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Week-to-week interplay between teachers' motivating style and students' engagement

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ABSTRACT

Research has shown that teachers' autonomy support and provision of structure relate to students' agentic and behavioral engagement. Moreover, agentic engagement elicits higher teacher autonomy support. In the present 5-week diary study, we investigated the dynamic nature of this interplay between teachers and students through their cross-assessment of students' agentic and behavioral engagement. We also considered the week-to-week student-reported teacher autonomy support and provision of structure as well as two student personal characteristics — proactive personality and situational autonomous versus controlled motivation. Two hundred fifty-seven Turkish middle school students and their teachers from 13 classes participated in the study. Multilevel analyses showed that students' week-to-week perceived autonomy support and initial level of autonomous motivation positively predicted week-to-week agentic engagement (teacher- and student-reported). Students' week-to-week perceived structure positively predicted week-to-week agentic and behavioral engagement (student-, but not teacher-, reported). These findings indicate the interplay between students' situational engagement and teachers' situational motivating style (i.e., autonomy support and provision of structure). They also suggest greater predictive power for students' situational motivation over the personal trait of proactive personality.

KEYWORDS

Agentic engagement; behavioral engagement; autonomy support; structure; autonomous motivation; intrapersonal analysis; diary study

STUDENTS' ENGAGEMENT IS highly appreciated as a prerequisite for learning (Skinner et al., 2016). Many studies on students' engagement have highlighted the importance of the teacher motivating style, whereas a few have underscored the importance of students' personal attributes. Specifically, research has shown that autonomy-supportive teaching (i.e., acknowledging students' perspective, encouraging self-initiation and providing choices) and provision of structure (i.e., establishing a clear set of justified rules, behaving in a consistent way, and providing help and support) are positively related to students' behavioral, cognitive and emotional engagement (Hospel & Galand, 2016; Janget al., 2010; Skinner & Belmont, 1993). Recent research has also shown that agentic engagement (i.e., students' expression of queries, preferences and needs in the classroom) relates to autonomy-supportive teaching (Matoset al., 2018; Patall et al., 2019). When students feel that their teacher encourages self-initiation and provides choices (autonomy support), they also feel that they express their preferences and needs in the learning situation. Moreover, when students are agenticallly engaged, they also guide their teachers toward their

needs and facilitate them to become more supportive (Reeve, 2013; Reeve et al., 2020b). Therefore, an interplay, between the teacher and the student operates.

However, no research has investigated the relation of perceived autonomy support to agentic engagement through cross-informant assessment to reveal this interplay. A lack of research also on the relation of other aspects of the teacher's motivating style to agentic engagement prevents us from fully understanding how the teacher and the student together contribute in the learning process. For example, well-structured teaching relates positively to students' behavioral engagement (Jang et al., 2010), but does it also relate to agentic engagement?

In the present diary study, we addressed these issues by investigating the week-to-week relation of teacher-reported agentic and behavioral engagement in specific class sessions to student's perception of teacher-provided autonomy support and structure. Moreover, as agentic engagement requires a degree of proactivity and autonomous functioning, we also investigated to what extent initial levels of students' proactive personality (i.e., the desire to actively change their environment) and autonomous motivation (i.e., studying out of interest or for personally meaningful reasons) predict mean-level differences in teacher-reported and student-reported agentic and behavioral engagement and whether they moderate the week-to-week relations of engagement to autonomy support and structure.

Agentic and Behavioral Engagement

Engagement refers to a student's active involvement in learning and it is associated to highly valued educational outcomes (Jang et al., 2010; Wang & Degol, 2014), such as persistence and grades (Kuh et al., 2008). Engagement is a multidimensional meta-construct that incorporates cognitive, behavioral, emotional, and agentic components (Fredrick et al., 2004; Reeve & Tseng, 2011) that are inter-connected in a dynamic fashion. As engagement may be theoretically and operationally defined through different perspectives in the literatures of achievement emotions, self-regulated learning and motivation, there is no consensus about its components and how to measure each of them (Fredrick et al., 2004). For Skinner and Belmont (1993) student engagement in learning activities includes a behavioral (behavioral involvement) and emotional (a positive emotional tone) component. In the seminal work of Fredrick et al. (2004), engagement is a three-component construct consisted of behavioral, emotional, and cognitive engagement. A decade ago, Reeve and Tseng (2011) introduced agentic engagement as a fourth component, while Fredricks et al. (2016) recently proposed social engagement as another potential dimension. Despite the disagreement about the components of engagement, there is a consensus that all components are interrelated, and can be strongly intercorrelated (Vasalampi et al., 2016). For this reason, in some studies strongly correlated components of engagement have been merged (e.g., cognitive and behavioral; Pöysä et al., 2019; or cognitive and emotional; Malmberg et al., 2014). It seems, therefore, necessary that each study provide a clear definition of its conceptualization of engagement (Boekaerts, 2016; Bond et al., 2020).

