previous studies on the relation between school attitudes and student-teacher relations were predominantly cross-sectional and could thus not examine temporal and bidirectional relations. In our study, we examined school attitudes and student-teacher relations, the latter operationalized by student perceived teacher acceptance, across three measurement waves.

Gender Differences

With regard to mean levels, girls have consistently been found to demonstrate more positive school attitudes and higher levels of school attachment or school bonding (e.g., Ireson & Hallam, 2005; Oelsner et al., 2011; Wang & Eccles, 2012). Moreover, girls report more positive relations to their teachers (e.g., Gest et al., 2005; Lietaert, Roorda, Laevers, Verschueren, & De Fraine, 2015; Wentzel et al., 2010). These mean level differences match gender stereotypes according to which girls, relative to boys, have higher levels of social orientation, desirable behaviour, and adherence to social expectations (Prentice & Carranza, 2002).

The gender intensification hypothesis (Hill & Lynch, 1983) assumes that the gender gap regarding mean levels of psychological constructs widens with increasing age. Hence, girls' more positive school attitudes and better student-teacher relations might become more and more obvious. Regarding school attitudes, the study by Oelsner et al. (2011) provided some support for the gender intensification hypothesis since boys' decline in school bonding was steeper than girls' across grades 6 to 8. Yet, Hughes et al. (2015) did not find any gender differences in the trajectory of school belonging across grades 6 to 8. Some studies, however, reported a decline of girls', but not of boys', school attachment (Gillen-O'Neel & Fuligni, 2013; Witherspoon & Ennett, 2011).

With respect to student-teacher relations, empirical studies have supported the gender intensification hypothesis as boys were found to experience a greater decline in closeness in student-teacher relations in kindergarten and early elementary school years than girls (Jerome, Hamre, & Pianta., 2009; see also Hajovsky et al., 2017). However, these findings were based on teacher-rated quality of student-teacher relations. It has remained unknown whether these findings also pertain to student-rated student-teacher relations. Student perceptions and teacher perceptions of the quality of student-teacher relations constitute separate constructs (Zee & Koomen, 2017).

In addition to gender differences in the mean levels and developmental trajectories, it can be examined whether boys and girls show similar temporal relations between school attitude and student-teacher relations. We address this issue with respect to the final years of elementary school.

The Present Study

In our study, the constructs of school attitudes and perceived teacher acceptance were measured three times across grades 3 and 4 at elementary school in Germany. These are the two final years of elementary school before the transition to secondary school.

We first aimed to investigate the developmental trajectories of school attitudes and perceived teacher acceptance. The transition into secondary school in Germany after grade 4 is associated with an ability tracking procedure. Given this imminent enrolment decision, performance standards, achievement pressures, expectations, and evaluation practices intensify at the end of elementary schooling. This, along with the approach of adolescence, might increase the misfit between the school environment and students' needs (Eccles et al., 1993). We therefore expected a decline in positive school attitudes and perceived teacher acceptance across grades 3 and 4.

Our second aim was to examine the temporal relations between school attitudes and perceived teacher acceptance. Since previous research and theory presumed the positive impact of social interactions on student outcomes (Davis, 2003; Martin & Dowson, 2009), high levels of prior perceived teacher acceptance was expected to influence later positive school attitude. A reverse relation is also conceivable with former positive school attitude being positively related to later teacher acceptance. Hence, this study investigated whether school attitudes and perceived teacher acceptance are reciprocally related.

Finally, we considered gender differences in the mean levels and developmental trajectories of, as well as in the temporal relations between, school attitudes and perceived

teacher acceptance. In line with corresponding previous studies, girls were assumed to display more positive school attitudes and higher levels of perceived teacher acceptance. However, evidence has remained inconclusive with regard to gender differences in the developmental trajectories of the constructs, and with regard to the relations between both constructs.

Method

Sample

The data analysed in the present study were retrieved from the large-scale longitudinal study "Bildungsprozesse, Kompetenzentwicklung und Selektionsentscheidungen im Vorschul- und Schulalter" (BiKS) (Educational Processes, Competence Development and Selection Decisions in Preschool and School Age; Artelt, Blossfeld, Roßbach, & Weinert, 2013). The BiKS study was funded by the German Research Foundation (DFG), the data were made available by the Research Data Centre (FDZ) at the Institute for Educational Quality Improvement (IQB, Berlin). The study was conducted in the two German federal states of Hesse and Bavaria to investigate the development of competence and motivational constructs across school years as well as the conditions and consequences of educational decisions. The complete BiKS study encompasses two separate longitudinal studies, that is, BiKS 3-10 with assessments of students across the first year in kindergarten to grade 4 (final year at elementary school), and BiKS 8-14 covering grade 3 (elementary school) to 9 (secondary school). The present study was based on BiKS 8-14.

We considered the first three measurement waves of the complete BiKS 8-14 study which took place during students' two final years (grades 3 and 4) at elementary school. Students' school attitude and perceived teacher acceptance were only assessed at these waves. The first measurement wave (t1) was realised from February to April 2006, that is, when the students had attended grade 3 for more than six months (the German school year starts in the summer). The second wave (t2) was realised in November and December 2006, when the

students attended grade 4. The third wave (t3) took place near the end of students' grade 4 (May to July 2007). In elementary school, students are taught by their class teacher in most of the subjects. The class teacher did not change across grades 3 to 4 for all students (respective information was missing for one student).

The sample analysed in our study consisted of 2376 students [1240 (52.2%) boys, 1136 (47.8%) girls]. At t1, the participating students' age ranged from 7 to 11 years (M=8.75, SD=0.577) as it is expected for German third grade students. The majority of the students (N=1691, 71.2%) had no immigrant background as both students and their parents had been born in Germany. For 205 (8.6%) students, either the parent or the student had been born in Germany, and for 317 (13.3%) students, neither the parents nor the students had been born in Germany. For 163 (6.9%) students, there was no information on this measure regarding immigrant background.

