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Title: Students' academic and emotional adjustment during the transition from primary to secondary school : a cross-lagged study

Year: 2019

Version: Accepted version (Final draft)

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Please cite the original version:

Engels, M. C., Pakarinen, E., Lerkkanen, M.-K., & Verschueren, K. (2019). Students' academic and emotional adjustment during the transition from primary to secondary school : a cross-lagged study. *Journal of School Psychology*, 76, 140-158. <https://doi.org/10.1016/j.jsp.2019.07.012>

Students' Academic and Emotional Adjustment During the Transition From Primary to
Secondary School: A Cross-Lagged Study

Engels, M. C., Pakarinen, E., Lerkkanen, M-K., & Verschueren, K. (2019). Students' academic and emotional adjustment during the transition from primary to secondary school: A cross-lagged study. *Journal of School Psychology, 76*, 140-158.

Abstract

The current study examined several indicators of students' academic and emotional adjustment during the transition from primary (i.e., grade 6) to secondary school (i.e., grades 7 and 9). Specifically, the study investigated how students' engagement, achievement, and burnout, as well as student-teacher conflict, evolve together over time. A total of 356 adolescents (57.3% boys) filled out questionnaires about their burnout and their behavioral and cognitive engagement. Students' achievement was measured using standardized test scores. Conflict in the teacher-student relationship was assessed using teacher ratings. Cross-lagged models revealed bi-directional associations between behavioral and cognitive engagement. More teacher conflict related to less behavioral engagement, whereas higher achievement predicted more cognitive engagement one and two school years later. The results underscore that, despite the interrelatedness of behavioral and cognitive engagement during the transition from primary to secondary school, both show unique contextual and personal correlates.

Keywords achievement, behavioral engagement, cognitive engagement, school transition, student burnout, teacher-student conflict

Students' Academic and Emotional Adjustment During the Transition From Primary to Secondary School: A Cross-Lagged Study

For many students, the transition from primary to secondary education is a challenging time for their academic and emotional adjustment to school. This transitional period sees an increased emphasis on grades and competition, a decline in adolescents' perception of the emotional support they receive from their teachers, and a decrease in their sense of belonging in their classrooms (Salmela-Aro, 2017). During school transitions, students are also at an increased risk of dropping out of school, which makes such transitions a critical developmental period for detecting early signs of academic and emotional maladjustment (Skinner, Furrer, Marchand, & Kindermann, 2008; Virtanen, Lerkkanen, Poikkeus, & Kuorelahti, 2016).

Key aspects of academic and emotional adjustment include students' school engagement (Skinner, 2016), achievement (Guskey, 2013), burnout (Salmela-Aro, Kiuru, Pietikäinen, & Jokela, 2008) as well as teacher-student conflict (Longobardi, Prino, Marengo, & Settanni, 2016). Although studying these aspects together may provide a complementary and comprehensive understanding of students' adjustment to school, the various aspects are typically investigated separately (Virtanen et al., 2016). As a result, we know little about the transactional associations or direction of effects between students' school engagement, achievement, burnout, and teacher-student conflict, which could help us to target interventions at specific aspects of students' academic and emotional adjustment.

According to the stage-environment fit theory (Eccles et al., 1993), academic and emotional maladjustment of adolescents might result from a lack of fit between adolescents' developmental needs and their environment. Similarly, the self-system model of motivational development (Connell & Wellborn, 1991; Skinner, 2016) postulates that certain aspects of the school context, such as students' relationships with their teachers, differentially provide

students with opportunities to fulfill their basic psychological needs, such as relatedness, competence, and autonomy. These experiences shape students' internal self-systems and their reactions to stressful situations, which processes provide a motivational basis for their engagement, burnout, and achievement in school. For example, transitioning into school environments characterized by greater teacher control and decrease of teacher-student relationship quality can hamper academic engagement and achievement, and stimulate behavioral problems and school-related stress (Eccles, Lord, & Midgley, 1991; Engels et al., 2016; Roeser & Eccles, 1998). In turn, students' school-related emotions and behaviors may shape the relationship with their teacher as well. By exhibiting pro- or anti-school emotions and behaviors, students may receive teacher behavior that matches their motivation for school (Skinner & Belmont, 1993).

The present study aimed to fill a gap in the literature by examining students' school engagement (i.e., students' behavioral and cognitive involvement in school), achievement (i.e., students' academic achievement on standardized math and literacy tests), burnout (i.e., exhaustion due to study demands) and teacher-student conflict (i.e., negative, strained, and conflictual teacher-student relationships, as perceived by the teacher) conjointly. More specifically, it extends prior research by investigating whether these constructs uni- or bi-directionally affect one another across time. In addition, this study allows us to examine the possibility of indirect effects, for instance, whether teacher conflict shapes students' achievement through school engagement. The study extends prior research by investigating the cross-lagged associations of these constructs from primary school (i.e., grade 6) until the end of lower secondary school (i.e., grades 7 and 9). Furthermore, as the role of teacher-student conflict has remained relatively understudied during adolescence (Roorda, Jak, Zee, Oort, & Koomen, 2017; Roorda, Koomen, Spilt, & Oort, 2011), this study adds to our understanding of this teacher-student relationship dimension by examining its relations with students'

engagement, burnout, and achievement during the transition to secondary school. Furthermore, we distinguish between students' behavioral and cognitive engagement in order to provide a more nuanced and differentiated understanding of students' engagement in school. In the following sections, we discuss each of the key variables and their associations with the other variables in the model.

Students' School Engagement as a Predictor of Achievement, Burnout, and Teacher-Student Conflict

Researchers have described the concept of school engagement as the quality of students' involvement with schooling (Skinner, 2016). School engagement is generally considered a multidimensional construct consisting of behavioral, emotional, and cognitive components. In this study, we focus on students' behavioral and cognitive engagement for two reasons. First, compared to emotional engagement, behavioral engagement is more observable for the teacher (Appleton, Christenson, & Furlong, 2008) and might play a more pronounced role in students' academic development (Fredricks, Blumenfeld, & Paris, 2004). Second, cognitive engagement is a relatively understudied phenomenon compared to the other two dimensions (Appleton, Christenson, Kim, & Reschly, 2006), and consequently, left several questions about the development and impact on students' learning unanswered (Finn & Zimmer, 2012).

Behavioral Engagement

In general, behavioral engagement refers to students' involvement in academic activities (Appleton et al., 2008). This type of engagement is conceptualized in terms of behavioral participation and reflects the extent to which students exert effort in their schoolwork, pay attention in class, and prepare for class (Institute for Research and Reform in Education, 1998). Prior research has found that students' behavioral engagement typically decreases across school years (Engels et al., 2017; Wang & Eccles, 2012a), which places students at increased risk of school drop-out (Janosz, Archambault, Morizot, & Pagani, 2008).

Several studies have emphasized the importance of students' behavioral engagement for successful learning and achievement, such as grades and standardized tests (e.g., Fredricks et al., 2004). Moreover, it has been suggested that early problems with behavioral engagement have long-lasting consequences for achievement (Ladd & Dinella, 2009). Conversely, Mägi and colleagues (2013) showed that high and low behavioral engagement (i.e., task avoidance) can be characteristic for both high- and low-achieving students. As a result, a modest positive association between behavioral engagement and achievement has been assumed. Most of the research in this field, however, has been cross-sectional in nature, conducted in primary schools, or has not distinguished between the various dimensions of engagement (see Roorda et al., 2017 for an overview).

Few studies have examined students' behavioral engagement in relation to their feelings of school burnout, and none have examined this association during the transitional period from primary to secondary education. Despite the lack of clear empirical evidence, one could argue that students' behavioral engagement may affect student burnout. On the one hand, behavioral engagement could be related to higher levels of burnout, since being behaviorally engaged can increase students' workload, which has been related to higher burnout (Yang, 2004). On the other hand, higher behavioral engagement could be associated with less burnout, as being behaviorally engaged in school gives students a certain level of control over their studies, which may decrease their feelings of burnout (Santen, Holt, Kemp, & Hemphill, 2010). However, in a study among older students (grades 9, 10, and 11), no evidence was found that engagement predicts burnout (Salmela-Aro & Upadyaya, 2014). That finding, however, could have been due to the operationalization of student engagement, which was an aggregate of behavioral (i.e., absorption), emotional (i.e., energy), and cognitive (i.e., dedication) dimensions of engagement. It is also possible that the authors found fewer associations among older students during their transition from lower secondary to upper secondary school, as students are generally more

adjusted to the educational system in secondary school than students who transition from primary to secondary school.

In addition, although the evidence is scarce, there are some indications that students' behavioral engagement could affect the teacher-student relationship. In a study conducted among primary school students, Skinner and Belmont (1993) found that teachers responded with more neglect, coercion, and inconsistency to students who initially showed low behavioral engagement. This finding implies that students elicit teacher behavior that matches the students' own level of behavioral engagement. Thus, students with more behavioral engagement could evoke less conflict in their relationships with their teachers compared to those students who exhibit less behavioral engagement. This notion is supported by several studies on behavioral problems and teacher conflict, which have shown that teachers are most likely to form conflictual relationships with students whom they view as having behavioral problems (Doumen et al., 2008; Hamre, Pianta, Downer, & Mashburn, 2008; Sutherland & Oswald, 2005). Other studies, however, found no evidence for the role of students' engagement in shaping teacher-student relationship quality (Engels et al., 2016; Weyns, Colpin, De Laet, Engels, & Verschueren, 2017).

Cognitive Engagement

The definition of cognitive engagement is grounded in theory on personal investment, self-regulation, and striving for mastery (Fredricks et al., 2004). In the present study, cognitive engagement was defined as the extent to which students perceive control regarding their schoolwork in general and believe that their schoolwork is relevant to their personal goals and future endeavors (Appleton et al., 2006). By doing so, the conceptualization of cognitive engagement is closely linked to utility (i.e., how a task fits into an individual's future plans) and attainment values (i.e., the importance of doing well on a task) postulated in the expectancy-value theory (e.g., Wigfield & Eccles, 2000). The general model of expectancy-value theory

was designed to explain individual and group differences in individuals' decisions to engage in, and the extent of their actual engagement in various achievement-related activities (Eccles & Wang, 2012). In contrast to engagement theories, expectancy-value theory places greater emphasis on the role of both personal and social identities and short- and long-term goals as key mediators of engagement through their influence on the individual's hierarchies of subjective task values (Eccles & Wang, 2012). As such, expectancy-value theory focuses on self-related characteristics that might influence engagement through their impact on subjective task values.