Although we concur that engagement at the classroom level entails behavior, emotion, cognition, agency and perhaps social interaction, we focus on behavioral and agentic engagement for three reasons. First, because we were especially interested in assessing students' engagement through their teachers' reports, we considered that learners' behavioral and agentic engagement could be more easily observed by their teachers during in-class activities than cognitive, emotional or social engagement (Lee & Reeve, 2012). Second, we wanted to minimize the study burden on teachers, as making two ratings is more reasonable than making five ratings. Third, by narrowing our assessments in two dimensions, we minimized possible halo effects on teachers' ratings, that is carryovers from the judgment of one dimension to some others.

Behavioral engagement at the classroom level refers to the observable actions students take to be on-task in terms of effort and persistence in the face of difficulty (Skinner et al., 2009).

Behavioral engagement also involves coming to class, coming to class prepared, completing tasks, and adhering to rules rather than being disruptive. Such on-task, observable, and progress-enabling actions generally arise from students' motivational states (e.g., psychological need satisfaction; Skinner et al., 2008) and teachers' instructional supports (e.g., autonomy support, provision of structure; Jang et al., 2010), and these displays of effort and participation do generally predict indicators of academic progress, such as skill development (Ericsson et al., 1993), standardized test score gains (Alexander et al., 1993; Ladd & Dinella, 2009), and staying in school (vs. dropping out; Rumberger, 1995).

Agentic engagement at the classroom level refers to the observable actions students take to express themselves in the learning process in terms of the extent to which students pose questions, express their preferences, opinions, or needs, communicate their interest, provide input and suggest alternatives, and request assistance (e.g., modeling), feedback, and concrete examples for abstract concepts (Reeve, 2013). This proactive engagement also arises from students' motivational states (e.g., psychological need satisfaction; Reeve & Tseng, 2011) and teachers' instructional supports (e.g., autonomy support, Matos et al., 2018) and positively predicts academic achievement (Reeve, 2013; Reeve et al., 2020) and career decision-making self-efficacy (Mameli et al., 2019). More importantly, agentic engagement links students' actions with teacher instructional behavior (Reeve et al., 2020) showing the "evocative impact" (p. 180) of students on teacher instruction (Nurmi, 2012). The agentially engaged student joins her own effort with the teacher's effort to teach effectively and, together, they produce learning conditions and differentiated instruction that are specifically tailored to the student's needs.

Teacher Instructional Behavior and Student Engagement

Teachers use different approaches to motivate and effectively engage students in learning. In the framework of Self-determination theory (SDT; Ryan & Deci, 2017), when teachers satisfy students' psychological needs for autonomy, competence and relatedness, students function optimally in the classroom. Autonomy refers to a sense of volition and self-endorsement, and it is satisfied through teacher-provided autonomy-support. Competence refers to a sense of effectance in interacting with the environment, and it is satisfied through teacher-provided structure. Relatedness refers to a sense of belongingness and emotional connection, and it is satisfied through teacher-provided care and involvement. According to SDT, when teachers satisfy these three psychological needs to their students, they foster students' learning, optimal functioning, and wellbeing (Ryan & Deci, 2017). Research has shown that teacher involvement is difficult to empirically separate from autonomy support as when a teacher scores high in involvement, she also scores high in autonomy support (Leenknecht et al., 2017). The teacher who respects students' choices and acknowledges their feelings (autonomy support) is usually a caring teacher (involvement). Therefore, an autonomy supportive teacher satisfies students' needs for both autonomy and relatedness (Cheon & Reeve, 2013). For this reason autonomy support and provision of structure are the two main indicators of need-supportive teaching in the literature (see Jang et al., 2010; Hospel & Galand, 2016; Sierens et al., 2009; Yoo, 2015).