Measures

The scales for measuring students' school attitude and perceived teacher acceptance were both retrieved from a German instrument called "Fragebogen zur Erfassung emotionaler und sozialer Schulerfahrungen von Grundschulkindern dritter und vierter Klassen" (FEESS 3-4; Rauer & Schuck, 2003). This questionnaire assesses the emotional and social experiences with and at school at the end of elementary school. The scale for school attitudes consists of three items (e.g., "I like going to school"). The scale for measuring students' perceived teacher acceptance encompasses five items (e.g., "My teachers look after me"; see Table S1 of the Online Supplements). The students were asked to answer all items on a four-point Likert scale (1=not true, 2=rather not true, 3=rather true, 4=true). Before the analyses, the items were recoded so that higher ratings consistently demonstrated more positive school attitudes and higher levels of perceived teacher acceptance. At all three waves, Cronbach's

alpha reliability estimates were sufficient to good for the scales of school attitude (t1: α=.822; t2: α=.850; t3: α=.858) and perceived teacher acceptance (t1: α=.776; t2: α=.794; t3: α=.838).

Statistical Analyses

The analyses were conducted within the framework of structural equation modelling (SEM,) applying Mplus 8 (Muthén & Muthén, 1998-2017). The robust maximum likelihood estimator (MLR) was applied to all models. Missing values were estimated by the Full Information Maximum Likelihood (FIML) implemented in Mplus. The FIML approach is known to be reliable in handling missing data (Enders, 2010) and also to be a trustworthy method for handling missing data in longitudinal studies (Jeličič, Phelps, & Lerner, 2009). Among the 2376 students analysed here, 90 students (3.8%) dropped between t1 and t2, and 115 (4.8%) students dropped between t2 and t3.

All models included correlated uniquenesses between the same items across the three time waves to account for possibly shared method variance due to the repeated use of the same items (Marsh & Hau, 1996). By using the Mplus option “type=complex” with schools as a clustering variable, all models considered the hierarchical structure of the data. Students were nested into 82 schools.

The first set of models targeted the mean level development of the constructs. Testing mean level development requires longitudinal measurement invariance including the invariance of factor loadings and item intercepts across time (Millsap, 2011). Invariant factor loadings ensure that the same constructs were measured across time (Widaman, Ferrer, & Conger, 2010), and invariant item intercepts safeguard that invariance results from latent constructs instead of manifest item indicators. We therefore first stated a confirmatory factor analysis (CFA) model assuming separate factors for school attitude and teacher acceptance at each of the three waves (i.e., configural invariance; Millsap, 2011). This model was then expanded by including time-invariant factor loadings, and time-invariant factor loadings and

item intercepts. To examine the developmental trajectories of the constructs, we conducted latent growth curve models (Duncan, Duncan, & Strycker, 2006), first for school attitude and then for perceived teacher acceptance. The latent growth curve models were unconditional linear latent growth models in which a latent intercept factor represents the initial level and a slope factor depicts the rate of change of the construct considered. Given the unequal time intervals between the three waves, the values of the linear slope factors were set to 0, 1, and 1.7. Afterwards, we estimated a "dual-domain" (Byrne, 2012) or "parallel process" (Wang & Wang, 2012) latent growth curve model in which we simultaneously estimated the growth trajectories for school attitude and perceived teacher acceptance. This model allows insight into the relation between the intercept and slope factors of both outcome variables. Finally, we included gender as a time-invariant covariate of the intercept and slope factors of school attitude and teacher acceptance to examine whether boys and girls differ in their initial level and change in these constructs.

To test the temporal relations between school attitude and perceived teacher acceptance across the three waves, we stated a cross-lagged panel model (Curran & Bollen, 2001). This model estimated the autoregressive stability and cross-lagged relations between the two constructs across consecutive waves, as well as the correlations of the disturbances of the constructs within each wave. Since the invariance of factor loadings across time is a necessary, yet sufficient, precondition to examine relations across time, all respective models were based on the model of invariant factor loadings.

In the next step, gender was integrated as a grouping variable. We first examined loading invariance across gender and time to test whether the same constructs were assessed with boys and girls across time. We then stated a cross-lagged panel model in which the relations between school attitude and teacher acceptance were freely estimated across gender. This model was compared to a model in which the relations were set invariant across gender.

To assess the fit of the models, we considered the commonly applied descriptive goodness-of-fit indices [i.e., the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR)] using the recommended cut-off values (Kline, 2005). For invariance evaluation, we relied on the guideline proposed by Cheung and Rensvold (2002, p. 251), according to which "a value of ΔCFI smaller than or equal to –0.01 indicates that the null hypothesis of invariance should not be rejected."

Results

Longitudinal Measurement Invariance

The CFA model (Model 1 in Table 1) including separate factors for school attitude and perceived teacher acceptance at each of the three measurement waves had an excellent fit. The items had substantial loadings on their corresponding factors at each time wave further supporting the integrity of this model (Table S1 of the Online Supplements). School attitude and perceived teacher acceptance were positively correlated at each time wave (Table S2 of the Online Supplements). The CFI value did not change when assuming invariant factor loadings across time (Model 2). When additionally including time-invariant item intercepts (Model 3), the CFI value declined by Δ=-.001 allowing testing the mean level development of school attitudes and teacher acceptance by latent growth curve models.

Developmental Trajectories

Based on the model of invariant factor loadings and item intercepts (Model 3 in Table 1), Model 4 is a latent growth curve model for school attitude. The significantly negative mean value of the slope factor indicated declining mean levels of school attitude (Table 2). The significantly negative covariance between the intercept and slope factors implied that the higher the baseline level of school attitude at t1, the faster the negative change. Finally, the

variance of both the intercept and slope factors were positive and significant. Hence, there was variation between individuals in the initial level and rate of change of school attitude.

Model 5 (Tables 1 and 2) is the latent growth curve model for perceived teacher acceptance. The significant negative slope factor indicated a decrease in the mean level of teacher acceptance across time. Individuals were found to differ in both their initial level and in their rate of change. Due to the nonsignificant covariance between the intercept and slope factors, the rate of change did not depend on the initial level of perceived teacher acceptance.

Model 6 (Tables 1 and 2) is the latent growth curve model testing the growth trajectories for school attitude and perceived teacher acceptance simultaneously. The results regarding the intercepts and slopes of school attitude and teacher acceptance replicated the results from the separate models for both constructs. The significant covariance between the intercept factors showed a positive relation between the baseline levels of school attitude and teacher acceptance. The significantly positive covariance between the slope factors indicated that the rates of growth of school attitude and teacher acceptance were related to each other, although the direction of influences could not be specified and will be tested by cross-lagged panel models below. The negative covariance between the intercept of school attitude (teacher acceptance) and the slope of teacher acceptance (school attitude) indicated that students with higher initial levels on school attitude (teacher acceptance) had a larger decline in teacher acceptance (school attitude).

