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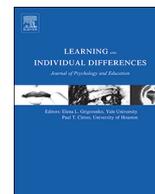
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## Different teachers, different relationships? Student-teacher relationships and engagement in secondary education



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### ABSTRACT

The present study examined whether secondary school students share different relationships with different teachers (homeroom teacher, teacher of easiest subject, teacher of hardest subject). Furthermore, we investigated whether students' engagement with the subjects of these teachers and associations between relationship quality and engagement varied across subjects. Seventh grade students ( $N = 476$ ; 50.8% boys) reported about their relationships (closeness, conflict) with the three teachers and their behavioral and emotional engagement with the three subjects. Structural equation modeling revealed that students experienced the most favorable relationship with their homeroom teacher and the least favorable relationship with the teacher of their hardest subject. Students were also less behaviorally and emotionally engaged with their hardest subject than with the other two subjects. Finally, associations between relationship quality and engagement did not differ across subjects. To conclude, it seems important to distinguish between teachers and subjects when examining relationships and engagement in secondary school.

### 1. Introduction

Ample evidence exists that the *affective* quality of the relationship between teachers and *individual* students (i.e., dyadic student-teacher relationships) is important for students' school functioning. For example, the affective quality of dyadic student-teacher relationships appeared to be associated with students' engagement with school (see Roorda, Koomen, Spilt, & Oort, 2011; Roorda, Jak, Zee, Oort, & Koomen, 2017 for a meta-analytic overview). In the past, it has often been argued that student-teacher relationships would be less important for the school functioning of secondary school students than for primary school students (Buhmester & Furman, 1987; Hargreaves, 2000; Lynch & Cicchetti, 1997). More recently, however, it has been shown that student-teacher relationships are just as important for secondary school students' engagement, and that positive student-teacher relationships are even more strongly associated with secondary school students' engagement than with primary school students' engagement (Roorda et al., 2011; Roorda et al., 2017). Still, there are important differences between primary and secondary school that should be considered when examining associations between student-teacher relationship quality and students' engagement. For example, secondary school students usually see multiple teachers during the school day, with whom they will most likely develop qualitatively different relationships (Overall,

Fletcher, & Friesen, 2003). Similarly, students' engagement will probably also differ across subjects (Goetz, Frenzel, Lüdtke, & Hall, 2010; Goetz, Frenzel, Pekrun, Hall, & Lüdtke, 2007). Until now, however, most secondary school studies examined student-teacher relationships and students' engagement with teachers and school in general (e.g., Galand & Hospel, 2013; Lee, 2015; Smit, de Brabander, & Martens, 2014), thereby ignoring the fact that relationship quality and engagement may be teacher or subject specific.

In the present study, we therefore distinguished between different teachers and subjects when examining the association between the affective quality of dyadic student-teacher relationships and secondary school students' engagement. In a first step, we examined whether secondary school students experience differences in their relationships with three different teachers (i.e., their homeroom teacher, the teacher of their easiest subject, and the teacher of their hardest subject). Second, we investigated whether there are differences in students' engagement with the subjects taught by these teachers. Third, we studied whether the strength of associations between student-teacher relationships and students' engagement differed across subjects. We targeted seventh grade students (usually 12 or 13 years old) because this is the first year of secondary school in the Netherlands and, hence, students are in a transitional period. As such, forming positive relationships with teachers seems to be especially important for students at this stage in

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order to become engaged and to adjust optimally to their new school environment (Eccles et al., 1993; cf., Gehlbach, Brinkworth, & Harris, 2012).

### 1.1. Attachment theory

Previous studies on student-teacher relationships in primary education are often based on attachment theory (Pianta, 1999; Verschueren & Koomen, 2012). According to this theory, a positive relationship with the teacher enables students to seek support and comfort from their teacher in times of stress (i.e., safe haven function) and also may provide them with a secure base from which they can explore the classroom environment (i.e., secure base function). Consequently, students are enabled to become engaged with learning activities and, hence, perform better on school tasks (Bergin & Bergin, 2009; Koomen, van Leeuwen, & van der Leij, 2004; Thijs & Koomen, 2008). In contrast, if students share a negative relationship with their teacher, they are not enabled to use their teacher as secure base and safe haven, which will hamper their engagement with learning activities (Hamre & Pianta, 2001). Thus, sharing positive relationships with teachers will increase students' school engagement, whereas negative student-teacher relationships will hamper students' engagement (Roorda et al., 2011, 2017). Recently, it has been argued that attachment theory might also apply to secondary school students, especially with regard to the secure base function (de Laet, Colpin, Goossens, van Leeuwen, & Verschueren, 2014; Verschueren, 2015). Accordingly, secondary school studies have been increasingly been inspired by attachment theory (e.g., Chong, Huan, Quek, Yeo, & Ang, 2010; Engels et al., 2016; Gehlbach et al., 2012).

According to attachment theory, working models or mental representations play an important role in the development and quality of student-teacher relationships. Mental representations refer to the thoughts, beliefs, feelings, and emotions that each relationship partner (e.g., the teacher or the student) develops with regard to his/herself, the other, and their mutual relationship (Pianta, Hamre, & Stuhlman, 2003). These mental representations are, amongst others, formed by the quality of the daily interactions between student and teacher. As individual teachers tend to differ in their interactional styles (e.g., den Brok, Brekelmans, & Wubbels, 2004), students will most likely develop different mental representations for their specific teachers (Overall et al., 2003). In previous research, a lot of attention has been paid to variations in the affective quality of the relationships that the same teacher develops for different students in his/her classroom (e.g., Henricsson & Rydell, 2004; Hughes & Kwok, 2007; Koomen & Jellesma, 2015; McGrath & van Bergen, 2015; Nurmi, 2012). Much less is known, however, about the variation in the quality of the relationships that the same student shares with his/her different teachers, even though students' mental representations are likely to differ across teachers (Overall et al., 2003).

In studies based on attachment theory, the closeness dimension is often used as an indicator of positive relationship quality and the conflict dimension as an indicator of negative relationship quality. Closeness refers to the degree of warmth and openness in the relationship and is considered to enhance students' ability to use their teacher as a secure base and safe haven and, hence, promote their engagement. In contrast, conflict describes the degree of discordant and coercive interactions and negativity in the relationship, which will hamper students in using their teacher as a source of security and diminish their engagement with school work (Pianta, 2001; Verschueren & Koomen, 2012). Studies in secondary school focused mainly on positive dimensions of the student-teacher relationship (e.g., emotional support, relatedness, connectedness, care) and tend to neglect negative dimensions (Roorda et al., 2017). Primary school studies, however, frequently found that negative dimensions were more strongly associated with students' school engagement than positive dimensions (e.g., Hamre & Pianta, 2001). Therefore, the present study also measured the degree of conflict in students' relationships with their different teachers.

