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Student–Teacher Relationships and Students’ Externalizing and Internalizing Behaviors: A Cross-Lagged Study in Secondary Education

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The present study examined reciprocal influences between student–teacher relationship quality and students’ externalizing and internalizing behaviors in secondary education. Our sample included 1,219 secondary school students (49.1% boys; $M_{\text{age}} = 13.53$, $SD = 1.77$) from seventh, eighth, tenth, and eleventh grade. Students reported about their externalizing and internalizing behaviors and the quality of the relationships (closeness, conflict) with their Dutch and math teachers at three occasions within one school year. Cross-lagged path models showed positive reciprocal associations between conflict with the math teacher and externalizing behavior over time. For the Dutch teacher, externalizing behavior positively predicted conflict over time, but not the other way around. Externalizing behavior also negatively predicted closeness with both teachers over time.

Since the introduction of inclusive education, more students with externalizing and internalizing problem behaviors are nowadays in regular secondary schools. Secondary school teachers, however, often do not feel capable to deal with such students’ behaviors adequately and also tend to feel that their main responsibility is to stimulate students’ learning and not to deal with their problem behaviors (Leraar24, 2019). Furthermore, externalizing and internalizing behaviors in adolescence appear to be associated with later psychiatric disorders, school dropout, lower achievement, and lower engagement with school work (Costello, Egger, & Angold, 2005; McLeod, Uemura, & Rohrman, 2012; Wang & Fredricks, 2014). Therefore, attention for such behaviors in secondary school seems to be warranted. One possible way to decrease students’ externalizing and internalizing behaviors, could be to invest in positive relationships between individual teachers and individual students (dyadic relationships), as previous studies have found that positive, dyadic relationships with teachers are associated with less externalizing and internalizing behaviors (e.g., Lei, Cui, & Chiu, 2016; Pianta & Stuhlman, 2004). On the other hand, there is evidence that students’ externalizing and internalizing behaviors impact

relationship quality as well (e.g., Henricsson & Rydell, 2004; Rudasill, 2011). Moreover, some studies have revealed reciprocal influences between student–teacher relationship quality and students’ externalizing and internalizing behaviors, and even provide evidence for transactional cycles in which relationship quality and students’ behaviors influence and strengthen each other over time (e.g., Roorda, Verschueren, Vancraeyveldt, Van Craeyveldt, & Colpin, 2014; Skalická, Stenseng, & Wichstrøm, 2015). Such findings may be helpful to identify starting points for interventions.

For secondary school students far less information is available about how externalizing and internalizing behaviors are associated with student–teacher relationships than for students in primary school. There is, however, evidence that associations may be age dependent and therefore not directly generalizable to secondary school students (cf. de Jong, Koomen, Jellesma, & Roorda, 2018; Pakarinen et al., 2018). Furthermore, unlike primary students, secondary students usually have different teachers for each subject (i.e., up to 15 different teachers a week in Dutch secondary schools). Secondary students thus have to form and maintain

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relationships with much more different teachers than primary students. Previous research in secondary school, however, often merely focused on the degree of support provided by teachers in general (e.g., de Wit, Karioja, Rye, & Shain, 2011; Frey, Ruchkin, Martin, & Schwab-Stone, 2009; Murberg & Bru, 2009) or on acceptance and rejection by the homeroom teacher (Al-Yagon, 2016). Meanwhile, a few studies have found evidence that secondary school students share qualitatively different relationships with their different teachers (Roorda, Jorgensen, & Koomen, 2019; Wallace, Ye, McHugh, & Chhuon, 2012). Moreover, in another study (Wallace, Ye, & Chhuon, 2012) the correlation between the connection to high school teachers in general and the connection to a specific teacher was only .44. Taken together, these studies suggest that it is important to distinguish between different teachers when examining student-teacher relationship quality in secondary school.

In the present study, we therefore looked at reciprocal associations between students' dyadic relationships with two different teachers and their externalizing and internalizing behaviors. More specifically, we focused on relationships with the Dutch and the math teacher, as secondary students usually see these teachers for somewhat more hours than their other teachers and almost all students in both lower and upper secondary school follow these courses. We did not focus on students' homeroom teachers, as homeroom teachers have the additional task of acting as a supervisor, confidant, and contact person for students and their parents, and, hence, would be less comparable to other teachers. Instead, to enhance the generalizability of our findings, we focused on relationships with two teachers who likely fulfill a comparable role for students.

Theoretical Framework

Studies examining student-teacher relationships as *predictors* of students' externalizing (e.g., aggression, hyperactivity, conduct problems) and internalizing behaviors (e.g., anxiety, social inhibition, psychosomatic complaints, depressive symptoms; Merrell, 1999) have often been based on an extended attachment perspective. According to this perspective, positive student-teacher relationships enable students to feel emotionally secure, which in turn, enables them to adjust to the classroom environment in a healthy way (Pianta, 1999; Thijs & Koomen, 2008; Verschueren & Koomen, 2012). In contrast, if students share negative relationships

with their teachers they will feel less secure and more likely believe that they are not worthy of fair and caring treatment by teachers. Consequently, they may become worrisome and anxious or respond with hostility and aggression to others as well (Doumen, Buyse, Colpin, & Verschueren, 2011). More recently, researchers have argued that the extended attachment perspective also applies to secondary students (Verschueren, 2015) and, hence, secondary school studies have increasingly been inspired by this perspective (e.g., Gehlbach, Brinkworth, & Harris, 2012).

Other theories, like the socialization theory (Bell, 1968; Mejia & Hoglund, 2016), consider student-teacher relationships more as the *outcome* of students' externalizing and internalizing behaviors. Socialization theory argues that students themselves are also active agents of change. According to this view, the degree to which students display externalizing or internalizing behaviors at school or both will determine how teachers interact with them and what kind of relationship they will develop with each other (Bell, 1968; Mejia & Hoglund, 2016).