When including gender (0=male, 1=female) as a time-invariant covariate into this model (Model 7 in Table 1), the findings indicated that girls displayed higher initial levels of school attitude and perceived teacher acceptance (Table 2; see also Table S3 of the Online Supplements). Boys and girls, however, were not found to differ in their rates of change for both constructs.

Relations between School Attitude and Perceived Teacher Acceptance

Based on the model of invariant factor loadings (Model 2 in Table 1), a cross-lagged panel model (Model 8) was conducted to examine the temporal relations between school attitude and perceived teacher acceptance (Table S4 of the Online Supplements). To make the models more parsimonious and to obtain more robust and precise estimates, we restricted the path coefficients to invariance across waves (Model 9). Hence, the path leading from school attitudes (teacher acceptance) at t1 and teacher acceptance (school attitudes) at t2 was stated to be of similar size as the path leading from school attitudes (teacher acceptance) at t2 to teacher acceptance (school attitude) at t3.

The resulting coefficients indicated high stability of the considered constructs (Table S5 of the Online Supplements; Figure 1). Prior perceived teacher acceptance was positively related to subsequent school attitude across t1 and t2 and across t2 and t3. School attitude was positively related to later teacher acceptance across t1 and t2, and across t2 and t3.

Invariance across Gender

Model 10 (Table 1) included gender as a grouping variable in a CFA model assuming separate factors for school attitude and perceived teacher acceptance at each wave. When including invariant factor loadings across time and gender, the CFI declined by Δ=-.001 (Model 11). Hence, factor loading invariance across time and gender could be established in order that it was possible to compare the temporal relations among constructs across gender.

Based on this model of factor loading invariance, we stated a cross-lagged panel model (Model 12 in Table 1) which estimated the temporal relations between school attitude and perceived teacher acceptance freely across gender. The fit of a model (Model 13) in which the temporal relations were set invariant across gender did not decline but it increased due to higher model parsimony. Hence, the temporal relations between school attitude and perceived teacher acceptance seem to be similar for boys and girls.

Discussion

The findings from the latent growth curve models indicated that both students' positive school attitudes and perceived teacher acceptance declined across the two final elementary school years before the transition to secondary school. This can be attributed to an increasing achievement orientation, stricter evaluation practices, and more formal student-teacher relations which might be due to the transition decision. Yet, the students were not asked for their perceptions of their learning environment. More research is thus necessary to confirm the assumption that the decline in students' school attitude and perceived teacher acceptance originates from changes in students' learning environment.

The observed decline in the constructs assessed here (school attitude and perceived teacher acceptance) was only small in size and might also be subject to regression to the mean, but should still be considered as meaningful and of practical importance. It can be the starting point of a negative developmental trend that might continue in secondary school. Along with various studies documenting declining levels of other important socio-emotional and motivational constructs at the end of elementary school [e.g., competence and value beliefs (Fredricks & Eccles, 2002); mastery goal orientation (Anderman & Midgley, 1997)], applied researchers and practitioners should consider these school years in terms of potential risks for the onset of a progressive decline of academic motivation.

Hence, enhancement programs fostering students' school attitudes and student-teacher relations might already be necessary at elementary school. In order to promote students' school attitudes, student-teacher relations should be enhanced given the found temporal relations leading from prior perceived teacher acceptance to later school attitudes. Interventions specifically developed to enhance students' school attachment and school bonding (e.g., Allen, Kern, Vella-Brodrick, Hattie, & Waters, 2018; Battistich, Schaps, & Wilson, 2004; Hawkins, Guo, Hill, Battin-Pearson, & Abbott, 2001) should be probed for their effectiveness with elementary school students facing the transition to secondary school.

Prior positive school attitudes were also related to higher levels of later perceived teacher acceptance. Hence, perceived teacher acceptance should not only be regarded as a determinant of school attitudes but also as an outcome of school attitudes. The temporal relation between school attitudes and teacher acceptance was bidirectional in nature, and both constructs seem to form a network of interrelations. We consider this to be an important theoretical contribution since previous theories focused on a unidirectional perspective assuming positive student-teacher relations to be a determinant of positive school attitudes. Hence, in order to foster positive student-teacher relations, specific approaches to foster school attachment and school bonding (e.g., Allen et al., 2018; Battistich et al., 2004; Hawkins et al., 2001) should be investigated regarding their effect on student-teacher relations. Based on the stage-environment-fit model (Eccles et al., 1993), to preserve students' positive school attitudes and favourable student-teacher relations, the school environment should attempt to cater for students' needs, and to consider that students' needs change as they become grow older so that the learning environment has to change as well.

Girls reported higher initial mean levels of positive school attitudes and perceived teacher acceptance, corroborating the findings from previous studies on gender differences on school attitudes and student-teacher relations (e.g., Gest et al., 2005; Lietaert et al., 2015; Wang & Eccles, 2012). Yet, boys and girls were not found to differ with regard to their developmental trajectories of school attitude and teacher acceptance. The gender intensification hypothesis could be partly validated for the development of positive school attitudes within secondary school years (Oelsner et al., 2011) and for teacher-reported student-teacher relations (Jerome et al., 2009; see also Hajovsky et al., 2017). Yet, in our study, we could not to validate the gender intensification hypothesis for self-reported school attitudes and student-teacher relations in elementary school students. This, however, does not preclude that gender differences in the development of school attitudes and student-teacher

relations emerge as students grow older. Boys and girls did not differ in their temporal relations between school attitude and perceived teacher acceptance. Girls and boys might still differ in their social determination of school attitudes when considering other indicators for the quality of the student-teacher relations or when considering other social agents than teachers such as peers (Ladd, Kochenderfer, & Coleman, 1996).

Indeed, beyond teacher relations, previous studies documented the influence of peer relations on school attitudes (e.g., Boulton, Chau, Whitehand, Amataya, & Murray, 2009; Eggum-Wilkens, Valiente, Swanson, & Lemery-Chalfant, 2014; Ladd et al., 1996). This finding again illustrates the social determination of school attitudes. Future studies should also test for bidirectional relations between peer relations and school attitudes. Moreover, given the small bidirectional relations between school attitudes and teacher acceptance, future research is necessary to detect further determinants of both constructs.