To date, it remains unclear how cognitive engagement develops over time. It might be that the decline in behavioral engagement aligns with a decrease of cognitive engagement (e.g., Wang & Eccles, 2012a). In contrast, the ability to become cognitively engaged in school may also increase over time alongside the maturation of the prefrontal cortex and the limbic system (Mahatmya, Lohman, Matjasko, & Feldman Farb, 2012). Students also generally start to see the relevance of their schoolwork for their future careers as they mature (e.g., Upadyaya & Salmela-Aro, 2013).

Previous research on the relation between cognitive engagement and achievement has yielded mixed findings, which may be due to the different methods these studies used to assess cognitive engagement (Finn & Zimmer, 2012). In general, however, more cognitive engagement predicts higher achievement among students (e.g., Finn & Zimmer, 2012). Some studies have suggested that aspects of cognitive engagement, such as strategy use and self-regulation skills, are beneficial to students' learning and, thus their achievement (Finn & Zimmer, 2012). In contrast, evidence of the relation between students' cognitive engagement and burnout is limited. As stated above, Salmela-Aro and Upadyaya (2014) found no evidence for the role of students' engagement in their burnout when using a general measure of engagement that did not distinguish between the engagement dimensions. Based on the stage-

environment fit theory, however, one could argue that in a school context with increasing study demands and emphasis on performance (Eccles et al., 1993)—as in secondary school—students who highly value and see the relevance of their education and schoolwork will experience an increase in their school-related stress, and hence are at increased risk for school burnout.

To the best of our knowledge, no previous study has examined whether students' cognitive engagement affects the quality of the teacher-student relationship in general, or more specifically, teacher-student conflict. Yet, consistent with the idea that students evoke teacher behavior in line with the students' engagement levels, students who are more cognitively engaged in school and value education may be less involved in conflicted relationships with their teachers (Nurmi & Kiuru, 2015; Skinner & Belmont, 1993). The current study investigates this possibility for cognitive engagement.

In addition, as suggested by motivational theory on school engagement (Skinner et al., 2008), students' behavioral and cognitive engagement can be seen as interrelated constructs that reinforce each other over time. For instance, adolescents who recognize the importance of schooling in their lives are more likely to behaviorally invest in it and work hard for school (i.e., cognition triggers action; Li & Lerner, 2013). In turn, it is likely that more active participation and effort in school contributes to the importance students attach to their school work (Li & Lerner, 2013). However, more research is necessary to ascertain the nature of the interrelations of school engagement dimensions (Li & Lerner, 2013; Skinner et al., 2008).

Students' Achievement as a Predictor of Engagement, Burnout, and Teacher-Student Conflict

Academic achievement, which refers to students' academic competencies, is often measured using students' grade point averages or standardized test scores (Bates, Shifflet, & Lin, 2013). In this study, we used standardized test scores in reading and math, as teacher-assigned grades are more subjective than standardized scores and can vary at the teacher and school level (Bates et al., 2013).

Research conducted in comprehensive schools (grades 1 to 4) has revealed a modest positive association between achievement in reading and math, and students' behavioral engagement (i.e., effortful engagement and task-focused behavior) (Hughes, Luo, Kwok, & Loyd, 2008; Kiuru et al., 2014). It has been suggested that poor learning outcomes typically lead to task-avoidance through the process of failure expectations, whereas good academic performance activates mastery orientation and task-focused behavior (Onatsu-Arvilommi & Nurmi, 2000). Previous research on cognitive engagement is limited, but studies have shown that low prior achievement is associated with lower cognitive engagement, whereas high prior achievement is related to higher cognitive engagement (Li et al., 2017). Some studies have suggested that the more students thrive in school academically, the more efficacious they feel, which in turn increases their engagement in school (Li et al., 2017; Salmela-Aro & Upadaya, 2012).

To the best of our knowledge, no previous studies have investigated whether students' achievement can affect their burnout or teacher-student relationship, as achievement is generally used as an outcome measure instead of a predictor. Yet higher achievement could possibly lead to positive achievement emotions (Pekrun, 2006), which may be linked to students' lower burnout levels. In addition, higher achievement might be related to lower levels of teacher-student conflict. For instance, Košir and Tement (2014) showed that students' achievement, as measured by their grades at the beginning of the school year, was positively related to teacher acceptance (i.e., how much the teacher liked the student) at the end of the school year. However, the association of achievement with burnout and teacher-student relationships might be more pronounced for school grades than for standardized test scores (as in the current study), as grades are based on teacher ratings and hence, more high-stakes for students, with whom teachers directly share the grades.

Students' Burnout as a Predictor of Engagement, Achievement, and Teacher-Student

Conflict

Only a few studies have investigated students' school burnout as an indicator of students' maladjustment at school (Salmela-Aro & Upadyaya, 2014). School burnout is a school-related stress syndrome that may be described as a continuous process of feeling overwhelmed, lacking enjoyment, and seeing little value in school-related work (Salmela-Aro, 2017; Salmela-Aro & Upadaya, 2012). School burnout aligns conceptually with the concept of disaffection (Skinner & Pitzer, 2012). Some researchers perceived school burnout to be the psychological process of emotional disengagement from school (Wang, Chow, Hofkens, & Salmela-Aro, 2015). Burnout reflects students' exhaustion, cynicism about the value of school, and feelings of inadequacy to be successful, which are all critical indicators of emotional disengagement (Salmela-Aro, Savolainen, & Holopainen, 2009).

In general, three burnout dimensions may be distinguished: (a) *exhaustion* due to study demands, (b) feelings of *inadequacy* as a student, and (c) *cynicism* towards school (Salmela-Aro, Kiuru, Leskinen, & Nurmi, 2009). Exhaustion generally reflects the extent to which students have affective feelings of strain and chronic fatigue due to their schoolwork (Salmela-Aro & Upadyaya, 2014). This study focused on the dimension of exhaustion due to study demands, as this construct might be particularly interesting in the context of the transition from primary to secondary school. As proposed by stage-environment fit theory, study demands increase when students move from primary to secondary school, and thus most likely, also their feelings of exhaustion.

Regarding the relation between burnout and engagement, Salmela-Aro and Upadyaya (2014) found a uni-directional association from burnout to engagement, indicating that higher burnout was associated with lower engagement one year later. Yet, given the specific age group (15–19 years), the authors stressed the need for additional research on students in middle and

high school. Furthermore, burnout can also affect students' achievement. If students experience emotional exhaustion, then they will be emotionally fatigued, irritated, and frustrated, thus diminishing their mental resources for achievement (Yang, 2004).

In addition, when students feel burned out by school, this might also affect the teacher-student relationship. Although evidence on this relation is limited, students' burnout might "spill over" to the teacher-student relationship through the process of emotional transmission (Demerouti, Bakker, & Schaufeli, 2005). Negative spillover occurs when unpleasant experiences have negative implications for one's interactions, for instance in the classroom setting. Thus, students who experience burnout at school may suffer decreased well-being, and they may have difficulties in meeting their teachers' expectations and contributing to a positive classroom climate (Larson & Almeida, 1999; Salmela-Aro, Tynkkynen, & Vuori, 2011).

Teacher-Student Conflict as a Predictor of Engagement, Burnout, and Achievement

Within the school environment, relationships with teachers can affect students' engagement, burnout, and achievement (Wang & Eccles, 2012b). Even though teachers are important for students of all ages, most research on the role of the affective teacher-student relationship has been conducted using early or middle childhood samples (Bergin & Bergin, 2009; Roorda et al., 2011; Verschueren & Koomen, 2012). This focus has limited our understanding of these processes during adolescence. Even less research has been conducted during the school transition from primary to lower secondary school. Although developing high-quality affective teacher-student relationships in secondary school could be more challenging than with earlier ages (since students spend less time with single teachers), teachers remain important for students' development during adolescence (e.g., Bergin & Bergin, 2009; Roorda et al., 2017; Roorda et al., 2011).

In this study, we investigated a relatively understudied in relation to school engagement, but yet important aspect of the teacher-student relationship: conflict. Teacher-student conflict

can be defined as the degree to which a teacher perceives a relationship with a student as negative, strained, and conflictual (Pianta, 2001; Verschueren & Koomen, 2012). Teachers who experience relatively high levels of conflict in their relationship with a particular student, perceive the student as angry or unpredictable, which then creates resistance and disharmony in their relationship (Verschueren & Koomen, 2012). In turn, this situation will negatively affect students' academic and emotional adjustment (Longobardi et al., 2016). Although impact of negative teacher-student relationships on students' adjustment might be especially important, as conflictual relationships and maladjustment might strengthen each other over time, only a few studies have examined negative, conflictual teacher-student relationships in secondary education (Roorda et al., 2017).

Conflictual teacher-student relationships can negatively affect students' engagement. For instance, a study by Engels and colleagues (2016) among adolescents revealed that negative teacher-student relationships were associated with lower behavioral engagement in the subsequent school year. Research from kindergarten has also shown that teacher-rated conflict negatively affected teachers' ratings of children's behavioral engagement, such as more school avoidance and less cooperative participation in the classroom (Birch & Ladd, 1997; Doumen, Koomen, Buyse, Wouters, & Verschueren, 2012). Most research on cognitive engagement to date has investigated teacher support (i.e., warmth and closeness), which is not necessarily the same as low levels of teacher conflict (i.e., negative and conflictual interactions). For instance, Ryan and Patrick (2001) found that students' perceptions of teacher support predicted more cognitive engagement during middle school. In addition, Wang and Eccles (2012b) revealed that more teacher support predicted higher levels of students' subjective valuing of learning. These studies tentatively suggest that more conflict is associated with less cognitive engagement, and thus, similar to the association between conflict and the behavioral and emotional dimensions of engagement (Birch & Ladd, 1997). However, cognitive engagement

is typically described as a more internal dimension compared to the other engagement dimensions (Appleton et al., 2006). Therefore, it could be that students' cognitive engagement is less affected by conflicts in their teacher-student relationship than their behavioral engagement. The negative consequences of teacher-student conflict have also been found for students' achievement. For instance, Hughes, Wu, Kwok, Villarreal, and Johnson (2012) found in their study that student-rated conflict directly and indirectly (through behavioral engagement) predicted lower achievement in reading and math for students in comprehensive school.