Finally, based on the developmental systems theory (Pianta, Hamre, & Stuhlman, 2003) and comparable theories, it can be argued that student-teacher relationships and students' externalizing and internalizing behaviors affect each other over time. This theory assumes that student-teacher relationships are dyadic microsystems in which teachers' and students' personal and behavioral characteristics affect how they experience their mutual relationship and vice versa. As such, students' externalizing and internalizing behaviors are viewed as one of the most relevant factors of influence on the relationship but are hypothesized to be impacted by the relationship as well (Pianta et al., 2003). Inspired by such theories, empirical studies have examined student-teacher relationships as either the predictor or outcome of students' externalizing and internalizing behaviors, or have studied how relationships and behaviors impact and perhaps also strengthen each other over time (i.e., reciprocal influences).

Student-Teacher Relationships and Externalizing and Internalizing Behaviors in Primary School

Researchers focusing on primary school students have often investigated student-teacher relationship quality as either the predictor or outcome of students' externalizing and internalizing behaviors. These studies usually distinguished between closeness (the degree of support, warmth, and open communication) and conflict (the degree of

negativity, discordance, and coercion; Verschueren & Koomen, 2012) in the student–teacher relationship. Conflict is considered a negative relationship dimension and shows associations with higher levels of externalizing and internalizing behaviors over time (Henricsson & Rydell, 2004; Jerome, Hamre, & Pianta, 2009; Myers & Morris, 2009). In contrast, closeness is viewed as a positive dimension, which shows negative associations with externalizing and internalizing behaviors, although these are often less strong than for conflict (Baker, 2006; Myers & Morris, 2009; Rudasill, 2011).

Some more recent primary school studies examined reciprocal associations between student–teacher relationship quality and students’ externalizing and internalizing behaviors. In these studies, both relationship quality and externalizing and internalizing behaviors were measured at two or three time points and researchers examined whether it was relationship quality that predicted students’ behaviors, or the other way around. Studies with young children (i.e., preschoolers, kindergartners, first graders) usually found reciprocal influences between student–teacher conflict and externalizing behavior over time (Roorda et al., 2014; Runions, 2014; Skalická et al., 2015; Zhang & Sun, 2011). Internalizing behavior, however, tended to be mainly a predictor of closeness (Roorda et al., 2014) or conflict (Zhang & Sun, 2011) and not an outcome. In a study focusing on kindergartners to third graders (Mejia & Høglund, 2016), externalizing problems predicted student–teacher conflict over time, but not the other way around. Two studies with upper elementary students (fourth to sixth graders) also found that externalizing behavior acted only as a predictor of student–teacher conflict, with some evidence being found for internalizing behavior as a predictor of closeness as well (de Jong et al., 2018; Pakarinen et al., 2018). For students who had the same teacher from grade four to six, student–teacher conflict also appeared to be a predictor of internalizing behavior (Pakarinen et al., 2018). To summarize, associations between student–teacher relationships seem to be reciprocal for young children, whereas for upper elementary students externalizing and internalizing behaviors seem to act mainly as a predictor of relationship quality but not the other way around.

Student–Teacher Relationships and Externalizing and Internalizing Behaviors in Secondary School

Different from primary school, there are only a few studies that examined associations between

student–teacher relationship quality and students’ externalizing and internalizing behaviors in secondary school. These secondary school studies most often focused on relationship quality as a predictor of students’ behaviors, with most attention being paid to students’ internalizing behavior (mostly depressive symptoms). Teacher support appeared to be negatively associated with middle and high school students’ depressive symptoms and somatic complaints, both in cross-sectional (Fredrick, Demaray, & Jenkins, 2017; Henriksen & Murberg, 2009; Luo, Xiang, Zhang, & Wang, 2017) and longitudinal studies (de Wit et al., 2011; Murberg & Bru, 2009). Furthermore, evidence was found for teacher support as a negative predictor of middle and high school students’ externalizing behavior (Frey et al., 2009; Stewart & Suldo, 2011). Finally, two studies including both positive and negative relationship dimensions revealed that student–teacher conflict and rejection by the teacher were associated with more externalizing and internalizing behaviors in secondary students as well (Al-Yagon, 2016; Longobardi, Settanni, Prino, Fabris, & Marengo, 2019). With regard to students’ behaviors as predictor of relationship quality, some cross-sectional studies found that secondary students’ externalizing behaviors were associated with less positive student–teacher relationships (Holen, Waaktaar, & Sagatun, 2018; Voisin, Hotton, & Neilands, 2018). In sum, these studies seem to indicate that student–teacher relationship quality also impacts secondary school students’ externalizing and internalizing behaviors, and that, perhaps, externalizing and internalizing behaviors affect secondary students’ relationships with their teachers as well.

As far as we know, only two studies looked at reciprocal influences in secondary school. The study of Li et al. (2018) included both primary and secondary school students. They found support for reciprocal influences between student–teacher relationship quality and students’ oppositional defiant symptoms but only from year 1 to 2 and not from year 2 to 3. Pössel, Rudasill, Sawyer, Spence, and Bjerg (2013) examined reciprocal influences for high school students, focusing on teacher support and depressive symptoms. Teacher support did not predict depression over time or the other way around, unless the degree of stressful life events that students experienced was taken into account. More specifically, teacher support diminished depression for students experiencing average and higher numbers of stressful events but increased depression for students with lower numbers of stressful events (Pössel et al., 2013). In contrast with studies with

older primary students, this study thus seems to offer more evidence for teacher support as a predictor than an outcome of depressive symptoms. Therefore, associations may be different in secondary school than in primary school. To find out whether interventions in secondary school could best target relationship quality or students' behaviors or both, more research investigating reciprocal influences in secondary school is needed. Different from previous studies focusing on reciprocal associations (Li et al., 2018; Pössel et al., 2013), the present study focused on student-teacher closeness as well as conflict and both students' externalizing and internalizing behaviors and included both lower and upper secondary students.