Regarding further limitations of your study, it has to be mentioned that the sample consisted of German elementary school students before their transition to secondary school after grade 4. Hence, the findings cannot be generalised to other samples including students from different grade levels, cultures, or educational systems where the transition to secondary school happens later. As this study only covers two school years, further studies spanning a longer period of time are needed to investigate the long-term development. It would be interesting to include the transition to secondary school in the study design to examine whether the observed decline in students' positive school attitudes and teacher acceptance continues, ceases, or even turns into a rebound effect.

The measures included in our study are solely based on students' self-reports. The study may thus be enriched by including teacher reports. Teacher reports on students' school attitude and student-teacher relations might be more strongly tied to students' classroom behaviour, but might also be related to teacher characteristics (e.g., teaching experience) and

teachers' sympathy for the student. Relatively higher relations might be expected when both constructs are assessed from the same perspective, that is, are either consistently based on students' or teachers' reports (Swann, Chang-Schneider, & Larsen McClarty, 2007).

We conceptually related school attitude to school attachment, school belonging, or identification with school. Yet, there is no agreement regarding the definition and separation of these constructs (Libbey, 2004; Maddox, & Prinz, 2003). Hence, educational research and theory is called on to clarify and distinguish the related terms and to agree upon a common framework for the operationalization and conceptualization of constructs targeting students' feelings and attitudes to their school (Barber & Schluterman, 2008).

References

Allen, K., Kern, M.L., Vella-Brodrick, D., Hattie, J., & Waters, L. (2018). What schools need to know about fostering school belonging: A meta-analysis. *Educational Psychology Review, 30,* 1–34. https://doi.org/10.1007/s10648-016-9389-8

Anderman, E.M., & Midgley, C. (1997). Changes in achievement goal orientations, perceived academic competence, and grades across the transition to middle-level schools. *Contemporary Educational Psychology, 22*, 269–298. https://doi.org/10.1006/ceps.1996.0926

Artelt, C., Blossfeld, H.-P., Faust, G., Roßbach, H.-G., & Weinert, S. (2013): *Bildungsprozesse, Kompetenzentwicklung und Selektionsentscheidungen im Vorschul- und Schulalter [Educational Processes, Competence Development and Selection Decisions in Preschool and School Age] (BiKS-8-14)*. Version: 2. IQB – Institut zur Qualitätsentwicklung im Bildungswesen. Dataset. http://doi.org/10.5159/IQB_BIKS_8_14_v2

Barber, B.K., & Olsen, J.A. (2004). Assessing the transition to middle and high school. *Journal of Adolescent Research, 19*, 3–30. https://doi.org/10.1177/0743558403258113

Barber, B.K., & Schluterman, J.M. (2008). Connectedness in the lives of children and adolescents: A call for greater conceptual clarity. *Journal of Adolescent Health, 43,* 209–216. https://doi.org/10.1016/j.jadohealth.2008.01.012

Battistich, V., Schaps, E., & Wilson, N. (2004). Effects of an elementary school intervention on students' connectedness to school and social adjustment during middle school. *The Journal of Primary Prevention, 24*, 243–262. https://doi.org/10.1023/B:JOPP.0000018048.38517.cd

Baumeister, R.F., & Leary, M.R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117*, 497–529. http://dx.doi.org/10.1037/0033-2909.117.3.497

Birch, S.H., & Ladd, G.W. (1997). The teacher-child relationship and children's early school adjustment. *Journal of School Psychology, 35,* 61–79. https://doi.org/10.1016/S0022-4405(96)00029-5

Boulton, M.J., Chau, C., Whitehand, C., Amataya, K., & Murray, L. (2009). Concurrent and short-term longitudinal associations between peer victimization and school and recess liking during middle childhood. *British Journal of Educational Psychology*, *79*, 207–221. https://doi.org/10.1348/000709908X336131

Bowlby, J. (1988). *A secure base: Parent-child attachment and healthy development*. London: Basic Books.

Byrne, B.M. (2012). *Structural equation modelling with Mplus. Basic concepts, applications, and programming.* New York, NY: Routledge.

Cernkovich, S.A., & Giordano, P.C. (1992). School bonding, race, and delinquency. *Criminology, 30*, 261–291.

Cheung, G.W., & Rensvold, R.B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling, 9,* 233–255. https://doi.org/10.1207/S15328007SEM0902_5

Curran, P.J., & Bollen, K.A. (2001). The best of both worlds: Combining autoregressive and latent curve models. In L.M. Collins, & A.G. Sayer (Eds.), *New methods for the analysis of change* (pp. 105–136). Washington, DC: American Psychological Association.

Davis, H.A. (2003). Conceptualizing the role and influence of student-teacher relationships on children's social and cognitive development. *Educational Psychologist, 38*, 207–234. https://doi.org/10.1207/S15326985EP3804_2

Deci, E.L., & Ryan, R.M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*, 227–268. http://dx.doi.org/10.1207/S15327965PLI1104_01

Dietrich, J., Dicke, A.-L., Kracke, B., & Noack, P. (2015). Teacher support and its influence on students' intrinsic value and effort: Dimensional comparison effects across subjects. *Learning and Instruction, 39*, 45–54. https://doi.org/10.1016/j.learninstruc.2015.05.007

Duncan, T.E., Duncan, S.C., & Strycker, L.A. (2006). *An introduction to latent variable growth curve modeling: Concepts, issues, and applications* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Eccles, J.S., Midgley, C., Wigfield, A., Miller Buchanan, C., Reuman, D., Flanagan, C., & Mac Iver, D. (1993). The impact of stage-environment fit on young adolescents' experiences in schools and families. *American Psychologist, 28*, 90–101. http://dx.doi.org/10.1037/0003-066X.48.2.90

Eggum-Wilkens, N.D., Valiente, C., Swanson, J., & Lemery-Chalfant, K. (2014). Children's shyness, popularity, school liking, cooperative participation, and internalizing problems in the early school years. *Early Childhood Research Quarterly, 29*, 85–94. https://doi.org/10.1016/j.ecresq.2013.10.002

Enders, C.K. (2010). *Applied missing data analysis*. New York: Guilford.

Eisele, H., Zand, D.H., & Thomson, N. R. (2009). The role of sex, self-perception, and school bonding in predicting academic achievement among middle class African American early adolescents. *Adolescence, 44*, 773–796.