### 1.2. Relationships with different teachers

From previous research, some information is available about the affective quality of relationships that individual students develop with different teachers in subsequent school years (e.g., Engels et al., 2016; Jerome, Hamre, & Pianta, 2009). Knowledge about similarities or differences in the quality of relationships that the same student shares with different teachers at the same moment in time, however, is not yet available. As secondary school students are usually taught by several teachers during the school day, the question about the degree of variation in relationships with different teachers seems to be particularly relevant when examining student-teacher relationships in secondary school. In line with this idea, it has been argued that for secondary school students, relationships with teachers are embedded within the subject matter taught by a specific teacher (Davis, 2006) and, hence, relationship quality would differ across teachers. Most previous studies in secondary school, however, ignored these possible differences by asking students to report about their relationships with teachers in general (e.g., Galand & Hospel, 2013; Lee, 2015; Smit et al., 2014). Other studies did acknowledge the relationship-specificity of working models by focusing on the relationship with the teacher of one specific subject (e.g., Lietaert, Roorda, Laevers, Verschueren, & de Fraigne, 2015; Sakiz, Pape, & Woolfolk Hoy, 2012). Still, these studies did not take into account whether relationship quality varies across different teachers.

Some studies examining teaching style at the group level (i.e., behaviors towards students in general) seemed to suggest that classroom climate or teachers' interpersonal style differs somewhat across subjects, such as math and German (Dietrich, Dicke, Kracke, & Noack, 2015) or physics and English (den Brok et al., 2004). When looking at dyadic student-teacher relationships (i.e., relationships between individual students and teachers; cf., Roorda et al., 2017, 2011), however, there are only two studies that actually reported about individual students' relationships with different secondary school teachers. Wallace, Ye, McHugh, and Chhuon (2012) revealed that high school students felt somewhat more connected to their English than to their mathematics teacher. In another study on the same sample, the authors found that the correlation between connection to teachers in general and connection to a specific teacher was only 0.44 (Wallace, Ye, & Chhuon, 2012), indicating that questioning students about the relationship with a specific teacher provided different information than questioning about teachers in general. Two other studies also focused on relationships with teachers of different subjects, however, the first one did not test whether there were significant differences between the two teachers (i.e., English and mathematics teachers) in the degree of support that students experienced (Jiang, Bong, & Kim, 2015). The second study did compare relationship quality between teachers, but each student only reported about one target subject (Lee, Robinson, & Sebastian, 2012). Therefore, the found differences may be due to differences between the groups of students rather than between teachers. The authors found that students felt more supported by their social studies teacher than by either their mathematics or science teacher, whereas they felt equally supported by their social studies and English teachers (Lee et al., 2012). Together, these studies give a first indication that it is important to distinguish between relationships with specific teachers when studying student-teacher relationships in secondary education.

In a further attempt to fill the gap between the assumed relationship-specificity of working models and the more global approach in existing studies, the present study examined whether secondary school students share qualitatively different relationships with three of their teachers. Different from previous studies (Jiang et al., 2015; Lee et al., 2012; Wallace, Ye, & Chhuon, 2012; Wallace, Ye, McHugh, & Chhuon, 2012), we did not focus on relationships with teachers of specific subjects, such as English or mathematics. Rather, we focused on students' relationship with their homeroom teacher because homeroom teachers are expected to function as a supervisor, confidant, and contact person for students and their parents and are, therefore, more likely to invest

time and effort in building relationships with students from their homeroom class. Hence, we expected that students would experience more favorable relationships (i.e., higher levels of closeness and lower levels of conflict) with their homeroom teacher than with their other teachers. In addition, we targeted students' relationships with the teachers of their easiest and their hardest subjects because this enabled us to formulate more specific hypotheses than a focus on specific subjects. More specifically, it has been theorized and found that students' academic *experiences* of a certain subject, such as their expectations for success, self-concept, subject value, and perceived subject difficulty, impact the formation of the relationship with the teacher of that subject (e.g., Davis, 2001; Davis, 2006). It also has been found that students with less favorable academic experiences (e.g., learning difficulties, low self-concept) tend to share less close and more conflictual relationships with their teachers than students with positive experiences (McGrath & van Bergen, 2015; Raufelder, Sahabandu, Martínez, & Escobar, 2015; Zee, de Bree, Hakvoort, & Koomen, 2019). Extending this line of reasoning, we hypothesized that finding a subject difficult may place a similar strain on the relationship and, hence, students would experience less closeness and more conflict in their relationship with the teacher of their hardest subject than in their relationship with the teacher of their easiest subject. It should be noted, however, that student-teacher relationships can influence students' academic experiences as well (e.g., because students share a conflictual relationship with a certain teacher, they may also experience the subject of this teacher as more difficult). Therefore, we consider the present study as an exploratory investigation of this topic.

### 1.3. Engagement with different subjects

There may also be differences in students' engagement with different subjects taught by different teachers. Students' engagement is a multidimensional concept, which can be defined as “the quality of a student's connection or involvement with the endeavor of schooling and hence with the people, activities, goals, values, and place that compose it” (Skinner, Kindermann, & Furrer, 2009, p. 494). In the literature, a distinction is often made between three main components of engagement: Behavioral engagement, which refers to students' engaged behaviors (e.g., effort, persistence, concentration), emotional engagement, which describes students' engaged emotions (e.g., enjoyment, satisfaction, boredom), and cognitive engagement with refers to students' thoughtfulness and willingness to invest in mastering

difficult skills and the comprehension of complex ideas (e.g., mastering, mental effort, self-regulation; Fredricks, Blumenfeld, & Paris, 2004). As cognitive engagement is a rather abstract construct that can be defined in different ways (Fredricks et al., 2004), we followed the operationalization of Skinner and colleagues and focused on students' behavioral and emotional engagement only (Skinner et al., 2009; Skinner, Furrer, Marchand, & Kindermann, 2008). Previous studies into the association between student-teacher relationships and engagement usually focused on students' engagement with school in general (e.g., Chen & Astor, 2011; Galand & Hospel, 2013; Lam et al., 2012) or used a composite measure of engagement in different subjects (e.g., Perry, Liu, & Pabian, 2010). Several researchers, however, have argued that students' engagement is mostly subject-specific (Frenzel, Goetz, Pekrun, & Watt, 2010; Goetz, Cronjaeger, Frenzel, Lüdtke, & Hall, 2010; Schiefele, 1991). In line with this proposition, relatively weak correlations have been found between experienced emotions and effort in relation to different subjects (i.e., mostly around 0.40 to 0.59 or lower; Dietrich et al., 2015; Goetz, Frenzel, et al., 2010; Goetz et al., 2007), even for related subjects, such as mathematics and physics (Goetz, Frenzel, et al., 2010). Likewise, Trautwein and Lüdtke (2009) and Wang, Fredricks, Ye, Hofkens, and Linn (2016) revealed that secondary school students' engagement and the degree of effort they put into their homework varies across subjects. The few existing studies seem to imply that it is important to distinguish between different subjects

when examining secondary school students' behavioral and emotional engagement.