Teacher-student conflict may also affect students' burnout, as teacher conflict is related to increases in students' mild depressive symptoms (Rudasill, Pössel, Winkeljohn Black, & Niehaus, 2014). Yet, the limited number of previous studies that have been conducted have investigated teacher support instead of teacher conflict in relation to students' burnout. In general, the results of these studies have indicated that higher levels of teacher support (i.e., encouragement and being interested) are associated with lower levels of burnout (Salmela-Aro et al., 2008). Correlates of teacher support and conflict, however, are not necessarily the same. Because interpersonal conflict may be particularly stressful for both students and teachers—even more so than a lack of support—more conflictual teacher-student relationships may increase the risk for students' feelings of burnout. Teachers typically spend less time with students with whom they have conflictual relationships. These students hence miss out on important behavioral and academic resources for coping with their exhaustion due to study demands (e.g., Milatz, Lüftenegger, & Schober, 2015).

The Role of Students' Sex, At-Risk Status, and Parental Education

There are several other factors that may affect students' academic and emotional adjustment as well: Students' sex, risk for learning difficulties, and parental educational level. First, research has consistently shown that boys generally have lower engagement and achievement compared to girls (Lam et al., 2012; Lamote, Speybroeck, Van Den Noortgate, &

Van Damme, 2013). In contrast, girls are more likely to suffer from exhaustion due to study demands and feelings of inadequacy compared to boys who are more likely to suffer from cynicism (Bask & Salmela-Aro, 2013; Salmela-Aro & Tynkkynen, 2012). Also, teachers generally report more conflicts in their relationship with boys compared to girls (Spilt, Koomen, & Jak, 2012). In addition, researchers have suggested that boys and girls differ in the way social relationships play a role in the development of their school engagement (Roorda et al., 2011). Yet, prior research has been inconsistent with some studies showing stronger associations between teacher-student relationships and school adjustment for girls (Baker, 2006; Brendgen, Wanner, Vitaro, Bukowski, & Tremblay, 2007), whereas others revealed stronger associations for boys (Furrer & Skinner, 2003; Lietaert, Roorda, Laevers, Verschueren, & De Fraine, 2015). To date, it remains unclear whether the longitudinal associations between school engagement, burnout, achievement, and teacher conflict differ for boys and girls.

Second, many students with learning difficulties hold a low sense of self-efficacy for performing well (Licht & Kistner, 1986), which adversely affects their motivation for and engagement in school. The limited prior research revealed that students at-risk for learning difficulties did not benefit more from supportive relationships with their teachers compared to other students (Baker, 2006). Yet, as evidenced by a meta-analysis, negative teacher-student relationships were more deteriorating for students who were academically at-risk because of their learning difficulties (Roorda et al., 2011). It has been suggested that conflictual relationships between teacher and student place an additional burden on these students, which further diminishes their engagement and achievement in school (Roorda et al., 2011).

In addition, the level of parental education matters for their academic and emotional adjustment to school. For instance, research showed that lower levels of socioeconomic status are related to lower academic achievement and less favorable school engagement trajectories (Archambault, Janosz, Morizot, & Pagani, 2009; Sirin, 2005), and higher levels of school-

related burnout (Salmela-Aro et al., 2008). For that reason, we included students' sex, risk status, and parental educational level as covariates in the analysis. Also, we explored whether boys and girls, and students at-risk and not at-risk differed in their longitudinal associations of academic and emotional adjustment.

The Finnish Context

According to the international PISA (Programme for International Student Assessment), Finnish students are consistently ranked among the best performers in mathematics, science, and reading in comparison to those of the other OECD countries (OECD, 2013). Although Finnish students had rather high levels of behavioral and cognitive engagement in lower secondary school (Virtanen et al., 2016), many students felt inadequate in school, exhausted by school, and cynical about the value of school (Salmela-Aro et al., 2008). These feelings of burnout have increased substantially over the past years (since 2015), and especially among girls. Almost half of comprehensive school students (12–13 years of age) report feeling cynical towards school (Salmela-Aro, Muotka, Alho, Hakkarainen, & Lonka, 2016b). In Finland, the primary school (grades 1 through 6) and lower secondary school (grades 7 through 9) phases are comprehensive and have no ability-tracking structures. Teachers in primary school hold master's degrees in education, while subject teachers in lower secondary school usually hold master's degrees in some subject domain, with an additional compulsory one year of pedagogical studies in educational science.

The Aims of the Present Study

This study investigated the cross-lagged associations between students' engagement, burnout, and achievement, as well as teacher-student conflict. By doing so, it sheds light on the longitudinal associations and direction of effects of these constructs. In this study, we focused on students in primary school (grade 6: 12–13 years) and lower secondary school (grade 7: 13–14 years; grade 9: 15–16 years). The study extends previous research in several important ways. First, we studied students' engagement, burnout, and achievement processes all together, in one

comprehensive model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Salmela-Aro & Upadyaya, 2014). Second, we included the relatively understudied role of teacher-student conflict as a factor that might affect students' engagement, burnout, and achievement in the classroom (Salmela-Aro & Upadyaya, 2014). Third, we tested the possibility of bi-directional processes of these constructs during the transition from primary to secondary school. Fourth, we included cognitive engagement as a relatively understudied engagement dimension in relation to students' burnout, achievement, and teacher-student conflict.

We hypothesized that behavioral and cognitive engagement are interrelated and reinforce each other over time (Li & Lerner, 2013; Skinner et al., 2008) (hypothesis 1). Also, we expected that both behavioral and cognitive engagement would be bi-directionally related to higher achievement (e.g., Fredricks et al., 2004) (hypothesis 2a) and bi-directionally related (only for behavioral engagement) to less teacher-student conflict (Birch & Ladd, 1997; Engels et al., 2016; Ryan & Patrick, 2001; Wang & Eccles, 2012b) (hypothesis 2b). We hypothesized that more burnout would be uni-directionally associated with less engagement (Salmela-Aro & Upadyaya, 2014) (hypothesis 3a). Moreover, we tentatively hypothesized that more burnout would be bi-directionally related to lower achievement over time (Yang, 2004) (hypothesis 3b). We also anticipated that more burnout would be bi-directionally associated with more teacher-student conflict over time (Karimi, Bashirpur, Khabbaz, & Hedayati, 2014; Košir & Tement, 2014; Salmela-Aro et al., 2008) (hypothesis 3c). Finally, we hypothesized that higher levels of teacher-student conflict would be bi-directionally associated with lower achievement over time (Hughes et al., 2012; Košir & Tement, 2014) (hypothesis 4). Given the limited research and/or inconsistent findings, all other cross-lagged associations were investigated in a more exploratory manner.

Method

Participants and Procedure

The current study is part of the First Steps study (2006–2016), an extensive age-cohort study in Finland that followed students from kindergarten to the end of the comprehensive school (Lerkkanen et al., 2006). The original sample ($N = 1,810$) was recruited from four municipalities in Finland: two in central, one in western, and one in eastern Finland. Participants comprised the whole age cohort from three municipalities and about half of the age cohort from one municipality. From all participants, parental active consent was received for the duration of the study.

This study used a sub-sample of 356 students in grades 6, 7, and 9, as these students had teacher ratings of their teacher-student relationship. Target sampling of these children was necessary to ensure that the data-collection demands placed on the teachers were not too heavy. These target students were selected either because they were identified as being at risk of reading disabilities at the end of kindergarten ($n = 161$; 65.8% boys) or were randomly selected control children from the same classrooms ($n = 192$; 49.5% boys). Risk for reading disabilities (Lerkkanen, Ahonen, & Poikkeus, 2010) was determined on the basis of kindergarten assessment for pre-reading skills (letter knowledge, phonemic awareness, and rapid automatized naming) and information on their parents' reading disabilities, indicated by either the mother or father self-reporting "mild" or "severe" problems with reading at school age¹. A student was identified as being at risk of reading disabilities if (1) he or she scored at or below the fifteenth percentile (of the total sample) in at least two of the measured skill areas or (2) the student scored at or below the fifteenth percentile in one of the skill areas and the parental questionnaire indicated a family risk. From the other participants of the follow-up ($N = 1,810$), a random sample of non-risk children who did not meet the risk criteria was also included in the individual follow-up assessment from first grade on. The random selection of the non-risk

¹The identification of at-risk children was done for research purposes only, and not for school or intervention purposes, in order to follow these children's school trajectories more closely. Teachers did not know who of the students belonged to the early at-risk group and who belonged to the control group.

sample from the classrooms was conducted in a stratified manner. Because of the variation of at-risk children per classroom, the number of non-risk children from different classrooms ranged between one and six, with a median of three children. Overall, the average classroom size was 17.94 ($SD = 7.64$) in grade 6 and 18.0 ($SD = 3.60$) in grade 7 and 9. To check the initial categorization of the at-risk status, we examined whether children who were identified with an early risk for reading difficulties in kindergarten still had poor reading skills at the end of grade 9. In grade 9, 20% of the students in our sample had a score of lower than 5 (max = 12) on reading comprehension skills at the end of grade 9, which included 37.5% non-risk students and 62.5% at-risk students. Thus, relatively more at-risk kindergartens have severe reading difficulties in grade 9.

Students filled out questionnaires in grade 6 (April 2013), grade 7 (April 2014), and grade 9 (April 2016), which took between 20 and 25 minutes to complete. Data were collected during regular lessons from all students. Students typically participated in the math and literacy performance tests during the same day before filling out the questionnaire. The trained research assistants administered the assessments according to the detailed written instructions. The research assistants reassured that students' responses would be treated with confidentiality. Participants had the opportunity to withdraw from the study at any phase.