Erkman, F., Caner, A., Hande Sart, Z., Börkan, B., & Şahan, K. (2010). Influence of perceived teacher acceptance, self-concept, and school attitude on the academic achievement of school-age children in Turkey. *Cross-Cultural Research, 44*, 295–309. https://doi.org/10.1177/1069397110366670

Fredricks, J.A., & Eccles, J.S. (2002). Children's competence and value beliefs from childhood through adolescence: Growth trajectories in two male-sex-typed domains. *Developmental Psychology, 38*, 519–533. https://doi.org/10.1037//0012-1649.38.4.519

Gasser, L., Grütter, J., Buholzer, A., & Wettstein, A. (2018). Emotionally supportive classroom interactions and students' perceptions of their teachers as caring and just. *Learning and Instruction, 54*, 82–92. https://doi.org/10.1016/j.learninstruc.2017.08.003

Gest, S.D., Welsh, J.A., & Domitrovich, C.E. (2015). Behavioral predictors of changes in social relatedness and liking school in elementary school. *Journal of School Psychology, 43*, 281–301. https://doi.org/10.1016/j.jsp.2005.06.002

Gillen-O'Neel, C., & Fuligni, A. (2013). A longitudinal study of school belonging and academic motivation across high school. *Child Development, 84*, 678–692. https://doi.org/10.1111/j.1467-8624.2012.01862.x

Goodenow, C. (1993). Classroom belonging among early adolescent students: Relationships to motivation and achievement. *Journal of Early Adolescence, 13*, 21–43. https://doi.org/10.1177/0272431693013001002

Hamre, B.K., & Pianta, R.C. (2001). Early teacher-child relationships and the trajectory of children's school outcomes through eighth grade. *Child Development, 72*, 625–638. https://doi.org/10.1111/1467-8624.00301

Hajovsky, D.B., Mason, B.A., & McCune, L.A. (2017). Teacher-student relationship quality and academic achievement in elementary school: A longitudinal examination of gender differences. *Journal of School Psychology, 63,* 119–133. https://doi.org/10.1016/j.jsp.2017.04.001

Hawkins, J. D., Guo, J., Hill, K. G., Battin-Pearson, S., & Abbott, R. D. (2001). Long-term effects of the Seattle social development intervention on school bonding trajectories. *Applied Developmental Science, 5*, 225–236. https://doi.org/10.1207/S1532480XADS0504_04

Hill, J.P., & Lynch, M.E. (1983). The intensification of gender-related role expectations during early adolescence. In J. Brooks–Gunn & A.C. Petersen (Eds.), *Girls at puberty* (pp. 201–228). New York, NY: Plenum Press. http://dx.doi.org/10.1007/978-1-4899-0354-9_10

Hughes, J.N. (2011). Longitudinal effects of teacher and student perceptions of teacher-student relationship qualities on academic adjustment. *The Elementary School Journal, 112,* 38-60. https://doi.org/10.1086/660686

Hughes, J.N., Im, M.H., & Allee, P.J. (2015). Effect of school belonging trajectories in grades 6-8 on achievement: Gender and ethnic differences. *Journal of School Psychology, 53*, 493–507. https://doi.org/10.1016/j.jsp.2015.08.001

Ireson, J., & Hallam, S. (2005). Pupils' liking for school: Ability grouping, self-concept and perceptions of teaching. *British Journal of Educational Psychology, 75*, 297–311. https://doi.org/10.1348/000709904X24762

Jeličič, H., Phelps, E., & Lerner, R.M. (2009). Use of missing data methods in longitudinal studies: The persistence of bad practices in developmental psychology. *Developmental Psychology, 45*, 1195–1199. http://dx.doi.org/10.1037/a0015665

Jerome, E.M., Hamre, B.K., & Pianta, R.C (2008). Teacher-child relationships from kindergarten to sixth grade: Early childhood predictors of teacher-perceived conflict and closeness. *Social Development, 18,* 915–945. https://doi.org/10.1111/j.1467-9507.2008.00508.x

Johnson, M.K., Crosnoe, R., & Thaden, L.L. (2006). Gendered patterns in adolescents' school attachment. *Social Psychology Quarterly, 69*, 284–295. https://doi.org/10.1177/019027250606900305

Kline, R.B. (2005). *Principles and practice of structural equation modeling.* New York: Guildford.

Ladd, G.W., Kochenderfer, B.J., & Coleman, C.C. (1996). Friendship quality as a predictor of young children's early school adjustment. *Child Development, 67*, 1103–1118.

Laet, S. de, Colpin, H., Vervoort, E., Doumen, S., van Leeuwen, K., Goossens, L., & Verschueren, K. (2015). Developmental trajectories of children's behavioral engagement in late elementary school: Both teachers and peers matter. *Developmental Psychology*, *51*, 1292–1306. http://dx.doi.org/10.1037/a0039478

Libbey, H.P. (2004). Measuring student relationships to school: Attachment, bonding, connectedness, and engagement. *Journal of School Health, 74*, 274–283. https://doi.org/10.1111/j.1746-1561.2004.tb08284.x

Lietaert, S., Roorda, D., Laevers, R., Verschueren, K., & De Fraine, B. (2015). The gender gap in student engagement: The role of teachers' autonomy support, structure, and involvement. *British Journal of Educational Psychology, 85*, 498–518. https://doi.org/10.1111/bjep.12095

Liljeberg, J.F., Eklund, J.M., Fritz, M.V., & Klinteberg, af B. (2011). Poor school bonding and delinquency over time: Bidirectional effects and sex differences. *Journal of Adolescence, 34*, 1–9. https://doi.org/10.1016/j.adolescence.2010.03.008

Lynch, M., & Cicchetti, D. (1997). Children's relationships with adults and peers: An examination of elementary and junior high school students. *Journal of School Psychology, 35*, 81–99. https://doi.org/10.1016/S0022-4405(96)00031-3

Maddox, S.J., & Prinz, R.J. (2003). School bonding in children and adolescents: Conceptualization, assessment, and associated variables. *Clinical Child and Family Psychology Review, 6*, 31–49. https://doi.org/10.1023/A:1022214022478

Marraccini, M.E., & Brier, Z.M.F. (2017). School connectedness and suicidal thoughts and behaviors: A systematic meta-analysis. *School Psychology Quarterly, 32*, 5–21. https://doi.org/10.1037/spq0000192

Marsh, H.W., & Hau, K.-T. (1996). Assessing goodness of fit: Is parsimony always desirable? *Journal of Experimental Education, 64*, 364–390. https://doi.org/10.1080/00220973.1996.10806604

Martin, A.J., & Dowson, M. (2009). Interpersonal relationships, motivation, engagement, and achievement: Yields for theory, current issues, and educational practice. *Review of Educational Research, 79,* 327–365. https://doi.org/10.3102/0034654308325583

McCoach, D.B., & Siegle, D. (2003). The School Attitude Assessment Survey–Revised: A new instrument to identify academically able students who underachieve. *Educational*

and Psychological Measurement, 63, 414–429. https://doi.org/10.1177/0013164403063003005

Midgley, C., Feldlaufer, H., & Eccles, J.S. (1989). Student/teacher relations and attitudes toward mathematics before and after the transition to junior high school. *Child Development, 60*, 981–992. https://doi.org/10.2307/1131038

Millsap, R.E. (2011). *Statistical approaches to measurement invariance*. New York: Routledge.