Teacher-provided autonomy support and structure foster students' classroom engagement (Jang et al., 2010). When autonomy supportive, teachers take their students' perspective, provide choices, avoid directives and commands (Deci et al., 1994), explain the personal relevance of the learning subject (Assor et al., 2002), acknowledge students' negative feelings (Jang et al., 2010), allow students to work in their own way (Reeve & Jang, 2006), show understanding to their students (Reeve, 2016), and use inviting language when making requests (Vansteenkiste et al., 2018). Reeve et al. (2004) found that when these qualities were observed in teachers, students also were observed to be highly engaged (Reeve et al., 2004). Likewise, when teachers provide structure, they provide appropriate guidance and constructive feedback (Jang et al., 2010), use optimally

challenging tasks, communicate clear expectations and justify rules (Aelterman et al., 2019; Grolnick & Pomerantz, 2009). Stroet et al. (2013), in their review, summarize the relation of aspects of teacher provision of structure to student engagement as it has been found in previous research.

Moreover, autonomy support and structure both predict students' behavioral engagement. Skinner and Belmont (1993) found that teacher-reported students' behavioral (and emotional) engagement were related to student-reported teacher's autonomy support and provision of structure. Likewise, Jang et al. (2010) observed 133 teachers and found that both teachers' autonomy support and structure predicted students' observed and self-reported behavioral engagement. Hospel and Galand (2016) found, in a sample of Belgian French-speaking adolescent students, that, at the classroom level, teacher-provided structure predicted students' self-reported behavioral, cognitive (self-regulation) and emotional engagement. On the other hand, teacher-provided autonomy support as well as the interaction of teacher-provided autonomy support and structure predicted only emotional engagement (Hospel & Galand, 2016). At the individual level, however, Mouratidis et al. (2018) found, in a sample of Belgian Dutch-speaking adolescent students, that both autonomy support and provision of structure at the beginning of the school year predicted increases in students' study effort (an indicator of behavioral engagement) at the end of the school year through students' autonomous motivation.

Regarding agentic engagement, students' perceptions of teacher's autonomy support at the beginning of the academic year predicted students' extent of agentic engagement at the end of the year — and vice versa (Matos et al., 2018). Likewise, students, whose teachers participated in training to become more autonomy supportive, had higher mid-year agentic engagement, and this agentic engagement boost then predicted higher year-end perception of teacher autonomy support (Reeve et al., 2020). Moreover, students' daily self-reported agentic engagement in science (i.e., situational agentic engagement) predicted their science teachers' daily perceived autonomy support (i.e., situational teacher autonomy support) (Patall et al., 2019). It seems that when students feel that their teacher encourages student initiative and provides choices (autonomy support), students feel that they can express their preferences and needs in the learning situation.

What is the case, however, when their teacher also provides a structured classroom environment? In a recent study, Cheon et al. (2020) trained physical education teachers to support autonomy, to provide structure, and to provide structure in an autonomy-supportive manner. They found that the students of these teachers, compared to the students of teachers who did not receive any training, were behaviorally, emotionally, cognitively and agentially more engaged in classroom activities. As Jang et al. (2010) have pointed out, teacher autonomy support and provision of structure are two distinct aspects of teaching style that need to be taken together into consideration.

Specifically, as students attended their different classes from week-to-week, we examined the interplay between students' agentic and behavior engagement on the one hand and teacher's autonomy support and structure on the other hand. That approach enabled us to examine not only the ups and downs of week-to-week agentic and behavioral engagement as a function of autonomy support and structure (i.e., the interplay of teacher and student) but also whether students' personal traits or attributes could account for mean-level differences in students' engagement. We were therefore able to consider whether students' personal backgrounds might play a role in the interplay of teacher and student in learning process or whether teacher and student functioning is more conducive to the situational interplay that occurs class-session to class-session. Among the several traits and personal attributes, we focused on proactive personality (i.e., individuals' desire to actively change their environment), which is conceptually related to agentic engagement, behavioral engagement, and quality of motivation (i.e., autonomous motivation, controlled motivation) (Gairns et al., 2015; Reeve, 2013).

Students' Proactive Personality and Quality of Motivation

Classroom-based research suggests personal dispositions such as agreeableness and conscientiousness predict students' behavioral, cognitive and emotional engagement (Qureshi et al., 2016), as does openness to experience (Bakker et al., 2015). Some attitudes or perceptions, rather than stable dispositions, have also been positively related to students' engagement. For example, proactive coping (i.e., perceiving demanding situations in life as personal challenges) relates positively to classroom engagement (Gan et al., 2007). Importantly, the tendency of self-expression in Facebook is related to students' agentic engagement in school activities (Datu et al., 2018), while students' self-efficacy is related to both agentic and behavioral engagement (Sokmen, 2019). Overall, it seems that both personal characteristics and classroom environment are related to students' engagement.