Participants in the sub-sample were on average 12.75 years old ($SD = 0.29$), and 57.3% were boys. The sub-sample was demographically homogeneous, as 78.9% of the students spoke Finnish at home. In addition, 69.0% of the parents had completed higher education, and most students lived in intact families (69.0%). The demographical composition of the sample was representative of the general Finnish population (Statistics Finland, 2007). One-way Analysis of Variance (ANOVAs) revealed small to medium differences between at-risk and non-risk children (Cohen, 1988), which were somewhat lower compared to research that identified at-risk students based on their low-SES and minority backgrounds (Finn & Rock, 1997; Finn &

Zimmer, 2012). Students who were identified as at risk reported, on average, lower levels of cognitive engagement (grade 6: $F(1, 348) = 4.90, p = .028; d = .24$; grade 9: $F(1, 318) = 4.28, p = .039; d = .23$) and higher levels of burnout (grade 6: $F(1, 348) = 6.89, p = .010; d = .28$; grade 7: $F(1, 319) = 6.57, p = .011; d = .29$). No significant differences were found between students with ($N = 356$) and without ($N = 1,454$) teacher ratings of conflict in the study variables.

In primary school, students typically have one teacher per classroom throughout the school year, whereas in secondary school, students have different teachers for each subject (and thus multiple teachers per classroom). In our sample, participants' teachers in grade 6 were from 86 schools and 125 classrooms ($M_{\text{age}} = 44.85, SD = 9.45; 48\%$ female). In grade 7, 62 teachers ($M_{\text{age}} = 45.66, SD = 8.86; 89.8\%$ female, predominantly literacy teachers) from 34 secondary schools and 128 classrooms participated in the study. In grade 9, 73 literacy teachers ($M_{\text{age}} = 46.87, SD = 8.04; 92.7\%$ female) and 87 math teachers ($M_{\text{age}} = 42.97, SD = 9.47; 57.1\%$ female) from 33 secondary schools and 131 classrooms agreed to participate. Math and literacy teachers were selected because in Finnish lower secondary school students have more math and language lessons per week than any other subject. Most teachers had more than 15 years of professional experience in school (54.1% in grade 6; 53.1% in grade 7; 62.5% for literacy and 41.5% for math teachers in grade 9). Teachers had the opportunity to refuse to participate in the research themselves, even if their classrooms participated in the study. Literacy and/or math teachers – depending on their willingness to participate in the study – filled out questionnaires, including a rating scale on the quality of the teacher-student relationship (STRS; Pianta, 2001). To reduce their workloads, math and literacy teachers filled out the rating scale for the target sample only.

Measurements

School Engagement. Students' behavioral engagement was assessed using the Research Assessment Packages for Schools (RAPS; Institute for Research and Reform in Education, 1998). Students answered a total of five items on a four-point rating scale, from 1 (*strongly disagree*) to 4 (*strongly agree*). Items were related to students' effort, attention, and preparation. A sample question was: "I work very hard on my schoolwork". Original items were translated blind into Finnish, and back translated into English. Previous research has validated this sub-scale and has revealed good psychometric properties (Institute for Research and Reform in Education, 1998; Virtanen et al., 2016). In this study, omega values (ω) were .71 [.65, .76] in grade 6, .74 [.70, .78] in grade 7, and .83 [.80, .86] in grade 9 (all values bootstrap corrected, 95% [CI]).

Students' cognitive engagement was assessed using a sub-scale of the Student Engagement Instrument (SEI; Appleton et al., 2006). Cognitive engagement refers to the extent to which students perceive control regarding their schoolwork and believe that their schoolwork is relevant for their personal goals and aspirations. Students answered a total of six items on a four-point rating scale, from 1 (*strongly disagree*) to 4 (*strongly agree*). A sample question was: "School is important for achieving my future goals". Original items were translated blind into Finnish, and back translated into English. This sub-scale has been validated by previous research and has revealed good psychometric properties (Appleton et al., 2006; Virtanen et al., 2016). In this study, omega values (ω) were .77 [.74, .81] in grade 6, .84 [.80, .87] in grade 7, and .77 [.70, .82] in grade 9 (all values bootstrap corrected, 95% [CI]).

For each engagement dimension, mean scores were calculated and transformed into z-scores (reflecting standardization over the total sample), with high values referring to higher levels of engagement.

Student Burnout. Students' emotional exhaustion was assessed using the Bergen Burnout Inventory (Näätänen, Aro, Matthiesen, & Salmela-Aro, 2003). Students answered a

total of four items on a five-point rating scale, from 1 (*completely disagree*) to 5 (*completely agree*). Items were related to students' chronic and uncontrollable fatigue that negatively affected both their ability to function and their personal environment. A sample question was: "I often sleep poorly because of the circumstances at school". Original items were translated blind into Finnish, and back translated into English. Prior validation research has revealed good psychometric properties (Salmela-Aro, Rantanen, Hyvönen, Tilleman, & Feldt, 2011; Virtanen et al., 2016). In this study, omega values (ω) were .73 [.67, .77] in grade 6, .78 [.74, .82] in grade 7, and .81 [.78, .84] in grade 9 (all values bootstrap corrected, 95% [CI]). A mean score was calculated and transformed into a z-score (reflecting standardization over the total sample), with high values referring to higher levels of burnout.

Achievement. Students' achievement in reading (i.e., reading comprehension) and math (i.e., arithmetic) was measured by means of group-administered standardized tests administered by trained research assistants. Reading skills were assessed using the sub-test of the nationally normed reading test battery (ALLU, from the Finnish "Ala-asteen lukutesti" [Test of Reading Performance for Primary School]) for grade 6 (Lindeman, 1998) and for grades 7 and 9 (Lerkkanen, Eklund, Löytynoja, Poikkeus, & Aro, 2017) using the same structure. Students were asked to read an expository text and then answer 12 multiple-choice questions, with four alternative answers for each question. Different texts were used at each measurement moment to reflect students' current grade levels. There was no upper time limit for the test, and the students could use at least 30 minutes to complete it. The text was available during the assessment, and students could decide themselves in which order they wished to proceed. The Kuder-Richardson reliability was .65 in grade 6, .67 in grade 7, and .60 in grade 9, reflecting moderate reliability (e.g., Tan, 2009).

Math skills were assessed using the group test of the Basic Arithmetic Test (Aunola & Räsänen, 2007). This speed test consists of a maximum of 28 items, with 14 items for addition

(e.g., $4 + 1 = _ - 21 = ___$) and 14 for subtraction (e.g., $106.20 - 30.04 = ___$), to be completed within a three-minute time limit. The difficulty of the tasks gradually increase throughout the test. The final score is the total number of correct answers. The Kuder-Richardson reliability was .81 in grade 6, .93 in grade 7, and .91 in grade 9, reflecting high reliability (e.g., Tan, 2009).

Reading and math skills were moderately correlated with each other ($r = .34$ at grade 6, $r = .41$ at grade 7, and $r = .35$ at grade 9; $p < .001$). Achievement scores were computed using the standardized mean of the standardized reading and math test scores.

Teacher-Student Conflict. Teacher-rated conflict was assessed using the short version of Student-Teacher Relationship Scale (Pianta, 2001). Teachers answered a total of eight items on a five-point rating scale (1 = *does not fit at all*; 5 = *fits very well*) for each of the selected students. Items were related to difficulties in the teacher-student relationship, such as a teacher's feelings of negativity and conflict with a student. A sample question was: "This student and I always seem to be struggling with each other". Original items were translated blind into Finnish, and back translated into English. Prior research has revealed good psychometric properties (Pakarinen et al., 2018; Pianta, 2001). In this study, omega values (ω) were .92 [.90, .93] in grade 6, .92 [.90, .94] in grade 7, and .93 [.91, .94] in grade 9 (all values bootstrap corrected, 95% [CI]). A mean score was calculated and transformed into a z-score (reflecting standardization over the total sample), with high values referring to higher levels of teacher-student conflict.

Covariates. Students' sex (coded as 0 for girls ($n = 152$) and 1 for boys ($n = 204$)), at-risk status (coded as 0 for non-risk and 1 for at-risk), and parental educational level (as an indicator of SES) were treated as covariates in the analysis. Parental educational level was measured using the average educational level of the students' parents. Parents' education was coded as 1 for *no vocational education*, 2 for *vocational courses (minimum 4 months)*, 3 for

vocational school degree, 4 for *vocational college degree*, 5 for *bachelor's degree*, 6 for *master's degree*, and 7 for *licentiate or doctoral degree*.

Statistical Analyses

Given the nested structure of our data (i.e., students were nested within classrooms), we examined whether multilevel modeling was necessary by calculating intraclass correlations (ICCs) and design effects (see Table 1). Variables with a significant ICC and a design effect above 2 indicated that there was variance within students' scores that could be explained by differences between classrooms, and controlling for clustering was necessary (Peugh, 2010).

Subsequently, to gain insight in the longitudinal changes in the study variables during the transition from primary to secondary school, we investigated mean-level changes over time. Mean-level changes were investigated using repeated-measures analysis of variance with "measurement wave" as the within-subjects variable. Next, cross-lagged models were separately estimated for behavioral and cognitive engagement. Cross-lagged models were specified using Mplus 8.1 (Muthén & Muthén, 1998-2018). First, we estimated a stability model, which included the autoregressive effects over time and the within-time correlations of each of the variables (Model 1). Second, we estimated a fully reciprocal model, which included the autoregressive effects over time, within-time correlations, and all cross-lagged associations of the variables (Model 2). Subsequently, we compared this model to a more parsimonious model (Model 3) in which stability paths and cross-lagged paths were constrained to be equal over time. In addition, moderation analyses were conducted for risk status and students' sex using multiple group analyses in Mplus. An unconstrained model was compared to a fully constrained model in which stability paths and cross-lagged paths were constrained to be equal across at-risk and non-risk students, and boys and girls. Consistent with prior research (Cheung & Rensvold, 2002; Satorra & Bentler, 2001), models were compared to check whether constraints were justified. When model fit was not significantly worse compared to the baseline

model, reflected in non-significant chi-square values, $\Delta S-B \chi^2(df)$, $p > .050$, and when ΔCFI was smaller than or equal to .01, constraints were justified. Indirect effects and confidence intervals were tested in Mplus using a bootstrap procedure with 1000 bootstrap samples (Lau & Cheung, 2012). Furthermore, in all models we controlled for parental education, sex, and at-risk status by allowing paths to the study variables at grade 6. We used the robust maximum likelihood estimator (MLR) and full information maximum likelihood (FIML, default estimation procedure in Mplus) to handle both non-normally distributed and missing data (Muthén & Muthén, 1998-2018). All study variables were normally distributed as skewness ranged between the acceptable limits of -2 and 2 (between -.98 for cognitive engagement in grade 7 and 1.43 for teacher-perceived conflict in grade 7). The clustering of students in classes was taken into account by applying the “complex analysis” option (Williams, 2000). This approach adjusts the standard error estimates for biases resulting from the clustered design of the sample.