Most of the studies that did measure engagement on a subject-specific level (Federici & Skaalvik, 2014; Guvenc, 2015; Kunter et al., 2013; Lietaert et al., 2015; Ruzek et al., 2016) focused on one specific subject per student and were thus not able to make comparisons between subjects. In the present study, we therefore also investigated whether students showed different levels of engagement with the three subjects: the subject of their homeroom teacher (i.e., the general subject taught by the homeroom teacher, not the homeroom hour; see Methods section), their easiest subject, and their hardest subject. According to self-determination theory (Deci, 1975; Reeve, 2012), a task that is perceived as being too difficult will lead to lower engagement in students. The underlying rationale would be that finding a task too difficult will threaten students' need of competence (i.e., the feeling that one has the skills and abilities to perform well), which is considered to be an important precondition for optimal engagement (Deci, 1975; Reeve, 2012). In line with this reasoning, sixth to ninth graders have been found to practice less (i.e., behavioral engagement) and to show more negative affect when they perceive a school task as being too difficult (Cornelisz & van Klaveren, 2018; Tulis & Fulmer, 2013). Fifth to eighth graders also displayed less effort and experienced less interest/enjoyment than usual when they had to perform a difficult reading task (Fulmer & Frijters, 2011). Similarly, a recent daily diary study with ninth to twelfth graders (Patall, Hooper, Vasquez, Pituch, & Steingut, 2018) revealed that students reported more disengagement (i.e., combination of behavioral, emotional, and cognitive engagement) on days when they perceived their science classwork as being more difficult than usual. Continuing this line of reasoning, we hypothesized that students would also be less engaged with the subject that they perceive as being the most difficult (i.e., their hardest subject). As task difficulty seems to be related to both indicators of behavioral (i.e., effort, practice time) and emotional engagement (i.e., interest/enjoyment, negative affect), we further believed that both students' behavioral and emotional engagement would be lower for the hardest subject than the easiest subject. Due to the lack of a strong theoretical rationale, we did not formulate specific hypotheses about students' engagement with the subject of their homeroom teacher.

### 1.4. Importance of student-teacher relationships for engagement in different subjects

Previous research has frequently found that positive student-teacher relationships are positively associated with both secondary school students' behavioral and emotional engagement (e.g., Engels et al., 2016; Galand & Hospel, 2013; Lietaert et al., 2015; Sakiz et al., 2012; Wang & Eccles, 2013). Although less often investigated, some evidence has also been found that negative student-teacher relationships are negatively related to students' engagement (e.g., Chong et al., 2010; Engels et al., 2016). However, these studies examined students' relationships and engagement with teachers and school in general (e.g., Engels et al., 2016; Galand & Hospel, 2013; Wang & Eccles, 2013) or with one specific teacher and subject (Chong et al., 2010; Lietaert et al., 2015; Sakiz et al., 2012). Therefore, it is not yet known whether dyadic student-teacher relationships are more important for students' engagement with some subjects than with others. When looking at teacher style, some indications were found that associations between teacher style and engagement may differ across subjects. For example, classroom climate (i.e., emotional support) appeared to be somewhat more strongly related to students' effort in German than in math (Dietrich et al., 2015). Furthermore, teachers' interpersonal style (i.e., proximity) seemed to be more strongly associated with students' effort in English than in physics, whereas the association with pleasure (i.e., engaged emotion) appeared to be slightly stronger for physics (den Brok et al., 2004). When focusing on dyadic student-teacher relationships, however, some evidence has been found that associations between teacher connectedness

or support and concepts related to engagement are more or less the same for English and mathematics (Jiang et al., 2015; Wallace, Ye, McHugh & Chhuon, 2012), indicating that associations may not strongly differ when looking at specific subjects (e.g., English, mathematics).

According to the academic risk hypothesis (Hamre & Pianta, 2001), student-teacher relationships will be more important for students at risk for academic maladjustment, because they have more to gain or to lose through the relationship. Accordingly, previous studies have found that associations between student-teacher relationship quality and students' engagement were stronger for students who tend to be less engaged, such as boys and students with a low socioeconomic status (see Roorda et al., 2011 for an overview). It is possible that this line of reasoning could also apply to associations for different subjects. That is, the relationship with the teacher of the hardest subject might be more important for students' engagement with this specific subject than their relationship with the other two teachers is for their engagement with the other subjects, because they are more likely to malfunction in subjects that they find difficult. An alternative hypothesis, however, is that the relationship with the homeroom teacher would be most strongly associated with students' subject-specific engagement due to the extra tasks and the special role that homeroom teachers play in their students' lives. Therefore, due to the focus of the present study, we expected to find differences between subjects in the strength of associations between student-teacher relationship quality and students' engagement.

### 1.5. The present study

The present study examined seventh grade students' relationships with three different teachers (i.e., their homeroom teacher, the teacher of their easiest subject, and the teacher of their hardest subject), their engagement with the subjects of these three teachers, and whether student-teacher relationships and engagement were differentially associated across the three subjects. As this was the first time that the used questionnaires were used to make comparisons across different teachers and subjects, we started with checking whether the questionnaires were measurement invariant across teachers/subjects. Subsequently, the following hypotheses were tested: First, we hypothesized that students would experience more closeness and less conflict in the relationship with their homeroom teacher than in the relationship with the other two teachers, and that they would experience more closeness and less conflict in the relationship with the teacher of their easiest subject compared to the teacher of their hardest subject (cf., Davis, 2006; McGrath & van Bergen, 2015; Raufelder et al., 2015; Zee et al., 2019). Second, we expected that students would be more behaviorally and emotionally engaged with their easiest subject than with their hardest subject (cf., Patall et al., 2018; Tulis & Fulmer, 2013), whereas we did not have a clear-cut hypothesis for their engagement with the subject of their homeroom teacher. Third, we formulated two alternative hypotheses with regard to the associations between student-teacher relationships and engagement. That is, it might either be the relationship with the homeroom teacher or the relationship with the teacher of the hardest subject (cf., Hamre & Pianta, 2001; Roorda et al., 2011) that would be most strongly associated with students' engagement with the respective subjects.

## 2. Materials and methods

### 2.1. Sample

Our sample consisted of 476 seventh grade students (50.8% boys) from 22 classrooms from five Dutch secondary schools. In the Netherlands, seventh grade is the first year of secondary school and students are usually 12 years old when they enter secondary school. Students are assigned to different tracks before the start of the school

year (i.e., lower vocational education, higher general secondary education, pre-university education, or a combination of two of these tracks) and students of the same class follow all their subjects together. Seventh graders usually have different teachers for each subject, up to ten to fifteen teachers in total, whom they see for one hour (e.g., art teachers) to three or four hours a week (e.g., Dutch, math, and physical education teachers; exact number of hours may differ across tracks and schools). All students also have a homeroom teacher, who teaches a general subject to his or her homeroom class but also functions as a contact person and confidant for students and parents and monitors the general progress of the homeroom students. Homeroom teachers usually have one homeroom hour per week with their class, in which more general aspects of school life are discussed (e.g., guidelines for effective learning approaches, problems with the functioning of the class in general). They also make additional individual appointments with students if needed. In sum, homeroom teachers see their homeroom students more frequently than other teachers and are expected to be more personally involved with their homeroom students than other teachers usually are.