Similarly, students' autonomous motivation (i.e., behavior is instigated by interest and enjoyment or personally important goals and values) also predicts students' behavioral engagement in physical education (Gairns et al., 2015; Yoo, 2015) as well as their agentic, behavioral, emotional and cognitive engagement at school more generally (Reeve, 2013). Moreover, students' controlled motivation (i.e., behavior is instigated by rewards, threats or internally pressuring reasons such as feelings of guilt) was found to be negatively related to their agentic, emotional and cognitive engagement (Reeve, 2013). Quality of motivation (i.e., autonomous versus controlled motivation) in a specific context is one of students' personal characteristics that seems to be related to their engagement.

Especially as it concerns agentic engagement, we argue that, in the specific context of a subject matter, being instigated by interest and personally meaningful reasons will naturally trigger student expression of her needs, preferences and queries. Likewise, personality dispositions such as proactivity could be especially related to agentic engagement. It is unknown, however, whether during a specific classroom event, students' proactive personality (a stable disposition) as compared to quality of motivation (a situational attribute) matters more for students' behavioral and agentic engagement. Moreover, we do not know whether students' proactive personality or quality of motivation interact with perceived autonomy support and provision of structure in the prediction of students' agentic and behavioral engagement.

The Present Study

In this 5-week diary study, we sought to describe the interplay of teacher and student in the learning process. We examined to what extent the week-to-week teacher-report of students' agentic and behavioral engagement in a particular lesson could be explained by student-reported autonomy support and provision of structure as well as student-reported proactive personality and autonomous versus controlled motivation. In that way, we examined from a dynamic perspective the interplay of teacher and student in the prediction of one of the most desired educational outcomes, students' engagement.

We expand previous studies in five important ways. First, unlike most of the previous studies which focused on the between-student differences in engagement (for an exception see the recent work of Patall et al., 2019), we examined from a more dynamic perspective the week-to-week fluctuations of students' agentic and behavioral engagement. Second, we assessed agentic engagement and behavioral engagement not only through students' reports but also through teachers' ratings. In that way, we avoided the method bias that is common in the majority of previous research that relies only on a single informant (Podsakoff et al., 2012). Third, we examined the joint role of both autonomy support and structure (not just autonomy support) in the prediction of week-to-week fluctuation of agentic and behavioral engagement. Fourth, we sought to explain not only the within-person (i.e., week-to-week) fluctuations of engagement as a function of week-