The overall model fit was evaluated based on the average Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). CFI values of $\geq .90$, RMSEA values of $< .08$, and SRMR values of $< .08$ were used as cut-off criteria for good model fit (Kline, 2005). Signs for model misspecification were checked by inspecting the values of standardized residuals (values above 1.96) and modification indices (values above 3.84) (Schreiber, Nora, Stage, Barlow, & King, 2006).

Results

Missing Data Analyses

Of the participants, two had missing data in grade 6 (0.6%), 30 in grade 7 (8.5%), and 34 in grade 9 (9.6%). The missing data ranged between 0% (for achievement in grade 6) and 29.8% (for conflict in grade 6) in the study variables. Data were not missing completely at random, but missing at random as indicated by Little’s MCAR test (normed chi-square below

2, i.e., $544/479 = 1.14$), $\chi^2(479) = 544.00$, $p = .021$. Post-hoc comparisons with one-way ANOVAs using Bonferroni correction indicated that students who had missed one wave of data collection had significantly lower achievement in grade 6 compared to students who had no missing data: $M_{\text{difference}} = .50$, $F(2, 353) = 5.63$, $p = .004$; $d = 0.24$. Students who missed one wave also had significantly higher levels of teacher-student conflict in grade 9 compared to students with no missing data: $M_{\text{difference}} = .62$, $F(2, 285) = 3.40$, $p < .035$; $d = .26$.

Confirmatory Factor Analyses

Confirmatory factor analyses were performed to investigate the presumed factorial structure of main variables and are presented in Table 1. All confirmatory factor analyses met the model fit criteria, indicating that all study variables revealed the presumed factorial structure. The standardized factor loadings were all significant and with an average loading over the three waves of .62 for behavioral engagement (.57, .59, .69, respectively), .62 for cognitive engagement (.59, .66, .61, respectively), .65 for student burnout (.64, .67, .65, respectively), and .73 for teacher conflict (.73 for all waves).

Descriptive Analyses and Mean-Level Changes

Descriptive statistics, intraclass correlations and design effects of the study variables are presented in Table 2. As Table 3 shows, correlations indicated moderate to large cross-year stability of the study variables: between $r = .31$ for conflict and $r = .75$ for achievement; $p < .010$ (Cohen, 1988). Concurrent and longitudinal correlations revealed that students' behavioral engagement ($r_s = -.17$ to $-.58$, $p < .010$) and cognitive engagement ($r_s = -.17$ to $-.54$, $p < .010$) were negatively correlated with students' burnout. Furthermore, students' engagement was moderately positively associated with achievement ($r_s = .16$ to $.27$ for behavioral engagement and $r_s = .19$ to $.31$ for cognitive engagement, $p < .010$) and negatively with teacher-student conflict ($r_s = -.16$ to $-.32$ for behavioral engagement and $r_s = -.13$ to $-.25$ for cognitive engagement, $p < .050$). Correlations also revealed that as students move through the school years, sex plays a more important role in students' engagement, burnout, and teacher-

student conflict. For instance, boys scored lower for burnout in grade 9, but not in grades 6 or 7. In addition, higher levels of parental education were positively associated with engagement ($r_s = .19$ to $.27$ for behavioral engagement and $r_s = .16$ to $.25$ for cognitive engagement, $p < .010$) and achievement ($r_s = .29$ to $.30$, $p < .010$) and were negatively associated with burnout ($r = -.12$ to $-.20$, $p < .050$) and teacher-student conflict ($r = -.14$ to $-.16$, $p < .050$).

In order to investigate mean-level changes in the engagement, burnout, and conflict, we conducted repeated-measures analysis of variance with “measurement wave” as the within-subjects variable. Mauchly’s test was significant at $p < .050$ for behavioral engagement ($\epsilon = .93$, $p < .001$), cognitive engagement ($\epsilon = .98$, $p = .041$), burnout ($\epsilon = .98$, $p = .027$), and conflict ($\epsilon = .93$, $p = .003$), thus indicating that the assumption of sphericity was violated, which could have resulted in an increase in Type I error. To overcome this violation, we used the Greenhouse-Geisser correction, which lowers the degrees of freedom in order to produce a more accurate p -value and thus makes the F -values more conservative (Field, 2009). We found no significant mean-level changes over time in behavioral engagement, $F(1.86, 561.97) = 2.23$, $p = .112$, $\eta^2 = .007$, and conflict, $F(1.86, 285.09) = 1.42$, $p = .243$, $\eta^2 = .009$. Although considered to be a small effect, mean levels did change significantly for cognitive engagement, $F(1.96, 585.57) = 3.15$, $p = .045$, $\eta^2 = .010$. Students in grade 6 reported, on average, lower levels of cognitive engagement ($M = 3.26$, $SD = .45$) compared to grades 7 ($M = 3.30$, $SD = .48$) and 9 ($M = 3.32$, $SD = .44$). We also found modest significant mean-level changes in burnout, $F(1.95, 580.06) = 9.38$, $p < .001$, $\eta^2 = .031$. In grade 6, students reported, on average, lower levels of burnout ($M = 2.15$, $SD = .80$) compared to grades 7 ($M = 2.21$, $SD = .81$) and 9 ($M = 2.37$, $SD = .87$).

Cross-Lagged Analyses

As can be seen in Table 4, model fit criteria of the stability model, reciprocal unconstrained, reciprocal fully constrained, and final model were met. Model fit improved

significantly by adding reciprocal paths (Model 2) to the stability model (Model 1). Yet, by constraining the stability and reciprocal paths over time (Model 3) model fit decreased significantly, $\Delta\text{S-B } \chi^2(30) = 90.39, p < .001$, which indicates that constraints were not justified. More stringent testing revealed that all stability and cross-lagged paths could be constrained to be equal over time, except for three stability paths and three cross-lagged paths (Model 4). More specifically, the stability paths of behavioral and cognitive engagement, and achievement between grade 6 and 9 could not be constrained. In addition, the cross-lagged paths from cognitive engagement to behavioral engagement, from student burnout to behavioral engagement, and from cognitive engagement to achievement were different at each time point. This model was selected as the final model, $\chi^2(74) = 152.86, p < .001$; CFI = .95; RMSEA = .06; SRMR = .05 (see Figure 1). Although standardized residuals and modification indices suggested to include additional effects of gender on behavioral engagement, burnout, and conflict in the other grades as well, we decided not to include them because of model simplicity. Compared to the stability model, the final model explained between 10-11% of additional variance in behavioral engagement, 8-12% in cognitive engagement, 0-1% achievement, and 1-3% in teacher conflict, but between 4-8% less variance in burnout.

In line with hypothesis 1, results revealed a bi-directional association between behavioral and cognitive engagement over time. Higher levels of behavioral engagement were associated with higher levels of cognitive engagement, and vice versa. In contrast to hypothesis 2a, students' behavioral and cognitive engagement were not longitudinally related to their achievement. Yet, higher levels of achievement were associated with higher levels of cognitive engagement one or two school years later. Furthermore, results showed no effect from students' behavioral and cognitive engagement to teacher conflict (hypothesis 2b). However, we did find that more conflict in the teacher-student relationship related to less behavioral engagement one or two years later (partially supporting hypothesis 2b). In contrast to our expectations, higher

levels of burnout were not associated with less behavioral and cognitive engagement (hypothesis 3a), lower achievement levels (hypothesis 3b), or more teacher-student conflict over time (hypothesis 3c). In addition, higher teacher conflict was also not related to lower achievement on a standardized test (hypothesis 4).

In addition, we found an indirect effect from behavioral engagement in grade 6 to behavioral engagement in grade 9 through students' cognitive engagement in grade 7, $\beta = .02$, $p = .038$. The effect from cognitive engagement in grade 6 to cognitive engagement in grade 9, through behavioral engagement in grade 7 was also significant, $\beta = .03$, $p = .010$. The effect from achievement in grade 6 to behavioral engagement in grade 9, through cognitive engagement in grade 7 was not significant, $\beta = .01$, $p = .119$. The indirect effect from conflict in grade 6 to cognitive engagement in grade 9, through students' behavioral engagement in grade 7 was also not significant, $\beta = -.02$, $p = .067$.

Regarding the control variables, we found higher levels of teacher-student conflict in grade 6 among boys, $\beta = .30$, $p < .001$. Furthermore, students at-risk for learning difficulties reported higher levels of burnout, $\beta = .12$, $p = .026$, and had lower scores on a standardized achievement test, $\beta = -.27$, $p < .001$, compared to students not at risk. Also, higher levels of parental education were related to higher levels of behavioral, $\beta = .19$, $p < .001$, and cognitive engagement, $\beta = .24$, $p < .001$, and achievement, $\beta = .25$, $p < .001$, and lower levels of burnout, $\beta = -.16$, $p = .010$, and teacher-student conflict, $\beta = -.15$, $p = .023$.

Moderation by Risk Status.