The Present Study

In the present study, we investigated reciprocal influences between student-teacher relationship quality (closeness and conflict with the Dutch and math teacher) and secondary students' externalizing and internalizing behaviors over time. That is, we examined whether relationship quality would act as a predictor or as an outcome of students' externalizing and internalizing behaviors or that they would reciprocally influence each other over time (see the conceptual model in Figure 1). We hypothesized to find negative associations between closeness and students' externalizing and internalizing behavior, whereas conflict would be positively associated with these behaviors (e.g., Al-Yagon, 2016; Frey et al., 2009; Murberg & Bru, 2009; Myers & Morris, 2009). Furthermore, associations may be mainly reciprocal for externalizing behavior (Li et al., 2018), whereas for internalizing behavior, relationship quality may be the predictor rather than the outcome (Pakarinen et al., 2018; Pössel et al., 2013).

Method

Sample

Our sample consisted of 1,219 students (49.1% boys, 50.9% girls) from 47 Dutch secondary school classrooms. From these students, 822 students (67.4%) were in lower secondary school, with 489 students (40.1%) in seventh grade and 333 students (27.3%) in eighth grade (Grade 1 and 2 of secondary school, respectively, in the Dutch school system). The rest of the students (397, 32.6%) were in upper secondary school, with 239 students (19.6%) in tenth grade, and 158 students (13.0%) in

eleventh grade (Grade 4 and 5 of secondary school in the Dutch school system). In the Netherlands, both lower and upper secondary graders are usually situated in the same building and have different teachers for each subject, up to 10 to 15 teachers a week. The sample included students from different educational tracks (i.e., 117 students were in lower vocational education, 365 students in higher general secondary education, 373 students in pre-university education, whereas 301 students were in classrooms in which two of these tracks were combined). As students from lower vocational education graduate after grade 10, there were only eleventh graders in the higher general secondary education and preuniversity tracks. At Time 1, students were on average 13.53 years old ($SD = 1.77$, range = 10–19 years). Most of the students (90.6%) and their parents (80.7% of the mothers, 81.3% of the fathers) were born in the Netherlands. Information about students' socioeconomic status was not available. However, schools were located in neighborhoods in which 10.9%–24.4% of the households had a low income (CBS Statline, 2017). The distribution of students across gender, ethnic background, and grade levels approximates the total population of Dutch secondary school students, which is as follows: 50.3% of Dutch secondary students are boys, 62.1% are in lower secondary education, and 75.3% are born in the Netherlands (CBS Statline, 2019a, 2019b). The number of students in lower vocational education, however, was underrepresented in the present sample, as 48% of Dutch secondary school students are in the lower vocational education track.

More than half of the students (67.3%) had a female Dutch teacher and 32.7% had a male Dutch teacher. Math teachers' gender was a bit more evenly distributed, with 48.9% of the students having a male math teacher and 51.1% of the students having a female math teacher. On average, students were taught 3.52 hr per week ($SD = 0.53$, range = 3–5 hr) by their Dutch teacher and 3.52 hr per week ($SD = 0.50$, range = 2–4 hr) by their math teacher. For 7.8% of the students, the Dutch teacher was also their homeroom teacher, and for 8.3% of the students, the math teacher was also their homeroom teacher.

Procedure

Approval for data collection was obtained from the Ethics Review Board from the University of Amsterdam. The data were collected by trained third year bachelor students and master students.

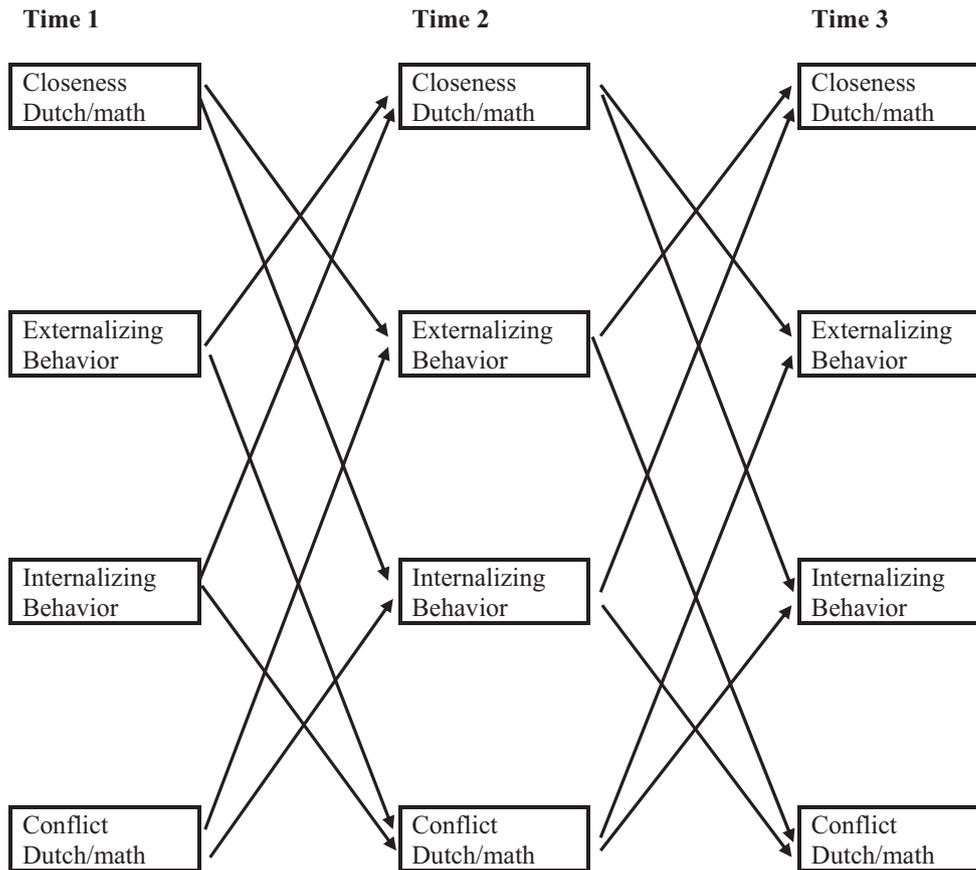


Figure 1. Conceptual model of the assumed associations between student-teacher relationship quality and students' externalizing and internalizing behaviors. This figure only displays the associations of interest for the present study (i.e., the cross-lagged associations).