Murray, C., & Greenberg, M.T. (2000). Children's relationship with teachers and bonds with school: An investigation of patterns and correlates in middle childhood. *Journal of School Psychology, 38*, 423–445. https://doi.org/10.1016/S0022-4405(00)00034-0

Muthén, L.K., & Muthén, B.O. (1998–2017). *Mplus User's Guide. Eighth Edition*. Los Angeles, CA: Muthén & Muthén.

O'Connor, E. (2010). Teacher-child relationships as dynamic systems. *Journal of School Psychology, 48*, 187–218. https://doi.org/10.1016/j.jsp.2010.01.001

O'Connor, E., & McCartney, K. (2007). Examining teacher-child relationships and achievement as part of an ecological model of development. *American Educational Research Journal, 44*, 340–369. https://doi.org/10.3102/0002831207302172

Oelsner, J., Lippold, M.A., & Greenberg, M.T. (2011). Factors influencing the development of school bonding among middle school students. *The Journal of Early Adolescence, 31*, 463–487. https://doi.org/10.1177/0272431610366244

Perry, C.M., & McIntire, W.G. (2001). School connection as school reform in rural schools. *The School Community Journal, 11*, 57–64.

Prentice, D.A., & Carranza, E. (2002). What women and men should be, shouldn't be, are allowed to be, and don't have to be: The contents of prescriptive gender stereotypes.

Psychology of Women Quarterly, 26, 269–281. https://doi.org/10.1111/1471-6402.t01-1-00066

Rauer, W., & Schuck, K.D. (2003). *FEESS 3–4. Fragebogen zur Erfassung emotionaler und sozialer Schulerfahrungen von Grundschulkindern dritter und vierter Klassen*. Göttingen: Beltz.

Reddy, R., Rhodes, J.E., & Mulhall, P. (2003). The influence of teacher support on student The influence of teacher support on adjustment in the middle school years: A latent growth curve study. *Development and Psychopathology, 15*, 119–138. https://doi.org/10.1017.S0954579403000075

Roeser, R.W., Midgley, C., & Urdan, T.C. (1996). Perceptions of the school psychological environment and early adolescents' psychological and behavioral functioning in school: The mediating role of goals and belonging. *Journal of Educational Psychology, 88*, 408–422. http://dx.doi.org/10.1037/0022-0663.88.3.408

Ryan, A. M., & Patrick, H. (2001). The classroom social environment and changes in adolescents' motivation and engagement during middle school. *American Educational Research Journal, 38*, 437–460. https://doi.org/10.3102/00028312038002437

Samdal, O., Nutbeam, D., Wold, B., & Kannas, L. (1998). Achieving health and educational goals through schools - a study of the importance of the school climate and the students' satisfaction with school. *Health Education Research Theory & Practice, 13*, 383–397. https://doi.org/10.1093/her/13.3.383

Spilt, J.L., Hughes, J.N., Wu, J.-Y., & Kwok, O.-M. (2012). Dynamics of teacher-student relationships: Stability and change across elementary school and the influence on children's academic success. *Child Development*, *83*, 1180–1195. https://doi.org/10.1111/j.1467-8624.2012.01761.x

Stanley, L.R., Comello, M.L.G., Edwards, R.W., & Marquart, B.S. (2008). School adjustment in rural and urban communities: Do students from ‘‘Timbuktu’’ differ from their ‘‘city slicker’ peers? *Journal of Youth and Adolescence, 37*, 225–238. https://doi.org/10.1007/s10964-007-9180-8

Strati, A.D., Schmidt, J.A., & Maier, K.S. (2017). Perceived challenge, teacher support, and teacher obstruction as predictors of student engagement. *Journal of Educational Psychology, 109*, 131–147. http://dx.doi.org/10.1037/edu0000108

Suldo, S.M., Shaffer, E.J., & Shaunessy, E. (2007). An independent investigation of the validity of the School Attitude Assessment Survey—Revised. *Journal of Psychoeducational Assessment, 26*, 69–82. https://doi.org/10.1177/0734282907303089

Swann, W.B., Chang-Schneider, C., & Larsen McClarty, K. (2007). Do people's self-views matter? Self-concept and self-esteem in everyday life. *American Psychologist, 62*, 84–94. https://doi.org/10.1037/0003-066X.62.2.84

Voelkl, K.E. (1997). Identification with school. *American Journal of Education, 105*, 294–318. http://dx.doi.org/10.1086/444158

Wang, M.-T., & Eccles, J.S. (2012). Social support matters: Longitudinal effects of social support on three dimensions of school engagement from middle to high school. *Child Development, 83*, 877–895. https://doi.org/10.1111/j.1467-8624.2012.01745.x

Wang , J., & Wang, X. (2012). *Structural equation modeling: Applications using Mplus*. Chichester, UK: John Wiley & Sons.