The present sample included students from all three tracks (i.e., 44.3% lower vocational education, 19.1% combination of lower vocational education and higher general secondary education, 18.9% combination of higher general secondary education and pre-university education, and 17.7% pre-university education). Students were on average 12.43 years old ( $SD = 0.56$ ; range 11–14 years). Most students (98.0%) and their parents (76.4% of the mothers; 74.1% of the fathers) were born in the Netherlands. There was a large variety in the subjects that students chose as their easiest and hardest subjects. Subjects that were relatively often mentioned as easiest subject were English (14.4%), mathematics (14.8%), and physical education (14.6%). Dutch (15.6%), English (19.3%), mathematics (10.6%), biology (10.3%), and history (10.6%) were relatively often chosen as hardest subject. Thus, the specific subject area did not seem to matter much for the degree to which students experienced a subject as difficult or easy. There also was a large variety in the kind of subject that was taught by the homeroom teacher, with English (17.8%), mathematics (15.4%), and physical education (19.8%) being taught most often.

### 2.2. Procedure

Approval for the present study was obtained from the ethical committee of the University of (blinded for review). Data collection took place in January and February 2016. Students reported about their relationship with the three teachers (i.e., homeroom teacher, teacher of easiest subject, and teacher of hardest subject) and their engagement with the three school subjects (i.e., subject of homeroom teacher, easiest subject, and hardest subject). Please, notice that students reported about their engagement with the general subject taught by the homeroom teacher (e.g., English, mathematics, physical education, Dutch) and not with the homeroom hour.

As the questionnaire was rather long, it was distributed across two different school days, scheduled on average 11 days apart. For each subject, students first rated their engagement, followed by the relationship quality to prevent bias. More specifically, we tried to prevent that students' engagement ratings would be affected by relationship ratings. Furthermore, half of the students first completed questions about their easiest subject and the subject of the homeroom teacher and filled out questions about the hardest subject in the second part of the questionnaire. The other half of the students first filled in questions about the hardest subject and the subject of the homeroom teacher and rated the easiest subject afterwards. The sequence of subjects did not impact the results.

## 2.3. Measures

### 2.3.1. Student-teacher relationships

Students reported about the affective quality of their relationship with each individual teacher on the Closeness and Conflict subscales of the Student Perception of Affective Relationship with Teacher Scale (SPARTS; Koomen & Jellesma, 2015). In the present study, a shortened version of the SPARTS was used (Zee & de Bree, 2017), with six items per subscale. The Closeness subscale assesses students' positive feelings towards the teacher, the degree of openness in the relationship, and students' reliance on the teacher in times of stress. The Conflict subscale measures the degree of anger, distrust, and negative behaviors in the relationship (see Table 4 for the items of both subscales). Items were answered on a 5-point Likert-type scale, ranging from 1 (*no, that is not true*) to 5 (*yes, that is true*). Previous studies found support for the reliability and the validity of the SPARTS (Jellesma, Zee, & Koomen, 2015; Koomen & Jellesma, 2015; Zee & de Bree, 2017). Cronbach's alphas in the present study ranged from 0.81 to 0.85. We also calculated McDonald's omega for each scale using the factor-loadings and residual-variance estimates from the configural invariance model, which takes the nesting of students within classrooms into account; omegas varied from 0.82 to 0.84 (see Table 1).

### 2.3.2. Engagement

Students rated their engagement with each subject on a shortened, Dutch translation of the Engagement versus Disaffection with Learning Questionnaire (Skinner et al., 2008; Dutch translation by Zee & Koomen, 2019). This questionnaire consists of two subscales, Behavioral Engagement (six items) and Emotional Engagement (originally six items, however, one item "When we start something new in class, I feel nervous" was deleted because of nonsignificant factor loadings). Items were reformulated in the present study to be subject-specific (e.g., 'school' was replaced by 'this subject'). Behavioral Engagement refers to students' engaged behaviors towards a specific subject, whereas Emotional Engagement measures students' engaged emotions towards a specific subject (see Table 4 for the items of both subscales). Items were rated on a 5-point Likert-type scale, ranging from 1 (*no, that is not true*) to 5 (*yes, that is true*). Zee and Koomen (2019) found support for the reliability and validity of the Engagement Questionnaire. Cronbach's alphas in the present study ranged from 0.77 to 0.84 and McDonald's omega's varied from 0.76 to 0.85 (see Table 1).

**Table 1**

Number of cases (N), Means (Standard Deviations), range, Cronbach's alpha's ( $\alpha$ ), and McDonald's omega ( $\omega$ ) for manifest study variables.

	N	M (SD)	range	$\alpha$	$\omega$
Subject of homeroom teacher					
1. Closeness	417	4.03 (0.75)	1.00–5.00	0.83	0.82
2. Conflict	417	1.37 (0.58)	1.00–5.00	0.82	0.82
3. Behavioral engagement	431	4.22 (0.61)	1.33–5.00	0.84	0.85
4. Emotional engagement	431	4.12 (0.76)	1.60–5.00	0.81	0.81
Easiest subject					
1. Closeness	419	3.50 (0.86)	1.00–5.00	0.84	0.83
2. Conflict	418	1.45 (0.67)	1.00–5.00	0.81	0.82
3. Behavioral engagement	446	4.20 (0.62)	1.00–5.00	0.84	0.84
4. Emotional engagement	444	4.14 (0.67)	1.80–5.00	0.77	0.76
Hardest subject					
1. Closeness	413	2.95 (0.92)	1.00–5.00	0.85	0.84
2. Conflict	413	1.69 (0.78)	1.00–5.00	0.83	0.84
3. Behavioral engagement	438	4.05 (0.66)	1.00–5.00	0.84	0.85
4. Emotional engagement	438	3.34 (0.88)	1.00–5.00	0.81	0.81

Note. Cronbach's alphas were calculated at level 1 (subject level). McDonald's omega takes the nesting of students within classrooms into account.

## 2.4. Analyses

Structural Equation Modeling with latent factors was performed in Mplus version 7.31 (Muthén & Muthén, 1998–2015). Missing values ranged from 6.3% - 13.2% per variable (see Table 1). Missings were partly due to absences during data collection and partly caused because students sometimes chose the subject of their homeroom teacher also as their easiest or hardest subject (5.9% for hardest subject, 8.4% for easiest subject). If this was the case, either the answers for the subject of the homeroom teacher or for the easiest or hardest subject were deleted (i.e., the subject that was rated last was deleted), in order to prevent overlap of subjects and teachers. The full-information maximum likelihood algorithm (FIML) was used to incorporate all available information from incomplete cases (Jelicic, Phelps, & Lerner, 2009). To make the underlying assumption of FIML of data being missing at random more plausible, educational track (0 = lower vocational education, 1 = higher general secondary education and pre-university education) and students' gender (0 = boys, 1 = girls) were included as auxiliary variables in all analyses. Furthermore, we used maximum likelihood estimation with robust standard errors (MLR in Mplus) to deal with the non-normality in our data. We treated our data as being continuous, as Rhemtulla, Brosseau-Liard, and Savalei (2012) showed that bias in parameter estimates, standard errors, and test statistics is only minimal when questionnaires have at least five answer categories. To take the nesting of students within classrooms into account, the "complex analysis" option was applied to request cluster-robust standard errors and test statistics (Williams, 2000).