These students also recruited the schools through their own personal networks and from mailing lists containing a random selection of schools. Students' parents received an information letter explaining the nature and aims of the study and were given the opportunity to object to their child's participation. Participation was declined for two students only.

Data collection took place during planned school visits. Time 1 was scheduled in the Fall of 2016, Time 2 in Winter 2017, and Time 3 in Spring 2017. During each occasion, students completed questions about the relationships with their Dutch and math teachers, their behavior at school, and their own and teachers' demographics. Students completed the questionnaires in the classroom during lesson hours and the total questionnaire took approximately 20–25 min to complete. All students who were present at the time of data collection filled out the questionnaires (except for the two students for whom participation was declined). Students did not receive a reward for their participation.

Measures

Relationships With Dutch and Math Teachers

Students rated the affective quality of their relationship with their Dutch teacher and their math teacher on a shortened version of the Student Perception of Affective Relationship with Teacher Scale (SPARTS; Koomen & Jellesma, 2015; Zee & de Bree, 2017). The Closeness subscale consists of six items and measures students' positive feelings toward a specific teacher, the degree of openness in the relationship, and students' reliance on this teacher in times of stress. The Conflict subscale also includes six items and assesses the degree of anger, distrust, and negative behaviors in the relationship with a specific teacher. Example items are "I tell this teacher things that are important to me" and "This teacher understands me" for Closeness and "I easily have quarrels with this teacher" and "This teacher treats me unfairly" for Conflict. Students rated each item on a 5-point Likert-type scale, varying from 1 (*no, that is not true*) to 5 (*yes, that is true*). Previous

research provided evidence for the reliability and the validity of the SPARTS (Koomen & Jellesma, 2015; Zee & de Bree, 2017). Roorda et al. (2019) also found support for the reliability and validity of the SPARTS in the Dutch secondary school context. In the present study, Cronbach’s alphas varied from .87 to .91 for Closeness and from .80 to .88 for Conflict (see Table 1).

Students’ Externalizing and Internalizing Behaviors

Students reported about their externalizing and internalizing behaviors at school on the Hyperactivity, Conduct Problems, and Emotional Symptoms subscales of the Dutch student-version of the Strengths and Difficulties Questionnaire (SDQ; van Widenfelt, Goedhart, Treffers, & Goodman, 2003).

Table 1
Descriptive Statistics, Cronbach’s Alphas (α), and Correlations for Student-Teacher Relationship Quality and Students’ Externalizing and Internalizing Behaviors

	N	M (SD)	α	1.	2.	3.	4.	5.	6.	7.	8.	
1. Closeness Dutch T1	1,031	3.08 (0.91)	.87	—								
2. Closeness Dutch T2	1,156	3.19 (0.89)	.88	.69*	—							
3. Closeness Dutch T3	1,126	3.12 (0.92)	.90	.61*	.78*	—						
4. Conflict Dutch T1	1,031	1.61 (0.67)	.80	-.55*	-.37*	-.36*	—					
5. Conflict Dutch T2	1,156	1.65 (0.65)	.80	-.38*	-.52*	-.46*	.57*	—				
6. Conflict Dutch T3	1,126	1.75 (0.74)	.85	-.34*	-.44*	-.58*	.48*	.69*	—			
7. Closeness math T1	1,034	3.24 (0.96)	.89	.31*	.24*	.20*	-.11*	-.15*	-.13*	—		
8. Closeness math T2	1,157	3.21 (0.99)	.91	.20*	.25*	.22*	-.12*	-.15*	-.15*	.73*	—	
9. Closeness math T3	1,116	3.17 (1.00)	.91	.21*	.22*	.27*	-.12*	-.16*	-.18*	.67*	.83*	
10. Conflict math T1	1,034	1.57 (0.72)	.84	-.15*	-.10*	-.09*	.33*	.29*	.28*	-.60*	-.47*	
11. Conflict math T2	1,157	1.72 (0.78)	.85	-.10*	-.10*	-.11*	.28*	.40*	.37*	-.48*	-.63*	
12. Conflict math T3	1,116	1.79 (0.81)	.88	-.15*	-.12*	-.14*	.30*	.37*	.43*	-.45*	-.55*	
13. Externalizing Beh. T1	1,153	1.93 (0.54)	.78	-.27*	-.23*	-.25*	.43*	.38*	.36*	-.23*	-.25*	
14. Externalizing Beh. T2	1,156	1.99 (0.54)	.80	-.22*	-.24*	-.25*	.35*	.48*	.43*	-.22*	-.27*	
15. Externalizing Beh. T3	1,126	2.01 (0.54)	.81	-.23*	-.25*	-.28*	.34*	.43*	.48*	-.24*	-.26*	
16. Internalizing Beh. T1	1,153	1.99 (0.73)	.74	-.09*	-.06	-.08*	.12*	.08*	.07	-.11*	-.12*	
17. Internalizing Beh. T2	1,156	2.02 (0.73)	.75	-.08	-.07	-.09*	.08*	.12*	.08	-.09*	-.11*	
18. Internalizing Beh. T3	1,126	2.02 (0.75)	.78	-.12*	-.09*	-.12*	.08	.09*	.10*	-.10*	-.11*	
				9.	10.	11.	12.	13.	14.	15.	16.	17.
1. Closeness Dutch T1												
2. Closeness Dutch T2												
3. Closeness Dutch T3												
4. Conflict Dutch T1												
5. Conflict Dutch T2												
6. Conflict Dutch T3												
7. Closeness math T1												
8. Closeness math T2												
9. Closeness math T3	—											
10. Conflict math T1	-.42*	—										
11. Conflict math T2	-.55*	.64*	—									
12. Conflict math T3	-.62*	.60*	.75*	—								
13. Externalizing Beh. T1	-.23*	.41*	.41*	.37*	—							
14. Externalizing Beh. T2	-.24*	.38*	.47*	.42*	.77*	—						
15. Externalizing Beh. T3	-.27*	.36*	.43*	.48*	.74*	.81*	—					
16. Internalizing Beh. T1	-.12*	.07	.12*	.09*	.28*	.21*	.21*	—				
17. Internalizing Beh. T2	-.11*	.04	.12*	.09*	.22*	.29*	.25*	.75*	—			
18. Internalizing Beh. T3	-.13*	.02	.11*	.11*	.22*	.24*	.32*	.69*	.78*	—		

Note. Autoregressive correlations are in italics, correlations between student-teacher relationship quality and students’ behaviors are in bold. Dutch = Dutch teacher; math = math teacher; Beh. = behavior.
* $p < .01$.