Follow-up moderation analyses were conducted to investigate whether at-risk and non-risk students differed in their cross-lagged associations between engagement, burnout, achievement, and teacher conflict. The unconstrained model differed significantly from the fully constrained model, indicating moderation by at-risk status, $\Delta S-B \chi^2(85) = 169.09$, $p < .001$. More stringent testing revealed that all stability and cross-lagged paths were allowed to

be constrained, except for four stability paths and one cross-lagged path, $\Delta S-B \chi^2(75) = 95.69$, $p = .054$. First, at-risk and non-risk students differed in the stability path of achievement between grades 7 and 9. For non-risk students, achievement was much more stable between grades 7 and 9 than for at-risk students ($\beta_{\text{non-risk}} = .57$, $p < .001$ versus $\beta_{\text{risk}} = .43$, $p < .001$). Second, stability paths between grades 6 and 9 were different for non-risk and at-risk students with respect to behavioral engagement ($\beta_{\text{non-risk}} = .07$, $p = .247$ versus $\beta_{\text{risk}} = .04$, $p = .464$), cognitive engagement ($\beta_{\text{non-risk}} = .03$, $p = .676$ versus $\beta_{\text{risk}} = .10$, $p = .128$) and achievement ($\beta_{\text{non-risk}} = .28$, $p < .001$ versus $\beta_{\text{risk}} = .40$, $p < .001$). Third, for at-risk students cognitive engagement in grade 6 was positively associated with achievement in grade 7 ($\beta_{\text{risk}} = .20$, $p = .002$), whereas this path was non-significant for non-risk students ($\beta_{\text{non-risk}} = -.04$, $p = .581$). This denotes that only for at-risk students the higher their level of cognitive engagement, the better their achievement on a standardized test one year later.

Moderation by Sex.

Differences between boys and girls in their cross-lagged associations between engagement, burnout, achievement, and teacher conflict were also explored. The unconstrained model differed significantly from the fully constrained model, suggesting moderation by at-risk status, $\Delta S-B \chi^2(85) = 198.21$, $p < .001$. More stringent testing revealed that all stability and cross-lagged paths were allowed to be constrained, except for four stability paths and one cross-lagged path, $\Delta S-B \chi^2(67) = 84.19$, $p = .076$. First, we found minor differences between boys and girls in the stability paths of behavioral engagement (grade 6 to 7: $\beta_{\text{boys}} = .48$, $p < .001$ versus $\beta_{\text{girls}} = .47$, $p < .001$; grade 7 to 9: $\beta_{\text{boys}} = .49$, $p < .001$ versus $\beta_{\text{girls}} = .40$, $p < .001$; grade 6 to 9: $\beta_{\text{boys}} = .09$, $p = .101$ versus $\beta_{\text{girls}} = .11$, $p = .157$) and achievement (grade 6 to 9: $\beta_{\text{boys}} = .33$, $p < .001$ versus $\beta_{\text{girls}} = .26$, $p < .001$). Somewhat larger differences were found for cognitive engagement (grade 6 to 7: $\beta_{\text{boys}} = .38$, $p < .001$ versus $\beta_{\text{girls}} = .53$, $p < .001$; grade 7 to 9: $\beta_{\text{boys}} = .22$, $p = .097$ versus $\beta_{\text{girls}} = .73$, $p < .001$; grade 6 to 9: $\beta_{\text{boys}} = .08$, $p = .279$ versus $\beta_{\text{girls}} = -.01$, p

= .895) and conflict (grade 6 to 7: $\beta_{\text{boys}} = .31, p = .004$ versus $\beta_{\text{girls}} = -.04, p = .660$; grade 6 to 9: $\beta_{\text{boys}} = .11, p = .229$ versus $\beta_{\text{girls}} = .10, p = .169$). This suggests that girls generally reported more stable levels cognitive engagement compared to boys, whereas boys had, on average, more stable levels of teacher conflict. Third, we found that only for boys more behavioral engagement in grade 7 related to more cognitive engagement in grade 9, whereas this association was non-significant and negative for girls ($\beta_{\text{boys}} = .36, p < .001$ versus $\beta_{\text{girls}} = -.12, p = .083$).

Discussion

This study investigated several indicators of students' academic and emotional adjustment during the transition from primary to secondary school. By doing so, it attempts to shed light on how students' engagement, achievement, burnout, and teacher-student conflict evolve together during the transition from primary (i.e., grade 6) and lower secondary school (i.e., grade 7 and 9).

First, in line with our expectations (hypothesis 1), students' behavioral and cognitive engagement were bi-directionally associated over time. This suggests that the more students' are behaviorally involved in school and learning activities, the more they believe that their schoolwork is important and relevant for their personal goals and future aspirations. In turn, the more students believe that their schoolwork is relevant, the higher their active participation during class. In line with prior research (Skinner et al., 2008), these findings highlight the interrelated nature of engagement dimensions.

In our comprehensive cross-lagged models, we found no evidence that students' behavioral and cognitive engagement related to higher levels of achievement across time. However, higher levels of achievement predicted more cognitive engagement one or two years later, which provides partial support for hypothesis 2a. These findings suggest that the more students thrive in school academically, the more successful they feel, which, in turn, may

increase the importance they attach to their schoolwork (Li et al., 2017; Salmela-Aro & Upadaya, 2012). Thus, in contrast to behavioral engagement, higher achievement promoted higher cognitive engagement one and two years later, revealing different associations for both engagement dimensions and highlighting the importance of distinguishing among the different aspects of school engagement.

Partially supporting hypothesis 2b, we found that more conflict in the teacher-student relationship related to less behavioral engagement one or two years later. This study yields fairly clear conclusions regarding the direction of effects with relationships shaping students' behavioral engagement, and not vice versa, which has also been found in prior research in two different age groups (Engels et al., 2016; Weyns et al., 2017). Consequently, the results highlight the crucial role of relationship quality for students' behavioral investment in school. In addition, our study extends the uni-directional effects found in other studies that have used student reports (Weyns et al., 2017) and peer reports (Engels et al., 2016) to teacher reports. To date, prior research on the association between cognitive engagement and teacher conflict has been scarce. Our study found no support for such association. One reason for this could be that cognitive engagement has been generally considered to be a more internal and less visible form of engagement (Appleton et al., 2006), and therefore less subjective to contextual affordances compared to students' behavioral engagement. Also prior research on early adolescence has predominantly focused on the role of positive teacher-student relationships (such as teacher support) in relation to students' cognitive engagement; as a result, the mechanisms and correlates involved could be different for teacher support and conflict.

The bivariate relations between burnout and both dimensions of engagement were significantly moderate with more engagement relating to lower burnout. However, in a comprehensive model controlling for both engagement dimensions, we found no significant interrelations over time (hypothesis 3a). This finding suggests that, even when students feel

overwhelmed and exhausted by their study demands, these feelings do not lower their later preparation for and investment in their schoolwork during their early secondary school years. Given the finding that students' burnout levels typically increase during the course of their school years, it could be that by the end of comprehensive school and the start of post-comprehensive education, students' burnout levels may have accumulated to an extent that their burnout also affects their engagement levels, as Salmela-Aro and Upadyaya (2014) found. The finding that burnout was not related to engagement (in line with Salmela-Aro & Upadyaya, 2014), teacher conflict, or achievement in a comprehensive model, tells us that high levels of engagement, conflict, and achievement are not a unique risk factor for students' burnout, but nor are they a protective factor. Our study calls for future research in order to unravel risk and protective factors associated with students' burnout, for instance, by investigating the misfit between students' demands and resources (Salmela-Aro & Upadyaya, 2014).

Despite a lack of clear empirical evidence, we tentatively expected a bi-directional association between burnout and achievement (hypothesis 3b). Although the bivariate associations confirmed that lower achievement related to higher burnout levels, we found no support for these associations in our cross-lagged model. It is also possible that certain aspects of students' academic lives other than academic achievement are more important for their levels of burnout, such as work load and lack of control (Yang, 2004). Moreover, as recent studies have shown, students can be engaged and exhausted at the same time yet still obtain relatively high achievement levels (Mägi et al., 2013; Tuominen-Soini & Salmela-Aro, 2014).

We also hypothesized that higher levels of burnout would be related to higher levels of teacher conflict and vice versa (hypothesis 3c), but we found no empirical support for this hypothesis. At least three explanations could contextualize this null finding. First, previous research on the association between burnout and teacher conflict has predominantly focused on social support from family, friends, and school and not specifically on teachers (Karimi et al.,

2014; Salmela-Aro et al., 2008). This suggests that different social relationships play differential roles in students' burnout. Second, it could be that negative aspects of social relationships, such as conflict, do not worsen students' burnout, but that only positive aspects of social relationships, such as support, help to reduce students' feelings of burnout. This notion provides further evidence that correlates of teacher support and conflict are not necessarily the same. Third, our study focused on exhaustion due to study demands; for this reason, the students' burnout may have been more affected by their study demands and work load (Yang, 2004).

Contrary to our expectations, we also found no evidence that students' achievement shapes teacher-rated conflict or vice versa (hypothesis 4). One possible explanation for this finding could be our operationalization of achievement, as we used standardized test scores instead of the teacher-rated grades that most previous researchers have used. Because standardized test scores are more objective compared to subjective evaluations by the teacher, the association between achievement and teacher-student relationships could have been inflated in previous research (Roorda et al., 2011).

In line with prior research, we found higher levels of conflict in the teacher-student relationship in grade 6 among boys (Spilt et al., 2012). Also, students at-risk for learning difficulties reported higher levels of burnout and had lower scores on the standardized achievement test compared to the other students in grade 6. Further, as expected higher levels of parental education were associated with more behavioral and cognitive engagement, and achievement (Archambault et al., 2009; Sirin, 2005). Higher levels of parental education were also related to lower levels of student' burnout (Salmela-Aro et al., 2008) and teacher-student conflict (e.g., Roorda et al., 2011).

Furthermore, we found some support for differences between at-risk and non-risk students in the transactional associations of engagement, burnout, achievement, and teacher

conflict. First, results showed that for non-risk students, achievement between grades 7 and 9 was much more stable than for at-risk students, indicating that the academic performance of non-risk students might be less dependent on changes in the school context compared to at-risk students. This idea aligns with the risk and resilience perspective, which stresses that the academic and emotional development of certain at-risk students may be more contingent on contextual affordances (Motti-Stefanidi & Masten, 2017). Second, we found that only for at-risk students cognitive engagement in grade 6 was positively related to achievement in grade 7. This seems to suggest that higher levels of cognitive engagement may be a protective factor for at-risk students in stimulating academic achievement (Finn & Zimmer, 2012). Furthermore, we found some evidence for differences between boys and girls in the longitudinal associations of the study variables. For instance, we found that girls reported, on average, more stable levels of cognitive engagement compared to boys, whereas boys generally had more stable levels of teacher conflict. This suggests that boys' level of cognitive engagement is more likely to be subjective to contextual changes, which is in line with the risk and resilience perspective (Motti-Stefanidi & Masten, 2017). Also, even though the school context and the teachers changed between grade 6 and 7, boys were more likely to continue negative and conflictual relationships with their teachers. Furthermore, only for boys more behavioral engagement in grade 7 was related to more cognitive engagement in grade 9, which indicates that stimulating boys' behavioral engagement could serve as a way to increase their cognitive engagement.