### 2.4.1. Measurement invariance

Before proceeding to testing our hypotheses, we checked for measurement invariance across subjects using confirmatory factor analysis (CFA) models. Model building proceeded in four steps: First, we built a baseline model (configural invariance) in which all factor loadings and intercepts were freely estimated. To identify the model, all factor means and variances were fixed to zero and one, respectively. In this model (and in all following models), residuals of parallel items were allowed to correlate across subjects. Second, weak invariance was tested by constraining the factor loadings to be equal across subjects (i.e., the factor loadings for the subject of the homeroom teacher were constrained to be equal to the factor loadings for the easiest and the hardest subject). In this step, the means of all common factors were set at zero, whereas the variances were freely estimated for the easiest and hardest subject but identified by setting them to one for the subject of the homeroom teacher. Third, strong invariance was tested by adding equality constraints to the intercepts across subjects. The means and variances of the common factors were set at zero and one, respectively, only for the subject of the homeroom teacher, whereas they were freely estimated for the easiest and hardest subject. Fourth, in case weak or strong measurement invariance did not hold, we checked modification indices to locate items showing non-invariance (Bentler, 1992; Bentler & Chou, 1993), and released the equality constraints on these items. This would result in a model with partial weaker/strong invariance, which would still allow valid comparisons between latent means, as long as a majority of factor loadings and intercepts can be constrained to be equal across groups (Byrne, Shavelson, & Muthén, 1989).

### 2.4.2. Differences in mean levels

The model with (partial) strong invariance allowed us to test whether there were differences in latent means between the three teachers/subjects. The means of the latent factors (i.e., Closeness, Conflict, Behavioral Engagement, Emotional Engagement) were fixed to zero for the subject of the homeroom teacher and freely estimated for the other two subjects. Subsequently, Wald Z tests were used to investigate whether the mean differences between the subject of the homeroom teacher and both the easiest and hardest subject were different from zero. Because the models were computationally intensive, we used

Wald Z tests to compare the means rather than fitting numerous models with one additional constraint. Finally, a model was built in which the latent means of the easiest subject were fixed to zero and the means of the other two subjects were freely estimated. Changing the reference category did not alter model fit, but it allowed us to compare the means between the easiest and hardest subject. Standardized latent means were also reported to ease interpretation of results,<sup>1</sup> with standardized mean differences of 0.2 being considered as small, 0.5 as medium, and 0.8 as being large effects (Cohen, 1988).

#### 2.4.3. Differences in associations

To allow the comparison of associations (i.e., regression slopes) across subjects, a small change compared to the model in the previous step was needed. In the previous CFA models (in which factors were merely correlated), the variances of all common factors for the homeroom teacher were fixed to one for identification, but in the regression models it would be the residual variances of endogenous factors that would be fixed to one for identification. This would make the scale of the regression slopes rather arbitrary. To link the scale of the slopes instead to the original scale of the observed variables, the first factor loading for each common factor was instead set at one for identification, and all factor variances were freely estimated. In this way, the regression slopes would become comparable across classrooms. Next, directed associations (regression paths) between Closeness and both Behavioral and Emotional Engagement and between Conflict and both Behavioral and Emotional Engagement were freely estimated first for each subject. In this model, all exogenous (i.e., relationship) factors were allowed to freely covary, as were the residuals of all endogenous (i.e., engagement) factors. In the next step, the directed associations were constrained to be equal across subjects. Comparing the fit of these two models allowed us to test whether the strengths of associations differed across subjects. Finally, we checked whether significant cross-subject associations existed (e.g., from Closeness with the homeroom teacher to Behavioral Engagement with the easiest subject). Only significant cross-subject associations were retained in the final model.

#### 2.4.4. Fit indices and model comparisons

To evaluate model fit,  $\chi^2$  values, Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Tucker Lewis Index (TLI), and Standardized Root Mean Square Residual (SRMR) were used. For exact model fit, the  $\chi^2$  value should be non-significant. However, because statistical models often do not fit exactly in the population, we also considered approximate fit indices (i.e., RMSEA, CFI, TLI, and SRMR). For RMSEA and SRMR, lower values indicate better model fit, with values below 0.08 indicating satisfactory fit; for CFI and TLI, higher values indicate better model fit, with values higher than 0.95 indicating satisfactory fit (Hu & Bentler, 1999; Kline, 2011). Because the correlations between the individual items were only modest (rarely higher than 0.4), the standard independence model used to calculate incremental fit indices (CFI and TLI) did not fit our data as poorly as in simulation studies that produced strict guidelines (e.g., Hu & Bentler, 1999). Therefore, we could expect CFI and TLI to be lower than 0.95, even when other fit indices would indicate good approximate fit (Heene, Hilbert, Draxler, Ziegler, & Bühner, 2011). As we expected our model to fit well approximately (but not exactly), we judged our model to have acceptable fit if the CFI and TLI values were near the less stringent criteria of 0.90 suggested by Bentler and Bonett (1980). Because MLR was the estimation method, the Satorra and Bentler (2001) scaled chi square difference test was used for model comparison. Models were considered to be equal if at least four of the following

<sup>1</sup> Standardized latent means were derived directly from the Mplus output. The standardized Mplus output expresses means and mean differences in units of standard deviations, which makes it unnecessary to calculate pooled standard deviations.

criteria were satisfied: change in  $\chi^2$  not significant, increase in RMSEA  $\leq 0.015$ , decrease in CFI and TLI  $\leq 0.010$ , increase in SRMR  $\leq 0.030$  for weak invariance and  $\leq 0.010$  for strong invariance (Chen, 2007; Chen, Curran, Bollen, Kirby, & Paxton, 2008; Cheung & Rensvold, 2002; Rutkowski & Svetina, 2014).

### 3. Results

Descriptive statistics and correlations between study variables per subject can be found in Tables 1 and 2. Within-subject correlations between Closeness and Conflict, on the one hand, and Behavioral Engagement and Emotional Engagement, on the other, were significant and in the expected direction for all three subjects. The cross-subject correlations (except for the correlation between Closeness with the teacher of the easiest subject and Emotional Engagement with the subject of the homeroom teacher) were also significant and in the expected direction but smaller than the within-subject correlations.

#### 3.1. Measurement invariance

Table 3 provides fit indices and comparisons of model fit for all estimated models. The configural invariance model appeared to fit reasonably well,  $\chi^2(2142) = 3414.144$ ,  $p < .001$ , RMSEA = 0.035, CFI = 0.898, TLI = 0.888, SRMR = 0.063. The CFI and TLI were a bit below the preferred 0.90 threshold, which could be explained by the relatively modest correlations between the observed variables (Heene et al., 2011). The chi square difference was significant for the comparison of the weak invariance model with the configural invariance model. However, as the changes of all four approximate fit indices (i.e., RMSEA, CFI, TLI, SRMR) were smaller than the cut off criteria (see Table 3), we concluded that the weak invariance model fitted the data approximately as well as the configural invariance model. In contrast, the strong invariance model fitted the data significantly worse than the weak invariance model, as indicated by a significant chi square difference and large decreases in the CFI and TLI (see Table 3). Checking the modification indices indicated that freely estimating the intercepts of items 2 and 5 about relationship quality (Closeness) and items 9 and 11 about engagement (Emotional Engagement; see Table 4) across subjects would improve model fit. According to all four approximate fit indices, the model with partial strong invariance fitted the data approximately as well as the model with weak invariance (see Table 3) and the overall fit of this model was also acceptable,  $\chi^2(2210) = 3649.805$ ,  $p < .001$ , RMSEA = 0.037, CFI = 0.884, TLI = 0.877, SRMR = 0.069. Therefore, the model with partial strong invariance was chosen as the final model (see Table 4 for factor loadings and intercepts).