Originally, Hyperactivity and Conduct Problems were used as separate subscales. However, more recent studies found that for low-risk or general population samples, it may be more appropriate to combine these two subscales into one Externalizing Behavior factor (Dickey & Blumberg, 2004; Goodman, Lamping, & Ploubidis, 2010; SDQ Information, 2019). Therefore, the subscales Conduct Problems and Hyperactivity (five items per subscale, ten items in total) were used as indicators of Externalizing Behavior, including both students' conduct problems (e.g., fighting, lying, losing temper) and hyperactive behaviors (e.g., being restless, distracted, unable to stay still). The subscale Emotional Symptoms (five items) was used as an indicator of Internalizing Behavior, measuring emotional difficulties, such as feelings of sadness, worrying, being scared, and psychosomatic complaints. Example items are "I worry a lot" and "I get a lot of headaches, stomach-aches or sickness" for Internalizing Behavior and "I am constantly fidgeting or squirming" (Hyperactivity) and "I get very angry and often lose my temper" (Conduct Problems) for Externalizing Behavior. Students rated these items on the same 5-point Likert-type scale as for the SPARTS, ranging from 1 (*no, that is not true*) to 5 (*yes, that is true*). Previous studies supported the reliability and validity of the SDQ for use with 11–16 year olds (Goodman et al., 2010; van Widenfelt et al., 2003) and in Dutch samples (Muris, Meesters, & van den Berg, 2003; van Widenfelt et al., 2003). Cronbach's alphas in the present study ranged from .74 to .78 for Internalizing Behavior and from .78 to .81 for Externalizing Behavior (see Table 1).

Demographics

Student Gender, Student Age, Teacher Gender, and Homeroom Teacher were included as covariates in the analyses (see Analyses section). At the beginning of the questionnaire, students indicated whether they were a boy (coded as 0) or a girl (coded as 1) and how old they were (age given in years). Before answering the questions about the relationship with their Dutch and math teacher, students were asked to indicate whether their Dutch and math teacher were male (coded as 0) or female (coded as 1) and whether this teacher was their homeroom teacher (coded as 1) or not (coded as 0). Furthermore, students reported about the grade and track they were in, in which country they themselves and their mother and father were born, and how many hours a week they were taught by

their Dutch and math teacher. However, these questions were only used for sample description.

Analyses

Reciprocal associations between student–teacher relationship quality and students' externalizing and internalizing behaviors were examined by using a cross-lagged structural equation modeling approach in Mplus Version 7.31 (Muthén & Muthén, 1998–2015). Model building consisted of three steps, with both the relationship with the Dutch and the math teacher being included in the same model: First, a baseline model was estimated, including within-time correlations (i.e., correlations between all variables at a specific occasion), autoregressive or stability paths (i.e., prediction of a variable by its own level at the previous occasion), and cross-lagged paths (i.e., prediction of a variable by another variable measured at the previous occasion, controlling for the previous level of the predicted variable; Kline, 2011). Cross-lagged paths were inserted from Closeness and Conflict (with either the Dutch or math teacher) to Externalizing and Internalizing Behavior, and from Externalizing and Internalizing Behavior to Closeness and Conflict. Student Gender (0 = boy, 1 = girl), Student Age (in years), Teacher Gender (0 = male, 1 = female), and Homeroom Teacher (0 = Dutch or math teacher is not the homeroom teacher, 1 = Dutch or math teacher is the homeroom teacher) were also included as covariates in the model by estimating paths from all covariates to the study variables at each occasion. In the baseline model, all paths were freely estimated. In the second step, the unstandardized autoregressive paths were constrained to be equal across the two time intervals (e.g., the path from Closeness Time 1 to Closeness Time 2 was set equal to the path from Closeness Time 2 to Closeness Time 3), to enable a more parsimonious model with more reliable parameter estimates (Little, 2013; Roorda et al., 2014). In the third step, the cross-lagged paths were also constrained over time (e.g., the path from Closeness Time 1 to Externalizing Behavior Time 2 was set equal to the path from Closeness Time 2 to Externalizing Behavior Time 3), to create an even more parsimonious model (Little, 2013; Roorda et al., 2014). We proceeded to the next step when the model had a comparable (or better) fit as the model in the previous step. More specifically, fit indices of Model 2 (autoregressive paths constrained) were compared with the fit indices of Model 1 (baseline), whereas the fit indices of Model 3 (cross-lagged paths constrained) were compared

with those of Model 2. As a post-hoc analysis, we examined whether the strength of the autoregressive and cross-lagged associations differed between lower and upper secondary students. To do so, we performed a multigroup analysis, in which we first constrained the autoregressive paths to be equal across groups and subsequently constrained the cross-lagged paths to be equal across groups (Little, 2013). Model comparison was done in the same way as for the model of the total sample.

To evaluate model fit, the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the standardized root mean square residual (SRMR) were used. RMSEA and SRMR values below .08 and CFI values higher than .90 indicate satisfactory fit (Hu & Bentler, 1999; Kline, 2011). Models were considered as having equal fit if the changes in RMSEA (Δ RMSEA), SRMR (Δ SRMR), and CFI (Δ CFI) were smaller or equal to .010. In the present study, students were nested within classrooms. To take the nested design into account, the “complex analysis” option was applied (Williams, 2000). To deal with the non-normality of the study variables, we used maximum likelihood estimation with robust standard errors. The number of missing data varied from 5.1% to 15.4% per variable (see Table 1). To address this missingness, the full-information maximum likelihood algorithm was used (Jelicic, Phelps, & Lerner, 2009). Standardized path coefficients were reported as effect sizes. Considering our large sample size, the significance level was set at .01 to reduce type I error (Tabachnick & Fidell, 2007).