With respect to mean-level changes in the study variables, we found, consistent with prior research (e.g., Finn & Zimmer, 2012; Salmela-Aro et al., 2016b) that across grades 6-9, students reported increasing levels of cognitive engagement and burnout. This finding fits within the idea that the ability to become cognitively engaged in school depends more on cognitive maturation (Mahatmya et al., 2012) as well as with stage-environment fit theory (Eccles et al., 1993), thus stressing that the difference between adolescents' developmental

needs and their school environment (i.e., one that is more competitive and more focused on grades) could increase the risk for students' burnout (Salmela-Aro, 2017). In this study, however, we found no mean-level changes in behavioral engagement or teacher-student conflict as suggested by prior research (Engels et al., 2017; Hughes & Cao, 2018; Wang & Eccles, 2012b). Specifically for behavioral engagement, it could be that the high levels of achievement of Finnish students compared to students from other OECD countries (OECD, 2013) could also require sufficient behavioral engagement in order for the students to reach high achievement. Also, students' behavioral engagement in school, such as by doing homework, might be less dependent on cognitive maturation compared to students' cognitive engagement, such as envisioning future goals. Furthermore, for conflict, we used individual ratings by teachers, which means that, in most cases, each school year different teachers rated their relationship with a particular student. Changes in conflict could be visible when students have the same teacher for subsequent school years, as is the case in Finnish primary school (Pakarinen et al., 2017).

Conclusions

In summary, this study revealed that students' academic and emotional adjustment during their transition from primary to secondary school is predominantly driven by their teacher-student relationship and achievement in school. Specifically, the extent to which students are behaviorally invested in school (i.e., paying attention and preparing for class) was consistently affected by the level of conflict in their relationship with the teacher. Furthermore, the more students believed that school was important and relevant to their personal goals and future aspirations was affected by their achievement. These findings highlight the importance of distinguishing between the different engagement dimensions, as they seem to have different correlates. Moreover, we found evidence for the interrelated nature of students' behavioral and cognitive engagement during the transition from primary to secondary education. In addition, we found support for differences between at-risk and non-risk students, and boys and girls. This

study has shown that, even though the school context and the teachers changed between grades 6, 7, and 9, students' prior levels of engagement, teacher conflict, and achievement could affect their academic and emotional adjustment one or two years later. The results underscore that, despite the interrelatedness of behavioral and cognitive engagement during the transition from primary to secondary school, both show unique contextual and personal correlates.

Limitations and Future Directions

Several limitations need to be taken into account when interpreting and generalizing these findings. First, this study was conducted in Finland, which has an educational system and context that differs from those of most other countries. For instance, lower secondary school in Finland is not characterized by academic tracking, which might be beneficial for students' educational development, as academic tracking has been shown to limit the quality of students' instructional opportunities, decrease students' perceptions of their abilities, and negatively affect their achievement, particularly for students in lower tracks (Cappella & Weinstein, 2001; Werblow, Urick, & Duesbery, 2013). Furthermore, teaching in Finland is also a particularly respected profession, and entrance to teacher-training programs is highly competitive, including very selective entrance interviews and tasks for candidates. Consequently, only those who are especially motivated and academically successful are able to obtain the required master's degree. In turn, the high quality of the teachers might be reflected in their students' engagement, achievement, and lack of burnout and the quality of the teacher-student relationship. However, a possible difference in mean-levels of these constructs does not necessarily imply a difference in their interrelations over time. In line with this thinking, prior research has shown similar associations between engagement and burnout in both Finland and the US, two countries with different educational contexts (Salmela-Aro, Moeller, Schneider, Spicer, & Lavonen, 2016a; Virtanen et al., 2016).

Second, the sub-sample we used in this study included only a few students per classroom who received teacher ratings of conflict. Although we did not find significant mean-level

differences in the study variables between students who received teacher ratings and students who did not receive these ratings, we encourage future researchers to include all students in the classroom when examining the associations between student engagement, achievement, and burnout and the teacher-student relationship. In addition, burnout in our study was measured by using only the exhaustion sub-scale, which thus excluded students' feelings of scholastic inadequacy and their cynicism towards school. We suggest that future researchers should incorporate all burnout dimensions, together or separately, as doing so may provide a more complete and nuanced depiction of student burnout. Also, our operationalization of socioeconomic status as parents' educational level could be considered as a somewhat restricted measure of socioeconomic status, which also comprises information on family income and occupational status (Sirin, 2005). Furthermore, there is a fair amount of overlap between our conceptualization of cognitive engagement as the extent to which students perceive control regarding their schoolwork in general and believe that their schoolwork is relevant to their personal goals and future endeavors, and the constructs of utility and attainment value of the expectancy-value theory (Eccles & Wang, 2012). Therefore, other conceptualizations of cognitive engagement, such as self-regulation skills or strategy use, might provide additional insights and a more complementary picture of the role of cognitive engagement in students' burnout, achievement, and relationships with their teacher. Also, our sample included a fairly high proportion of students who were at risk for learning difficulties compared to what might be expected in the general population, which confines the generalizability of our findings to the general population.

Third, most of the teachers in our sample were female, which could have affected the results. From prior research we know that students might have different relationships with female teachers compared to male teachers (Spilt et al., 2012). For instance, female teachers reported, on average, better relationships (i.e., closer, less conflictual, and less dependent) with

students than male teachers. Specifically, both male and female teachers reported more conflicts in their relationship with boys compared to girls, which suggests that conflict in the teacher-student relationship might be more pronounced among boys, thus potentially hampering their achievement. Future researchers should thus examine the role of teachers' sex in the relation between conflict and educational outcomes.

Finally, we suggest future research and analyses to investigate other dimensions of school engagement and teacher-student relationships, such as the role of students' emotional engagement in school (i.e., the degree to which students feel enjoyment, fun, interested during learning activities) and teacher-student closeness or dependency in order to gain a more complete understanding of students' academic and emotional adjustment to school. Also, future research could examine the role of students' intellectual investment traits, such as their typical intellectual engagement (Ackerman & Goff, 1994; Goff & Ackerman, 1992). Typical intellectual engagement refers to students' involvement in intellectual activities, such as learning tasks, his or her interest in and need for a profound understanding of complex issues (i.e., need for cognition). It has been suggested that higher levels of typical intellectual engagement relate to higher levels of achievement (Schroeders, Schipolowski, & Böhme, 2015). However, in their study Schroeders, Schipolowski, and Böhme (2015) found that the association between typical intellectual engagement and achievement disappeared when they accounted for students' fluid intelligence. Therefore, future research should consider taking the role of students' cognitive abilities into account, as this has been considered as one of the most powerful predictors of school success (Gagné & St. Père, 2001; Jögi, Kikas, Lerkkanen, & Mägi, 2015).

Practical Implications

The results of this study have several practical implications. First, our study revealed the interrelated nature of students' behavioral and cognitive engagement over time, implying that educational practitioners should aim for high engagement levels, as they can reinforce each

other and were not considered a risk nor protective factor for students' burnout. Second, because our results indicated that teacher conflict hampered students' behavioral engagement in school, teachers should strive for positive and non-conflictual relationships with their students both in primary and secondary school, and especially with boys. Thus, this study adds to the accumulating evidence that social relationships with teachers shape engagement, also during the transition from primary to secondary education. Third, as achievement was found to promote students' cognitive engagement, school practitioners could create situations in which students thrive in school academically, as this may increase their feelings of efficacy and their cognitive engagement in school (Li et al., 2017; Salmela-Aro & Upadaya, 2012). Fourth, among risk students, cognitive engagement was related to higher achievement, and could therefore be considered as a protective factor in the school transition from primary to secondary education. As a result, school practitioners should aim to promote high levels of cognitive engagement among at-risk students.

Acknowledgements

This project was funded by the Academy of Finland (Grant number 252 304 for 2006–2011; Grant number 263 891 for 2013–2015, Grant number 268 586 for 2014–2017; Grant number, 277 299 for 2015–2017), the Finnish Cultural Foundation (2014–2016), and FWO (Research Fund—Flanders; Grant number G.0728.14).

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Tables

Table 1

Model Fit Indices of the Confirmatory Factor Analyses

	χ^2	<i>df</i>	<i>p</i> -value	CFI	RMSEA	SRMR
Behavioral Engagement						
Grade 6	18.43	5	.003	.92	.09	.04
Grade 7	11.93	4 ¹	.018	.96	.08	.03
Grade 9	19.89	5	.001	.96	.10	.04
Cognitive Engagement						
Grade 6	14.21	8	.076	.98	.05	.04
Grade 7	21.23	8	.007	.97	.07	.04
Grade 9	28.21	8	.001	.95	.09	.04
Student Burnout						
Grade 6	3.19	2	.203	.99	.04	.02
Grade 7	1.12	2	.570	1.00	.00	.01
Grade 9	11.75	2	.003	.97	.13	.03
Teacher Conflict						
Grade 6	56.51	20	.001	.94	.09	.04
Grade 7	57.14	20	.001	.94	.09	.03
Grade 9	70.84	20	.001	.94	.09	.04

Note. ¹ Including an error correlation between item 2 (“I don't try very hard in school”) and item 4 (“I often come to class unprepared”).