Wentzel, K.R., Battle, A., Russell, S L., & Looney, L.B. (2010). Social support from teachers and peers as predictors of academic and social motivation. *Contemporary Educational Psychology, 35*, 193–202. https://doi.org/10.1016/j.cedpsych.2010.03.002

Widaman, K.F., Ferrer, E., & Conger, R.D. (2010). Factorial invariance within longitudinal structural equation models: Measuring the same construct across time. *Child Development Perspectives, 4,* 10–18. https://doi.org/10.1111/j.1750-8606.2009.00110.x

Witherspoon, D., & Ennett, S. (2011). Stability and change in rural youths' educational outcomes through the middle and high school years. *Journal of Youth and Adolescence, 40,* 1077–1090. https://doi.org/10.1007/s10964-010-9614-6

Zand, D.H., & Thomson, N.R. (2005). Academic achievement among African American adolescents: Direct and indirect effects of demographic, individual, and contextual variables. *Journal of Black Psychology, 31*, 352–368. https://doi.org/10.1177/0095798405278198

Zee, M., & Koomen, H.M.Y. (2017). Similarities and dissimilarities between teachers' and students' relationship views in upper elementary school: The role of personal teacher and student attributes. *Journal of School Psychology, 64*, 43–60. https://doi.org/10.1016/j.jsp.2017.04.007

Table 1

Goodness-of-fit Indices

		χ^2	df	CFI	TLI	RMSEA	90% CI RMSEA	SRMR
Longitudinal measurement invariance								
1	Configural invariance across time	331.176	213	.991	.989	.015	[.012; .018]	.028
2	Factor loading invariance across time	350.948	225	.991	.989	.015	[.012; .018]	.030
3	Factor loading and item intercept invariance across time	378.698	237	.990	.988	.016	[.013; .019]	.031
Mean level development								
4	Latent growth curve model for school attitude	74.651	24	.993	.990	.030	[.022; .038]	.026
5	Latent growth curve model for perceived teacher acceptance	133.504	89	.992	.990	.015	[.009; .020]	.031
6	Latent growth curve model for school attitude and perceived teacher acceptance	455.645	244	.985	.983	.019	[.016; .022]	.035
7	Latent growth curve model for school attitude and perceived teacher acceptance; gender as a covariate	538.975	264	.981	.978	.021	[.018; .023]	.036
Temporal relations between school attitude and perceived teacher acceptance								
8	Cross-lagged panel model	369.658	229	.990	.988	.016	[.013; .019]	.032
9	Cross-lagged panel model with invariant paths across waves	385.747	233	.989	.987	.017	[.014; .020]	.035
Temporal relations between school attitude and perceived teacher acceptance: Invariance across gender								
10	Configural invariance across time and gender groups	557.726	426	.990	.987	.016	[.012; .020]	.031
11	Factor loading invariance across time and gender groups	604.996	456	.989	.987	.017	[.013; .020]	.038
12	Cross-lagged panel model with invariant paths across waves, free across gender	655.280	472	.986	.984	.018	[.015; .021]	.043
13	Cross-lagged panel model with invariant paths across waves, invariance across gender	659.334	476	.986	.984	.018	[.015; .021]	.044

Note. df = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; CI = confidence interval; SRMR = standardized root mean squared residual. All models were conducted with the MLR estimator and included correlated uniquenesses between repeatedly used items and negative items. All χ^2 values are significant ($p < .001$).

Table 2

Parameters Estimates (and Standard Errors in Parentheses) from the Latent Growth Curve Models

	Model 4	Model 5	Model 6	Model 7
Means				
Intercept SA	3.041 (0.031)***		3.041 (0.031)***	2.850 (0.045)***
Slope SA	-0.091 (0.016)***		-0.094 (0.016)***	-0.117 (0.022)***
Intercept TA		3.345 (0.026)***	3.342 (0.027)***	3.233 (0.034)***
Slope TA		-0.092 (0.020)***	-0.091 (0.019)***	-0.113 (0.025)***
Covariances				
Intercept SA ↔ Slope SA	-0.078 (0.023)**		-0.073 (0.023)**	-0.072 (0.023)**
Intercept TA ↔ Slope TA		-0.048 (0.027)	-0.041 (0.025)	-0.044 (0.026)
Intercept SA ↔ Intercept TA			0.234 (0.234)***	0.211 (0.020)***
Slope SA ↔ Slope TA			0.066 (0.009)***	0.065 (0.009)***
Intercept SA ↔ Slope TA			-0.027 (0.013)*	-0.032 (0.013)*
Intercept TA ↔ Slope SA			-0.032 (0.011)**	-0.035 (0.011)**
Variances				
Intercept SA	0.549 (0.044)***		0.546(0.044)***	0.499 (0.044)***
Slope SA	0.123 (0.024)***		0.122 (0.024)***	0.116 (0.023)***
Intercept TA		0.307 (0.045)***	0.306 (0.042)***	0.292 (0.041)***
Slope TA		0.091 (0.026)***	0.078 (0.023)**	0.078 (0.023)***
Gender as a Covariate				
Gender → Intercept SA				0.400 (0.052)***
Gender → Slope SA				0.049 (0.029)
Gender → Intercept TA				0.230 (0.041)***
Gender → Slope TA				0.045 (0.026)

Note. All parameters are unstandardised estimates. SA = School Attitude; TA = Perceived Teacher Acceptance. Gender is coded 0=males, 1=females.