Results

Descriptives and correlations between study variables at all occasions are presented in Table 1.

Correlations between Externalizing Behavior and relationships with both the Dutch and math teacher were significant and in the expected direction at all time points. More specifically, Closeness and Externalizing Behavior were negatively correlated over time, whereas Conflict and Externalizing Behavior were positively correlated over time. Correlations with Internalizing Behavior were smaller and not always significant. In general, however, Closeness with the Dutch and math teacher tended to be negatively correlated with Internalizing Behavior, whereas correlations for Conflict tended to be positive (see Table 1).

Student-Teacher Relationships and Students' Externalizing and Internalizing Behaviors

Fit indices for the models examining associations between student-teacher relationship quality and students' externalizing and internalizing behaviors are displayed in Table 2. Constraining the autoregressive paths and the cross-lagged paths did not reduce model fit (see Table 2). The fit of the model with both autoregressive and cross-lagged paths constrained (Model 3) was adequate (RMSEA = .052, CFI = .964, SRMR = .043). Therefore, Model 3 was chosen as the final model.

Externalizing Behavior negatively predicted both Closeness with the Dutch teacher ($\beta = -.06, p < .001$ from Time 1 to Time 2; $\beta = -.06, p < .001$ from Time 2 to Time 3) and Closeness with the math teacher ($\beta = -.05, p = .001$; $\beta = -.06, p = .001$, respectively) over time. Furthermore, Externalizing Behavior positively predicted both Conflict with the Dutch teacher ($\beta = .15, p < .001$; $\beta = .15, p < .001$, respectively) and Conflict with the math teacher ($\beta = .15, p < .001$; $\beta = .15, p < .001$, respectively) over time. Conflict with the math teacher also

Table 2
Model Fit Indices and Model Comparison Statistics

	RMSEA	CFI	SRMR	Δ RMSEA	Δ CFI	Δ SRMR
Analyses for the total sample						
Model 1: unconstrained	.055	.969	.040			
Model 2: autoregressive paths constrained	.056	.965	.042	.001	-.004	.002
Model 3: cross-lagged paths constrained	.052	.964	.043	-.004	-.001	.001
Multigroup analyses comparing lower secondary school with upper secondary school						
Model 1: unconstrained	.066	.958	.048			
Model 2: autoregressive paths constrained	.065	.958	.049	-.001	.000	.001
Model 3: cross-lagged paths constrained	.064	.957	.050	-.001	-.001	.001

Note. For the RMSEA and SRMR, a negative value equals improved model fit, whereas for the CFI a positive value equals improved model fit. RMSEA = root mean square error of approximation; CFI = comparative fit index; SRMR = standardized root mean square residual.

Table 3
Significant and Nonsignificant Cross-Lagged Paths for the Final Model

	β (SE)
Cross-lagged paths	
Closeness Dutch T1—Externalizing behavior T2	-.02 (.02)
Closeness Dutch T2—Externalizing behavior T3	-.02 (.02)
Closeness Dutch T1—Internalizing behavior T2	-.03 (.02)
Closeness Dutch T2—Internalizing behavior T3	-.03 (.02)
Conflict Dutch T1—Externalizing behavior T2	-.01 (.02)
Conflict Dutch T2—Externalizing behavior T3	-.01 (.02)
Conflict Dutch T1—Internalizing behavior T2	-.02 (.02)
Conflict Dutch T2—Internalizing behavior T3	-.02 (.02)
Closeness math T1—Externalizing behavior T2	.02 (.02)
Closeness math T2—Externalizing behavior T3	.02 (.02)
Closeness math T1—Internalizing behavior T2	.01 (.02)
Closeness math T2—Internalizing behavior T3	.01 (.02)
Conflict math T1—Externalizing behavior T2	.05 (.02)*
Conflict math T2—Externalizing behavior T3	.06 (.02)*
Conflict math T1—Internalizing behavior T2	-.01 (.02)
Conflict math T2—Internalizing behavior T3	-.01 (.02)
Externalizing behavior T1—Closeness Dutch T2	-.06 (.02)*
Externalizing behavior T2—Closeness Dutch T3	-.06 (.02)*
Externalizing behavior T1—Conflict Dutch T2	.15 (.03)*
Externalizing behavior T2—Conflict Dutch T3	.15 (.03)*
Externalizing behavior T1—Closeness math T2	-.05 (.02)*
Externalizing behavior T2—Closeness math T3	-.06 (.02)*
Externalizing behavior T1—Conflict math T2	.15 (.02)*
Externalizing behavior T2—Conflict math T3	.15 (.02)*
Internalizing behavior T1—Closeness Dutch T2	-.01 (.01)
Internalizing behavior T2—Closeness Dutch T3	-.01 (.02)
Internalizing behavior T1—Conflict Dutch T2	-.01 (.02)
Internalizing behavior T2—Conflict Dutch T3	-.01 (.02)
Internalizing behavior T1—Closeness math T2	-.02 (.01)
Internalizing behavior T2—Closeness math T3	-.02 (.01)
Internalizing behavior T1—Conflict math T2	-.00 (.02)
Internalizing behavior T2—Conflict math T3	-.00 (.02)

Note. Standardized coefficients (β) are reported; Within-time correlations and paths from the covariates Student Gender, Student Age, Teacher Gender, and Homeroom Teacher to all variables in the model were estimated but are not displayed in the model.
* $p < .01$.

positively predicted Externalizing Behavior over time ($\beta = .05$, $p = .003$; $\beta = .06$, $p = .002$, respectively), indicating that associations between Conflict with the math teacher and Externalizing Behavior were reciprocal. Internalizing Behavior was not significantly associated with relationship quality at all (see Table 3; Figure 2).