Table 2

Descriptive Statistics, Intraclass Correlations, and Design Effects

Variable	<i>N</i>	Mean(<i>SD</i>)	Min.	Max.	<i>ICC</i> ^d	Between-variance (S.E.)	Within-variance (S.E.)	Design effect
Behavioral Engagement Grade 6	354	3.14(.45)	1	4	.02	.02(.05)	.94(.10)*	1.03
Behavioral Engagement Grade 7	322	3.12(.47)	1	4	.07	.07(.06)	.90(.09)*	1.10
Behavioral Engagement Grade 9	322	3.09(.54)	1	4	.12	.12(.07)	.89(.10)*	1.16
Cognitive Engagement Grade 6	351	3.25(.47)	1	4	.01	.01(.05)	.97(.09)*	1.02
Cognitive Engagement Grade 7	321	3.29(.48)	1	4	.03	.03(.06)	.99(.14)*	1.04
Cognitive Engagement Grade 9	322	3.32(.44)	1	4	.10	.10(.05)	.92(.12)*	1.14
Student Burnout Grade 6	351	2.19(.84)	1	5	.04	.04(.05)	.93(.09)*	1.07
Student Burnout Grade 7	323	2.21(.80)	1	5	.01	.01(.07)	.99(.10)*	1.02
Student Burnout Grade 9	318	2.40(.87)	1	5	.04	.04(.04)	.93(.10)*	1.05
Achievement Grade 6	-	-	-	-	.07	.09(.07)	.94(.10)*	1.12
Reading	356	7.15(2.57)	0	12	-	-	-	-
Math	354	15.80(3.70)	0	28	-	-	-	-
Achievement Grade 7	-	-	-	-	.10	.12(.07)	.90(.09)*	1.15
Reading	334	6.57(2.51)	0	12	-	-	-	-
Math	331	13.42(3.68)	0	28	-	-	-	-
Achievement Grade 9	-	-	-	-	.10	10(.06)	.88(.08)*	1.13
Reading	325	6.98(2.42)	0	12	-	-	-	-
Math	322	14.54(3.80)	0	28	-	-	-	-
Teacher Conflict Grade 6	250	1.75(.76)	1	5	.24*	.25(.08)*	.78(.11)*	1.42
Teacher Conflict Grade 7	278	1.70(.72)	1	5	.23*	.24(.07)*	.78(.13)*	1.39

Teacher Conflict Grade 9	288	1.72(.63)	1	5	.22*	.21(.07)*	.72(.13)*	1.31
Sex ^a Grade 6	356	.57(.50)	0	1	.02	.00(.01)	.24(.01)*	1.03
Sex Grade 7	-	-	-	-	.01	.00(.02)	.24(.01)*	1.02
Sex Grade 9	-	-	-	-	.01	.00(.02)	.24(.01)*	1.01
Parental Education ^b Grade 6	335	4.51(1.43)	1	7	.22*	.22(.07)*	.76(.08)*	1.34
Parental Education Grade 7	-	-	-	-	.26*	.25(.08)*	.73(.08)*	1.36
Parental Education Grade 9	-	-	-	-	.29*	.29(.08)*	.70(.09)*	1.37
Risk Status ^c Grade 6	328	.46(0.50)	0	1	.004	.001(.01)	.25(.01)*	1.01
Risk Status Grade 7	-	-	-	-	.05	.01(.02)	.24(.01)*	1.08
Risk Status Grade 9	-	-	-	-	.02	.01(.01)	.24(.01)*	1.03

Note. Two-tailed testing of significance. ^aGirl = 0; boy = 1. ^bAverage parental educational level with 1 = no vocational education and 7 = licentiate or doctoral degree. ^cNon-risk=0; at-risk=1. ^d6th grade classroom IDs were used for 6th grade variables, 7th for 7th grade variables, and 8th for 8th grade variables. * $p < .050$.

Table 3

Bivariate Correlations Between Engagement, Burnout, Achievement, Conflict, Sex, Parental Education, and Risk Status

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1. Behavioral Engagement Grade 6	1																		
2. Behavioral Engagement Grade 7	.55*	1																	
3. Behavioral Engagement Grade 9	.43*	.61*	1																
4. Cognitive Engagement Grade 6	.68*	.52*	.35*	1															
5. Cognitive Engagement Grade 7	.42*	.62*	.43*	.56*	1														
6. Cognitive Engagement Grade 9	.35*	.50*	.63*	.40*	.55*	1													
7. Student Burnout Grade 6	-.58*	-.37*	-.24*	-.54*	-.34*	-.26*	1												
8. Student Burnout Grade 7	-.26*	-.27*	-.17*	-.26*	-.29*	-.25*	.42*	1											
9. Student Burnout Grade 9	-.20*	-.27*	-.34*	-.17*	-.24*	-.35*	.33*	.35*	1										
10. Achievement Grade 6	.27*	.19*	.16*	.27*	.19*	.21*	-.22*	-.11	-.08	1									
11. Achievement Grade 7	.27*	.26*	.19*	.31*	.28*	.31*	-.25*	-.22*	-.18*	.65*	1								
12. Achievement Grade 9	.23*	.25*	.22*	.23*	.19*	.21*	-.16*	-.15*	-.10	.68*	.75*	1							
13. Teacher Conflict Grade 6	-.25*	-.18*	-.21*	-.25*	-.13*	-.14*	.17*	.08	-.06	-.22*	-.20*	-.26*	1						
14. Teacher Conflict Grade 7	-.26*	-.18*	-.29*	-.16*	-.13*	-.12	.19*	.11	.05	-.07	-.16*	-.19*	.31*	1					
15. Teacher Conflict Grade 9	-.17*	-.16*	-.32*	-.08	-.14*	-.23*	.05	.07	.17*	-.14*	-.12*	-.16*	.27*	.48*	1				
16. Sex ^a	-.12*	-.17*	-.31*	-.04	-.14*	-.20*	.01	-.10	-.15*	-.08	-.09	-.10	.31*	.31*	.21*	1			
17. Parental Education ^b	.19*	.19*	.27*	.25*	.16*	.25*	-.20*	-.09	-.12*	.30*	.29*	.30*	-.14*	-.06	-.16*	.02	1		
18. Risk Status ^c	-.09	-.10	-.10	-.12*	-.06	-.12*	.14*	.14*	.09	-.34*	-.34*	-.33*	.08	.12	.02	.17*	-.18*	1	

Note. Two-tailed testing of significance. ^aGirl = 0; boy = 1. ^bAverage parental educational level with 1 = no vocational education and 7 = licentiate or doctoral degree. ^cNon-risk = 0; risk = 1. * $p < .05$.

Table 4

Model Fit Indices of the Cross-Lagged and Moderation Analyses

	χ^2	df	p-	CFIRMSE	ASRM	MRComparison	Δ S-B	Δ df	p-	Δ CFI	
	value		value				χ^2	value			
M1: Stability model	225.13	90	.000	.92	.07	.08	-	-	-	-	
M2: Reciprocal unconstrained	124.78	50	.000	.96	.07	.04	M1 vs. M2	100.33	40	.000	.04
M3: Reciprocal fully constrained	216.62	80	.000	.92	.07	.06	M2 vs. M3	90.39	30	.000	.04
M4: Final	152.86	74	.000	.95	.06	.05	M2 vs. M4	34.00	26	.135	.01
<i>Moderation by risk status</i>											
M1: Unconstrained	144.45	80	.000	.96	.07	.05	-	-	-	-	
M2: Fully constrained	313.92	165	.000	.91	.07	.08	M1 vs. M2	169.09	85	.000	.05
M3: Final	239.34	155	.000	.95	.06	.06	M1 vs. M3	95.69	75	.054	.01
<i>Moderation by sex</i>											
M1: Unconstrained	94.96	80	.121	.99	.03	.04	-	-	-	-	
M2: Fully constrained	296.02	165	.000	.92	.07	.08	M1 vs. M2	198.21	85	.000	.07
M3: Final	179.34	147	.036	.98	.04	.06	M1 vs. M3	84.19	67	.076	.01

Figures

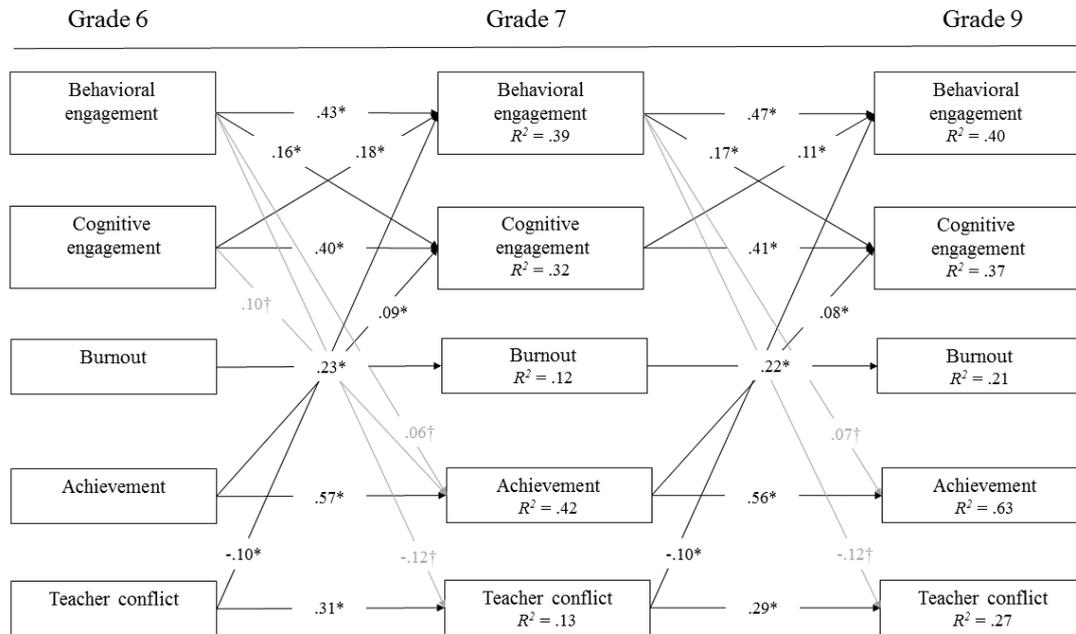


Figure 1. Cross-Lagged Model of School Engagement, Burnout, Achievement, and Teacher Conflict.

Note. Significant standardized estimates are presented. Sex, parental education, and risk status were included as covariates for each variable at grade 6. * $p < .050$. † $p < .100$.