#### 3.2. Differences in relationship quality and engagement

Table 5 displays mean differences and Z-tests for comparisons of relationship quality and engagement across subjects. For Closeness, all mean differences were significantly different from zero (Zs ranging from  $-2.92$  to  $-7.78$ ,  $ps < .010$ ). Effect sizes were small and negative for the comparison between the homeroom teacher and the teacher of the easiest subject (Cohen's  $d = -0.37$ ), large and negative for the homeroom teacher versus the teacher of the hardest subject (Cohen's  $d = -1.06$ ), and medium and negative for the teachers of the easiest subject versus the hardest subject (Cohen's  $d = -0.74$ ). For Conflict, the mean difference for the comparison between the homeroom teacher and the teacher of the easiest subject was not significantly different from zero ( $Z = 1.18$ ,  $p = .237$ ). In contrast, the mean differences in Conflict for the comparison with the teacher of the hardest subject were significantly different from zero ( $Zs = 4.11$  and  $3.57$ ,  $ps < .001$ ). Effect sizes were small and positive for the comparison between the teacher of the hardest subject and both the homeroom teacher and the teacher of the easiest subject (Cohen's  $ds = 0.46$  and  $0.35$ , respectively). These findings indicate that students perceive more closeness in

**Table 2**  
Bivariate correlations between manifest study variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
Subject of homeroom teacher											
1. Closeness	–										
2. Conflict	–0.51**	–									
3. Behavioral engagement	0.41**	–0.48**	–								
4. Emotional engagement	0.41**	–0.42**	0.69**	–							
Easiest subject											
5. Closeness	0.33**	–0.15**	0.12*	0.09	–						
6. Conflict	–0.14**	0.40**	–0.29**	–0.23**	–0.49**	–					
7. Behavioral engagement	0.20**	–0.35**	0.56**	0.32**	0.37**	–0.43**	–				
8. Emotional engagement	0.18**	–0.31**	0.36**	0.33**	0.44**	–0.47**	0.63**	–			
Hardest subject											
9. Closeness	0.26**	–0.14**	0.16**	0.13*	0.25**	–0.15**	0.17**	0.14**	–		
10. Conflict	–0.20**	0.50**	–0.37**	–0.30**	–0.15**	0.45**	–0.37**	–0.29**	–0.53**	–	
11. Behavioral engagement	0.23**	–0.29**	0.54**	0.33**	0.15**	–0.23**	0.49**	0.28**	0.43**	–0.50**	–
12. Emotional engagement	0.15**	–0.24**	0.43**	0.42**	0.11*	–0.18**	0.33**	0.27**	0.53**	–0.50**	0.60**

\*  $p < .05$ .  
\*\*  $p < .01$ .

**Table 3**  
Model fit and model comparison statistics.

	$\chi^2$	df	$p$	RMSEA	CFI	TLI	SRMR	$\Delta\chi^2$	df	$p$	$\Delta$ RMSEA	$\Delta$ CFI	$\Delta$ TLI	$\Delta$ SRMR
Configural invariance	3414.144	2142	< .001	0.035	0.898	0.888	0.063							
Weak invariance	3512.355	2180	< .001	0.036	0.893	0.885	0.067	87.75	38	< .001	0.001	–0.005	–0.003	0.004
Strong invariance	4046.259	2218	< .001	0.042	0.853	0.844	0.076	477.50	38	< .001	0.006	–0.040	–0.041	0.009
Partial strong invariance	3649.805	2210	< .001	0.037	0.884	0.877	0.069	128.93	30	< .001	0.001	–0.009	–0.008	0.002
Associations free	3693.981	2234	< .001	0.037	0.882	0.877	0.080	43.27	24	.009	0.000	–0.002	0.000	0.011
Associations constrained	3692.400	2242	< .001	0.037	0.883	0.878	0.082	4.68	8	.791	0.000	0.001	0.001	0.002
Cross-subjects	3684.930	2241	< .001	0.037	0.884	0.878	0.079	16.51	1	< .001	0.000	0.001	0.000	–0.003

Notes. The scaling correction factors, needed for the Satorra-Bentler correction were 1.0907; 1.0982; 1.1008; 1.0998; 1.1028; 1.1057; and 1.1060, respectively. For the RMSEA and SRMR, a negative value equals improved model fit, whereas for the CFI and TLI a positive value equals improved model fit. The model with partial strong invariance was compared to the model with weak invariance. Cross-subjects = model with significant cross-subject association (i.e., between Conflict with homeroom teacher and Behavioral Engagement with easiest subject) included.

their relationship with the homeroom teacher, followed by the relationship with the teacher of their easiest subject, followed by the relationship with the teacher of their hardest subject. Students appeared to experience no differences in the degree of conflict in their relationships with the homeroom teacher and the teacher of the easiest subject, whereas they did experience more conflict in the relationship with the teacher of their hardest subject compared to the other two teachers.

With regard to students' engagement, mean differences for the comparison of the subject of the homeroom teacher and the easiest subject were not significantly different from zero for both Behavioral Engagement ( $Z = -0.57, p = .568$ ) and Emotional Engagement ( $Z = 0.22, p = .830$ ). The mean differences for the comparisons with the hardest subject, however, were all significantly different from zero ( $Z$ s ranging from  $-2.53$  to  $-7.41, ps < .050$ ). For Behavioral Engagement, effect sizes were small and negative for both the comparison between the subject of the homeroom teacher and the hardest subject and between the easiest and the hardest subject (Cohen's  $d = -0.31$  and  $-0.25$ , respectively). For Emotional Engagement, effect sizes were large and negative (Cohen's  $d = -0.87$  and  $-0.90$ , respectively). Thus, there seem to be no differences in students' behavioral and emotional engagement with the subject of the homeroom teacher and the easiest subject, whereas students were less behavioral and emotional engaged with their hardest subject than with both the subject of their homeroom teacher and their easiest subject.

3.3. Associations between student-teacher relationships and engagement

Constraining the strengths of associations between the latent factors for relationship quality and engagement did not deteriorate model fit

compared to the model with all associations freely estimated,  $\Delta\chi^2(8) = 4.68, p = .791, \Delta$ RMSEA = 0.000,  $\Delta$ CFI = 0.001,  $\Delta$ TLI = 0.001,  $\Delta$ SRMR = 0.002 (see Table 3). The overall fit of the model with constrained associations was also acceptable,  $\chi^2(2242) = 3692.400, p < .001, RMSEA = 0.037, CFI = 0.883, TLI = 0.878, SRMR = 0.082$ . Thus, associations did not seem to differ across subjects. As can be seen in Table 6, Closeness was significantly and positively associated with both Behavioral and Emotional Engagement, whereas Conflict was significantly and negatively associated with Behavioral and Emotional Engagement for all three subjects. Finally, there appeared to be one significant cross-subject association. More specifically, Conflict in the relationship with the homeroom teacher appeared to be negatively associated with Behavioral Engagement with the easiest subject (see Table 6). Together, these findings indicate that the positive associations between closeness and engagement and the negative associations between conflict and engagement are the same for the subject of the homeroom teacher, the easiest subject, and the hardest subject. Furthermore, the degree of conflict in the relationship with the homeroom teacher seemed to be associated with students' engagement with their easiest subject as well.