Multigroup Analyses for Lower Versus Upper Secondary School

Fit indices for the multigroup models comparing the strengths of associations between lower and

upper secondary students can also be found in Table 2. Constraining the autoregressive paths and the cross-lagged paths to be equal across lower secondary school students and upper secondary school students did not reduce model fit (see Table 2). The fit of the model with both autoregressive and cross-lagged paths constrained across groups was also adequate (RMSEA = .064, CFI = .957, SRMR = .050). These results suggest that the strength of the autoregressive and cross-lagged associations does not differ across students from lower and upper secondary school. Hence, the model estimated for the total sample was considered the final model.

Discussion

The present study was one of the first to examine reciprocal influences between dyadic student-teacher relationship quality and students' externalizing and internalizing behaviors in secondary school, during one school year. Our sample included both lower and upper secondary students. We investigated whether more support was found for student-teacher relationship quality as either predictor or outcome of students' externalizing and internalizing behaviors, or both. To enhance the generalizability of our findings, we focused on students' relationships with both their Dutch teacher and their math teacher (cf. Roorda et al., 2019). Although replication of our findings is needed, our results seem to allow the following conclusions.

First, in line with upper elementary school studies (de Jong et al., 2018; Pakarinen et al., 2018) but different from the two studies including secondary school students (Li et al., 2018; Pössel et al., 2013), most evidence was found for students' externalizing behaviors as a predictor of student-teacher relationship quality. More specifically, students' externalizing behavior negatively predicted the degree of student-teacher closeness and positively predicted the degree of student-teacher conflict over time. Associations between externalizing behavior and conflict were the strongest, which is in line with the consistent evidence that has been found for such associations in primary school studies (Henricsson & Rydell, 2004; Jerome et al., 2009). Different from primary school studies (de Jong et al., 2018; Pakarinen et al., 2018; Roorda et al., 2014), however, externalizing behavior also negatively predicted closeness over time. The impact of externalizing behaviors on the affective quality of student-teacher relationships thus seems to be even stronger in secondary than in primary school. Moreover, these

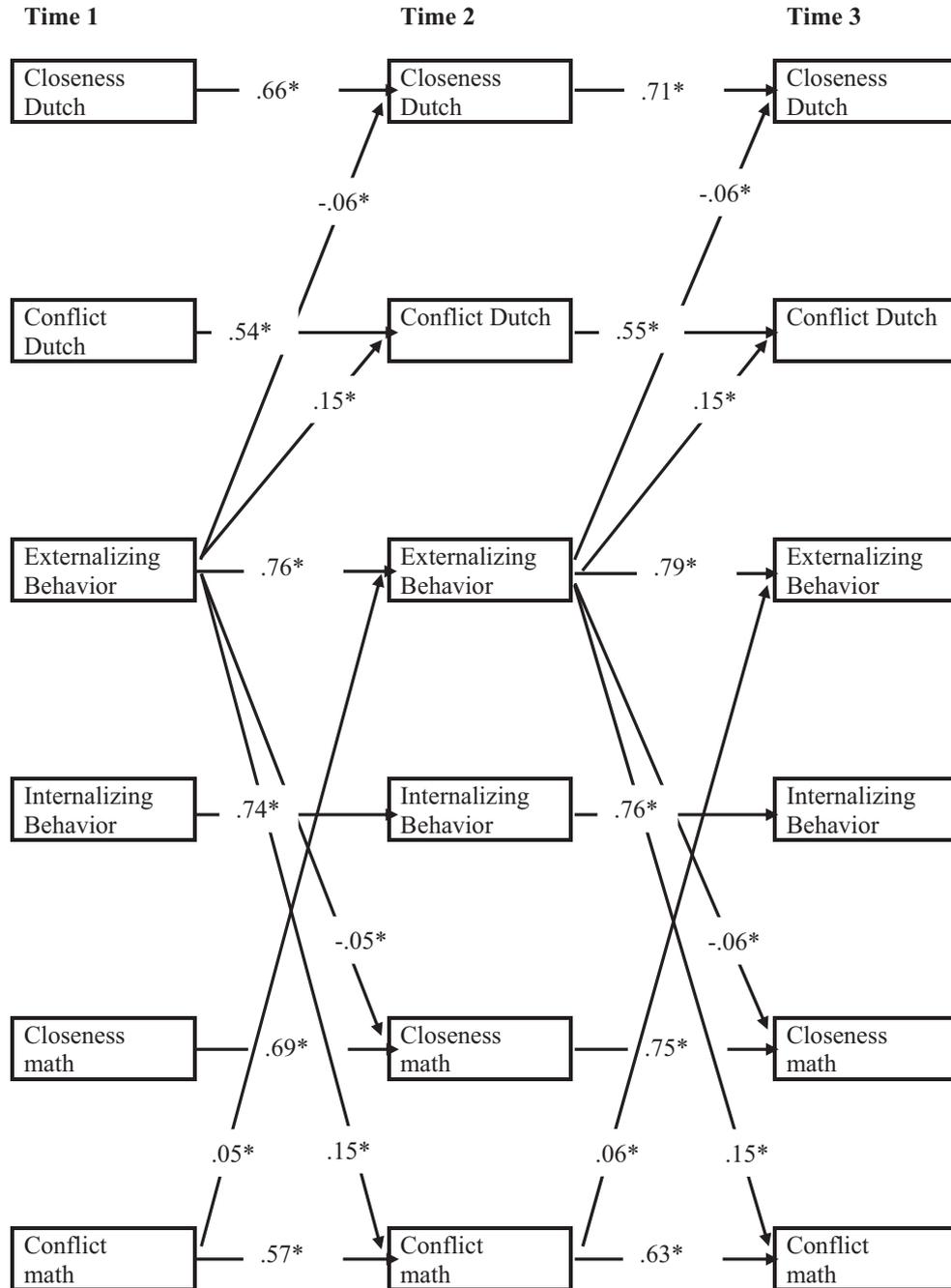


Figure 2. Final cross-lagged model displaying reciprocal associations between student-teacher relationship quality and students' externalizing and internalizing behaviors at Time 1, Time 2, and Time 3. Nonsignificant path coefficients, within-Time correlations, and paths from the covariates Student Gender Student Age, Teacher Gender, and Homeroom Teacher were not presented for reasons of clarity. All path coefficients are standardized.