*** $p < .001$; ** $p < .01$; * $p < .05$.

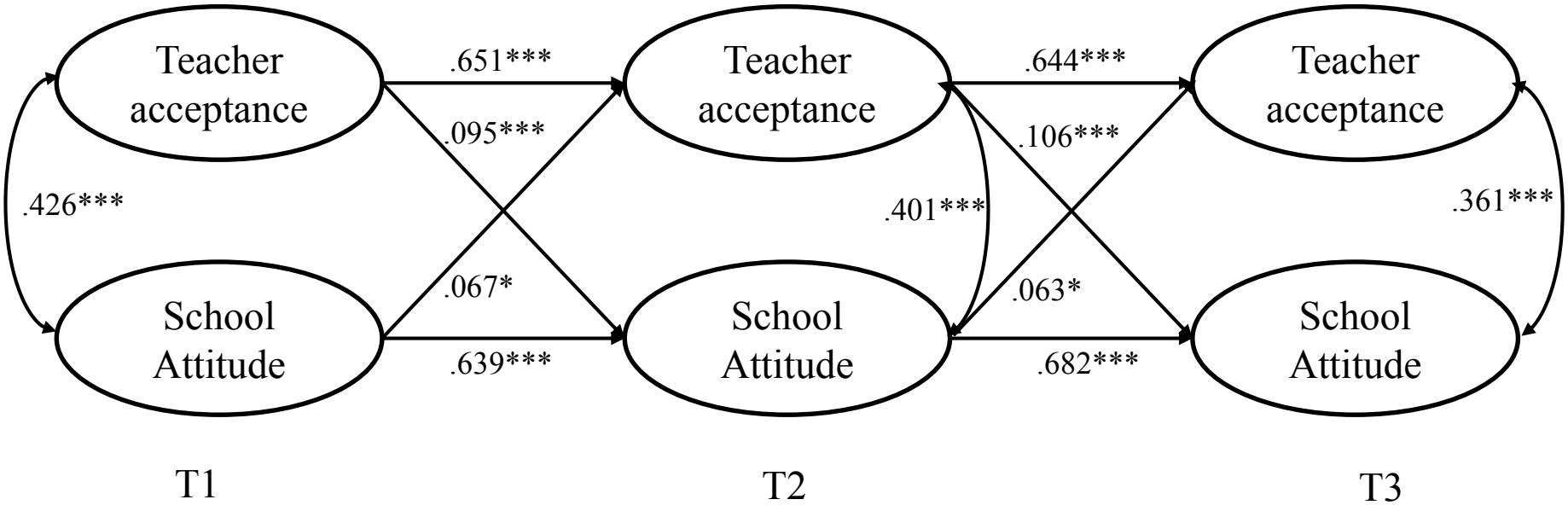

Figure 1. The cross-lagged panel model for the temporal relations between school attitude and perceived teacher acceptance. Standardised coefficients are presented. *** $p < .001$; ** $p < .01$; * $p < .05$.

Online Supplements to

"School Attitude and Perceived Teacher Acceptance: Developmental Trajectories, Temporal Relations, and Gender Differences"

Table S1

Standardized Factor Loadings (and Standard Errors in Parentheses) from Model 1 of the Main Manuscript

	T1	T2	T3
Perceived Teacher Acceptance			
Item 1 – "My teachers treat me fairly."	.640 (.033)	.714 (.019)	.752 (.019)
Item 2 – "My teachers like me."	.705 (.034)	.701 (.019)	.780 (.017)
Item 3 – "My teachers look after me."	.675 (.032)	.686 (.018)	.767 (.017)
Item 4 – "My teachers scold me too often." (reversed)	.599 (.040)	.589 (.024)	.617 (.027)
Item 5 – "My teachers help me when I need help."	.607 (.039)	.623 (.024)	.673 (.021)
School Attitude			
Item 1– "I like going to school."	.818 (.015)	.803 (.014)	.812 (.013)
Item 2 – "School is a real pain." (reversed)	.782 (.016)	.850 (.014)	.841 (.013)
Item 3 – "Everything would be a lot nicer without school." (reversed)	.739 (.016)	.779 (.014)	.803 (.012)

Note. For all factor loadings $p < .001$.

Table S2

Factor Correlations (and Standard Errors in Parentheses) from Model 1 of the Main Manuscript

	School Attitude t1	Perceived Teacher Acceptance t1	School Attitude t2	Perceived Teacher Acceptance T2	School Attitude t3
Perceived Teacher Acceptance t1	.414 (.033)				
School Attitude t2	.634 (.024)	.328 (.040)			
Perceived Teacher Acceptance t2	.350 (.030)	.636 (.044)	.501 (.027)		
School Attitude t3	.551 (.023	.306 (.039)	.741 (.019)	.457 (.030)	
Perceived Teacher Acceptance t3	.302 (.032)	.492 (.045)	.360 (.030)	.683 (.029)	.502 (.030)

Note. For all factor correlations $p < .001$.

Table S3

Descriptive Statistics

		Total Sample	Boys	Girls
School Attitude t1	*M (SD)*	2.94 (1.03)	2.75 (1.08)	3.15 (0.93)
	skewness (kurtosis)	-0.617 (-0.963)	-0.344 (-1.300)	-0.936 (-0.273)
School Attitude t2	*M (SD)*	2.93 (0.99)	2.68 (1.04)	3.18 (0.88)
	skewness (kurtosis)	-0.616 (-0.869)	-0.282 (-1.254)	-1.010 (0.069)
School Attitude t3	*M (SD)*	2.78 (1.01)	2.55 (1.03)	3.03 (0.91)
	skewness (kurtosis)	-0.415 (-1.073)	-0.120 (-1.293)	-0.741 (-0.475)
Perceived Teacher Acceptance T1	*M (SD)*	3.43 (0.63)	3.33 (0.70)	3.56 (0.51)
	skewness (kurtosis)	-1.443 (1.897)	-1.249 (1.076)	-1.530 (2.508)
Perceived Teacher Acceptance T2	*M (SD)*	3.32 (0.66)	3.20 (0.72)	3.45 (0.57)
	skewness (kurtosis)	-1.179 (1.067)	-0.992 (0.435)	-1.310 (1.718)
Perceived Teacher Acceptance T3	*M (SD)*	3.28 (0.71)	3.15 (0.78)	3.43 (0.59)
	skewness (kurtosis)	-1.234 (1.155)	-1.036 (0.454)	-1.335 (1.709)

Note. M = Mean. *SD* = Standard deviation.

Table S4

Standardized Path Coefficients (and Standard Errors in Parentheses) from the Cross-lagged Panel Models Freely Estimated across Time (Model 8 of the Main Manuscript)

Stability		
	School Attitude	Perceived Teacher Acceptance
t1-t2	.619 (.031)***	.602 (.051)***
t2-t3	.696 (.025)***	.673 (.039)***
Cross-lagged paths		
	School Attitude → Perceived Teacher Acceptance	Perceived Teacher Acceptance → School Attitude
t1-t2	.110 (.034)**	.071 (.043)
t2-t3	.027 (.037)	.109 (.030)***
Correlations		
	School Attitude ↔ Perceived Teacher Acceptance	
t1	.413 (.032)***	
t2	.408 (.040)***	
t3	.367 (.367)***	

Note. *** $p < .001$; ** $p < .01$; * $p < .05$.

Table S5

Standardized Path Coefficients (and Standard Errors in Parentheses) from the Cross-lagged Panel Models Invariant across Time (Model 9 of the Main Manuscript)

Stability		
	School Attitude	Perceived Teacher Acceptance
t1-t2	.639 (.024)***	.651 (.034)***
t2-t3	.682 (.023)***	.644 (.034)***
Cross-lagged paths		
	School Attitude → Perceived Teacher Acceptance	Perceived Teacher Acceptance → School Attitude
t1-t2	.067 (.027)*	.095 (.023)***
t2-t3	.063 (.025)*	.106 (.026)***
Correlations		
	School Attitude ↔ Perceived Teacher Acceptance	
t1	.426 (.032)***	
t2	.401 (.038)***	
t3	.361 (.049)***	

Note. *** $p < .001$; ** $p < .01$; * $p < .05$.