4. Discussion

The present study was one of the first to examine whether secondary school students share different relationships with different teachers at the same moment in time. Furthermore, we investigated whether students experienced different levels of engagement with different subjects and whether the strength of associations between student-teacher relationships and engagement varied across subjects. Different from previous studies that examined variation in relationships with teachers

**Table 4**  
Factor loadings and intercepts for the model with partial strong invariance.

	Factor loadings	Intercepts
<b>Closeness</b>		
1. I feel relaxed with this teacher.	0.57	4.51
2. I tell this teacher things that are important to me.	0.43	<b>3.24/2.42/2.61</b>
3. This teacher understands me.	0.65	4.21
4. I think I have a good relationship with this teacher.	0.71	4.14
5. If I have a problem, I can share it with this teacher.	0.65	<b>4.46/3.91/4.12</b>
6. This teacher usually knows how I feel.	0.67	3.49
<b>Conflict</b>		
7. I easily have quarrels with this teacher.	0.47	1.20
8. This teacher treats me unfairly.	0.41	1.21
9. This teacher thinks I do things sneaky.	0.47	1.36
10. I guess this teacher gets tired of me in class.	0.51	1.62
11. I feel this teacher does not trust me.	0.52	1.36
12. I can be very angry with this teacher.	0.70	1.49
<b>Behavioral engagement</b>		
1. I try hard to do well in this subject.	0.51	4.52
2. When I am in class, I think about other things (recorded).	0.64	3.70
3. When I'm in class, I listen very carefully.	0.60	4.09
4. When I'm in class, I just act like I'm working (recorded).	0.47	4.57
5. I pay attention in class.	0.55	4.35
6. In class, I work as hard as I can.	0.64	4.13
<b>Emotional engagement</b>		
7. When I'm in class, I feel good.	0.58	4.26
8. When we work on something in class, I feel interested.	0.69	4.02
9. When we work on something in class, I feel bored (recorded).	0.63	<b>4.06/3.76/4.25</b>
10. I enjoy learning new things for this subject.	0.79	4.02
11. I don't like this subject (recorded).	0.70	<b>4.29/4.52/3.61</b>

Notes. Unstandardized factor loadings and intercepts are reported. Intercepts in bold differ across subjects and are presented in this order: subject of homeroom teacher/easiest subject/hardest subject.

**Table 5**  
Mean differences and Z-tests for comparisons in relationship quality and engagement.

	Subject homeroom teacher versus easiest subject				Subject homeroom teacher versus hardest subject				Easiest subject versus hardest subject			
	Mean dif.	Z	p	Cohen's d	Mean dif.	Z	p	Cohen's d	Mean dif.	Z	p	Cohen's d
Closeness	-0.45	-2.92	.004	-0.37	-1.48	-7.78	< .001	-1.06	-0.85	-6.43	< .001	-0.74
Conflict	0.15	1.18	.237	0.13	0.64	4.11	< .001	0.46	0.42	3.57	< .001	0.35
Behavioral Enga.	-0.06	-0.57	.568	-0.06	-0.32	-2.53	.011	-0.31	-0.26	-3.23	.001	-0.25
Emotional Enga.	0.03	0.22	.830	0.04	-1.00	-6.06	< .001	-0.87	-1.23	-7.41	< .001	-0.90

Notes. Enga. = Engagement. Mean dif. = unstandardized mean difference. Cohen's d = standardized mean difference.

of specific subjects (Wallace, Ye, & Chhuon, 2012; Wallace, Ye, McHugh, & Chhuon, 2012), we focused on relationships with the homeroom teacher, the teacher of students' easiest subject, and the teacher of students' hardest subject. In addition to relational closeness, we also included conflict as a negative relationship dimension (cf., Baker, 2006; Hamre & Pianta, 2001) and distinguished between behavioral and emotional aspects of students' engagement (cf., Skinner et al., 2008; Skinner et al., 2009). As evidence for partial strong measurement invariance was found, the used questionnaires seemed to be suited to make comparisons between teachers and subjects. The present study may contribute to our knowledge about student-teacher relationships in secondary education in several ways.

First of all, our results seem to indicate that secondary school

students experience differences in the affective quality of their relationship with different teachers. In this way, our findings confirmed both theoretical assumptions (Overall et al., 2003) and scarce empirical findings (Jiang et al., 2015; Lee et al., 2012; Wallace, Ye, & Chhuon, 2012; Wallace, Ye, McHugh, & Chhuon, 2012) that conclusions about the quality of students' relationships cannot be generalized across different teachers. As expected (cf., Davis, 2006; McGrath & van Bergen, 2015), students experienced more closeness in the relationship with their homeroom teacher than in their relationship with the other two teachers. As such, homeroom teachers apparently seem to succeed in their role of confidential and contact person. Interestingly, students reported comparable levels of conflict in their relationship with their homeroom teacher and the teacher of their easiest subject, whereas they did experience more conflict with the teacher of their hardest subject compared to the other two teachers. Our results thus seem to suggest that students are more likely to share dysfunctional relationships with the teacher of their hardest subject than with other teachers. Finding this hierarchy in students' relationship perceptions seems to imply that students do experience differences in the affective quality of their relationship with different teachers. Together with previous findings that correlations between relationships with teachers in general and relationships with a specific teacher were only mediocre (Wallace, Ye, McHugh, & Chhuon, 2012), our results seem to implicate that a focus on teachers in general may not provide an accurate picture of secondary school students' relationship experiences. Therefore, it seems advisable for future research to focus on relationships with specific teachers. Moreover, it would be interesting to compare relationship quality with even more teachers than was done in the present and previous studies (Jiang et al., 2015; Lee et al., 2012; Wallace, Ye, & Chhuon, 2012; Wallace, Ye, McHugh, & Chhuon, 2012).

Second, as indicated by some previous studies (Dietrich et al., 2015; Goetz et al., 2007; Goetz, Frenzel, et al., 2010; Trautwein & Lüdtke, 2009), there also appeared to be some variation in students' engagement with the different subjects. More specifically, students' engagement with their hardest subject appeared to be lower than their engagement with the other two subjects. It thus seems to be mainly students' hardest subject that shows a drop in both their behavioral and emotional engagement, which is in line with studies showing that perceived task difficulty leads to lower engagement (e.g., Cornelisz &

van Klaveren, 2018; Patall et al., 2018; Tulis & Fulmer, 2013). Finding a divergent level of engagement with the hardest subject appears to indicate that future studies might profit from a stronger focus on engagement with regard to specific subjects in contrast to engagement with school in general as was common practice in most previous research.

Third, contrary to expectations (cf., Hamre & Pianta, 2001; Roorda et al., 2011), the strength of associations between student-teacher relationship quality and students' engagement did not differ across subjects. This applied to both closeness and conflict as relationship dimensions and to both behavioral and emotional engagement as outcome variables. Two alternative hypotheses were formulated in advance: First, the relationship with the teacher of the hardest subject

**Table 6**  
Associations between student-teacher relationship quality and students' engagement with the different subjects.