* $p < .01$.

findings seem to apply to students' relationships with both their Dutch and math teacher, indicating that students' relationships with multiple teachers may be impacted by their externalizing behavior in secondary school. This is an important finding,

considering that secondary students only see their teachers a couple of hours each week. More research is needed, however, to find out whether externalizing behavior will also impact students' relationships with other secondary school teachers,

with whom they spend less hours a week. Student–teacher relationship quality may, in turn, be predictive for other aspects of students’ school functioning, such as their engagement with school work or academic achievement (e.g., Engels et al., 2016; Roorda, Jak, Zee, Oort, & Koomen, 2017). Therefore, future studies might do well to include such other aspects of students’ school functioning as well. Our findings seem to indicate that to improve affective relationships with teachers (i.e., reduce conflict and promote closeness), it is advisable to focus interventions on students’ externalizing behavior early in the school (cf. Roorda et al., 2014; Zhang & Sun, 2011).

Second, some support for reciprocal influences between student–teacher relationships and students’ behaviors was found as well, as conflict in the relationship with the math teacher also positively predicting externalizing behavior over time. Our findings indicate that some teachers run the risk of getting into a vicious circle with students with externalizing behavior, with externalizing behavior and conflict strengthening each other during the school year. To break this vicious circle, interventions targeting both student–teacher relationships and students’ externalizing behavior early in the school year may be most effective. Furthermore, these findings also suggest that other teachers than the homeroom teacher (for only 8.3% of the students the math teacher was also the homeroom teacher) can impact students’ school adjustment (cf. Roorda et al., 2019). As it is often assumed that secondary school students become increasingly independent of teachers and more focused on peers (e.g., Hargreaves, 2000), it seems important to make secondary school teachers aware of the impact they may still have on their students, even if they are not the student’s homeroom teacher. Unexpectedly, findings were different for the Dutch than for the math teacher (i.e., conflict with the Dutch teacher did not predict students’ externalizing behavior). As the model with teacher gender and homeroom teacher as covariates provided the same results as the model without this covariates, these differences cannot be explained by these teacher characteristics. More research is needed to explain this finding.

Third, no significant associations were found between student–teacher relationship quality and students’ internalizing behavior. It could be that internalizing behavior does not impact relationship quality in secondary school because this behavior is less visible for teachers than externalizing behavior and students and teachers only see each other a couple of hours per week. Considering the

significant effects of teacher support on students’ internalizing behavior in previous longitudinal studies in secondary school (Murberg & Bru, 2009; de Wit et al., 2011), not finding an impact of student–teacher relationship quality on students’ internalizing behavior in the present study, was rather unexpected. As the only previous study looking at reciprocal influences in secondary school (i.e., Pössel et al., 2013) did not find significant main effects of teacher support on depressive symptoms either, this may be due to the design used. More interestingly, however, the results of Pössel et al. (2013) suggest that the impact of student–teacher relationship quality on internalizing behavior could be different for specific subgroups of students (based on the number of stressful life events that students experienced). Future studies may therefore profit from including moderators, such as number of experienced stressful life events or familiarity of the teacher (Pakarinen et al., 2018), when investigating reciprocal influences between student–teacher relationships and students’ internalizing behaviors.

Fourth, as far as we know, the present study was the first to test whether associations between student–teacher relationship quality and students’ externalizing and internalizing behaviors were different for lower versus upper secondary school students. Although replication is needed, our findings suggest that there are no differences between lower and upper secondary students regarding the impact of their externalizing and internalizing behaviors on the quality of their relationships with teachers nor in the degree to which these relationships predict their externalizing and internalizing behaviors.

Limitations and Future Research

The present study also has a few limitations that need to be taken into account when interpreting our findings. First, students reported about both student–teacher relationship quality as well as their own externalizing and internalizing behaviors, which might have led to shared informed variance. However, as we controlled for within-time associations between all variables, the effects found could not entirely be due to shared informant bias (Doumen et al., 2008). Still, it would be of added value if future studies looking at reciprocal influences could include teacher reports as well.

Second, students reported about their relationships with their Dutch and math teachers only. We focused on these teachers, because secondary school students usually see them somewhat more often than most of their other teachers. Still, it would be

interesting for future studies to include relationships with more and other teachers to examine whether the present findings could be generalized to dyadic relationships with teachers with whom they spend less time than with the Dutch and math teacher.

Third, students from lower vocational education were underrepresented in our sample. Independent *t*-tests showed that students from lower vocational education reported more externalizing behaviors and more conflict with their math teachers at all occasions, and less closeness with their math teachers at Time 1, than students from higher general secondary education and preuniversity education. In contrast, students from lower vocational education also reported consistently more closeness with their Dutch teachers than students from higher tracks. Despite these mean differences, post-hoc multigroup analyses showed that the strength of the autoregressive and cross-lagged associations was the same for students from lower vocational education compared to higher general secondary and preuniversity education. These results seem to indicate that the underrepresentation of lower vocational students does not fundamentally threaten the generalizability of our findings. Still, studies including more lower vocational students are needed to confirm this.

Conclusion

To conclude, the present study may contribute to our knowledge about student-teacher relationship quality and students' externalizing and internalizing behaviors in secondary school in several ways. First, our findings indicate that students' externalizing behaviors lead to more conflict and less closeness in relationships with different secondary teachers over time. For some teachers, the degree of conflict in the relationship also seems to predict students' externalizing behavior, indicating that conflict and externalizing behavior could strengthen each other over time. To break this vicious circle, interventions may be most effective if they target both students' externalizing behavior and student-teacher relationship quality in the beginning of the school year. Second, our findings suggest that associations between student-teacher relationship quality and students' externalizing and internalizing behaviors are similar in lower and upper secondary school, suggesting that these associations are just as relevant for upper as for lower secondary school students.

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