	Behavioral engagement		Emotional engagement	
	<i>b</i> ( <i>SE</i> )	$\beta$	<i>b</i> ( <i>SE</i> )	$\beta$
Within-subject associations				
Closeness	0.19 (0.03)**	0.23/0.26/0.29	0.36 (0.04)**	0.37/0.49/0.45
Conflict	-0.25 (0.07)**	-0.25/-0.27/-0.31	-0.21 (0.07)**	-0.18/-0.23/-0.22
Cross-subject association: Behavioral Engagement with easiest subject				
Conflict homeroom teacher	-0.12 (0.05)*	-0.11		

Notes. Both unstandardized (*b*) and standardized ( $\beta$ ) coefficients are reported. Standardized coefficients are provided in this order: subject of the homeroom teacher/easiest subject/hardest subject.

\*  $p < .05$ .

\*\*  $p < .01$ .

could be most strongly associated with students' engagement because students are more at risk for malachievement in this subject (Hamre & Pianta, 2001). Second, the relationship with the homeroom teacher could be more important due to the special role of homeroom teachers. One of the possible explanations for not finding the expected differences is that one hypothesis applied to part of the students, whereas the other hypothesis applied to the other students. That is, it might be that for some students, it was the relationship with the homeroom teacher that was most strongly associated with engagement, whereas for other students, the relationship with the teacher of their hardest subject was more strongly related to engagement (cf., Hamre & Pianta, 2001). Therefore, effects could be leveled out and, hence, no differences between subjects would be found. More research with, for example, person-centered analyses is needed to examine this proposition. It could also be, however, that secondary school students' relationships with their different teachers are similarly associated with their engagement with the subjects of these respective teachers. When interpreted this way, the present study seems to indicate that individual relationships with all teachers are equally important for students' engagement and not only the relationship with, for example, the homeroom teacher. Furthermore, in some instances, the effects of the relationship with a specific teacher may generalize to students' engagement with other subjects as well, as conflict with the homeroom teacher appeared to be associated with students' behavioral engagement with their easiest subject. Finally, the fact that not only closeness but also conflict was consistently associated with students' engagement appears to imply that secondary school studies should not solely focus on positive relationship dimensions but also take negative dimensions (e.g., conflict) into account. Still, longitudinal studies are needed to find out whether the revealed associations hold over time.

#### 4.1. Limitations

Some limitations need to be taken into consideration when interpreting the results of the present study. First, our study used a cross-sectional design, which prevents conclusions about causality of influences. Based on theoretical assumptions (Pianta, 1999; Verschueren & Koomen, 2012) and because previous cross-lagged studies showed that student-teacher relationships impacted students' engagement but not the other way around (Archambault, Pagani, & Fitzpatrick, 2013; Engels et al., 2016), we considered the relationship as predictor and students' engagement as outcome variable. Still, there are also some studies that found that students' engagement affected the quality of the student-teacher relationship (Hughes, Luo, Kwok, & Loyd, 2008; Skinner & Belmont, 1993). Furthermore, students may also perceive a certain subject as hard because they share a dysfunctional relationship with the teacher of this subject. More research with longitudinal designs is needed to permit conclusions about causality of influences. Such studies might also do wise to include more predictor variables (e.g., personality match of teachers and students) in order to get more

insight in why students develop more negative relationships with some teachers than with others.

Second, students reported about both the relationship quality and their own engagement, as was the case in most secondary school studies (cf., Roorda et al., 2011; Roorda et al., 2017). Therefore, the strength of associations between student-teacher relationships and engagement might be overestimated due to same informant bias (Roorda et al., 2011). As we were one of the first to study relationships with different teachers and because we were mainly interested in students' experiences, we believe that our study can still contribute to the existing literature in meaningful ways. In future research, however, it seems advisable to also include teachers' perceptions of relationship quality and students' engagement. Furthermore, it would also be interesting to include students' cognitive engagement as an outcome variable, which would provide an even more comprehensive operationalization of this concept (cf., Fredricks et al., 2004).

Finally, we only selected seventh grade students for this study because they have just made the transition to secondary school and, hence, have to deal with the challenges of adapting to a new school environment (Eccles et al., 1993; cf., Gehlbach et al., 2012). More research is needed, however, to find out whether our results would also generalize to students from higher grade levels.

#### 4.2. Implications for school practice

Although our findings thus need to be confirmed by longitudinal research, using different informants, and including more grade levels of secondary education before stronger conclusions can be drawn, we believe that some first implications for school practice can already be formulated. First, our findings seem to imply that secondary school teachers need to be made aware that they can all stimulate students to become more engaged with their subject by striving for relationships high in closeness and low in conflict, even if they are not students' homeroom teacher. Second, teachers should be made aware that students who perceive their subject as difficult are at risk for developing both more negative relationships with them and being less behaviorally and emotionally engaged with their subject. By regularly monitoring which students perceive their subject as difficult, teachers may offer more support and try to stimulate these students more to stay engaged in order to prevent the development of problematic relationships and low engagement. As secondary school teachers usually have a lot of students to relate to and mostly see them only for a few hours per week, it will be especially important to help teachers to invest in building good student-teacher relationships as efficiently as possible. Combining programs targeting secondary school students' relationship quality and engagement at the school level (e.g., Check & Connect; Christenson, Stout, & Pohl, 2012; Sinclair, Christenson, & Thurlow, 2005) with ideas and starting points from interventions targeting relationships between individual teachers and children in primary school (e.g., Relationship Focused Reflection Program; Spielt, Koomen, Thijs, & van der Leij, 2012)

might help to make interventions and training programs as focused and efficient as possible.

#### 4.3. Conclusion

To conclude, the present study may contribute to the literature in several ways. The results suggest that secondary school students experience differences in the quality of their relationship with different teachers, with the relationship with the homeroom teacher being the most favorable (i.e., higher in closeness than for the other two teachers) and the relationship with the teacher of their hardest subject being the least profitable (i.e., lower in closeness and higher in conflict than for the other two teachers). Students' engagement with their hardest subject also proved to be different from their engagement with the other two subjects, with both engaged behaviors and emotions being lower for the hardest subject. Teachers and other school practitioners should be made aware that students are most at risk for developing dysfunctional relationships and becoming disengaged with (the teacher of) their hardest subject. To make interventions as efficient as possible, it seems advisable to regularly monitor the degree of difficulty that students experience across different subjects and to use subject-specific interventions to tackle problematic relationships and low engagement. Future research would also profit from making the distinction between different teachers and different subjects when examining student-teacher relationships and engagement.

Furthermore, relationships with all three teachers seemed to be equally strongly associated with students' engagement with these teachers' subjects, as both closeness and conflict appeared to be consistently associated with students' engaged emotions and behaviors. It therefore seems advisable to make secondary school teachers aware that each of them may be important for students' engagement, even if they are not the homeroom teacher. Finally, as conflict appeared to be a relevant relationship dimension for students' engagement, future studies are advised to include this dimension more often.

#### Declaration of competing interest

None.

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