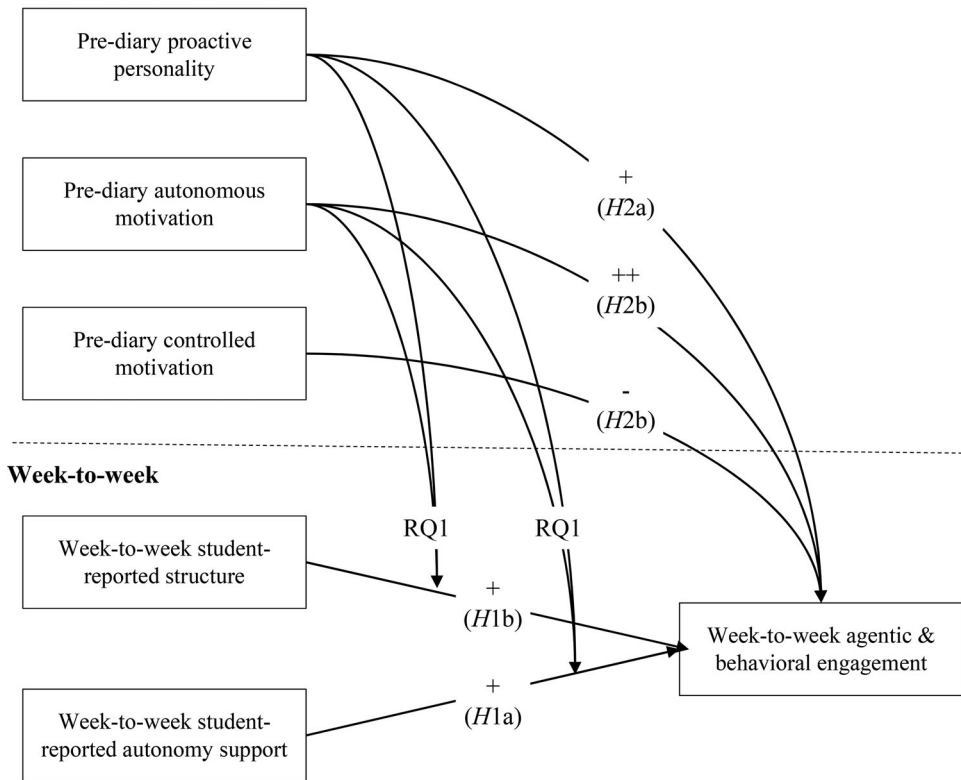
Between-person

Figure 1. The hypothesized model. Hypothesis 3 is represented by two crosses that imply a stronger positive relation between initial levels of autonomous motivation and week-to-week engagement than between initial levels of proactive personality and week-to-week engagement.

to-week perceptions of autonomy support and structure but also the between-person differences in engagement as a function of students' proactive personality and autonomous and controlled motivations, as assessed one week before the diary phase. Finally, we tested to what extent proactive personality and autonomous and controlled motivation might moderate the week-to-week relations of autonomy support and provision of structure to behavioral and agentic engagement.

Based on previous findings, we formed the following hypotheses (see Figure 1). We expected that both students' perceived autonomy-supportive teaching (e.g., Matos et al., 2018) (Hypothesis 1a) and provision of structure (Jang et al., 2010; Skinner & Belmont, 1993) (Hypothesis 1b) would predict teacher-reported agentic and behavioral engagement (cross-informant Hypotheses 1a and 1b). As a preliminary step of our cross-informant Hypotheses 1a and 1b, we expected week-to-week student-perceived autonomy support and structure to relate to student-reported agentic and behavioral engagement (same-informant Hypotheses 1a and 1b).

Given the conceptual relation of proactive personality to agentic engagement, we also hypothesized that students' initial level of proactive personality would positively predict mean-levels of teacher-reported agentic and behavioral engagement (cross-informant Hypothesis 2a) as well as of student-reported agentic and behavioral engagement (same-informant Hypothesis 2a). Likewise, as autonomous motivation relates positively to agentic and behavioral engagement in educational settings (Gairns et al., 2015; Reeve, 2013; Yoo, 2015), we hypothesized that students' initial level of autonomous and controlled motivation would positively and negatively, respectively, relate to both types of engagement (i.e., agentic and behavioral) reported by teachers and students (cross-

and same-informant Hypothesis 2 b). Further, we hypothesized that, compared to proactive personality, autonomous motivation would be the stronger predictor of situational engagement either teacher-reported or student-reported (respectively, cross-informant and same-informant Hypothesis 3). We hypothesized this because autonomous motivation was the more proximal, context-specific predictor of the same subject matter engagement (while the proactive personality was the broader, trait level predictor).

As there is no previous evidence about the interaction of personal attributes with the perceived autonomy-supportive or well-structured teaching environment in the prediction of engagement, we explored the following research question: Do initial levels of proactive personality or autonomous versus controlled motivation moderate the relation between autonomy support or provision of structure and agentic or behavioral engagement (either teacher- or student-reported)? (Research Question 1).

Method

Participants

Participants in this 5-week diary study were 262 students nested in 13 classes along with their teachers [$N=12$ (one teacher taught in two of the classes); 83.3% females; $M_{age} = 39.17$; $SD = 5.80$; years of teaching experience = 12.67; $SD = 7.45$] from a private middle school located in Ankara, Turkey. Five students were dropped from the analyses because three had previously been diagnosed with learning difficulties and two withdrew after the first week of data collection. Therefore, the retained student sample consisted of 257 middle school students (52.3% females; $M_{age} = 12.09$ years; $SD = 1.01$). Students belonged to five 6th grade classes (Turkish Literature, Math, Science, Social Sciences and Visual Arts; $N=102$), four 7th grade classes (Turkish Literature, Math, Arts and Social Sciences; $N=77$), and four 8th grade (Turkish Literature, Math, Science and Social Sciences; $N=78$) classes. Inspection of students' answers in the surveys showed that eight students provided obviously insincere answers and therefore, those data were excluded from the analyses.

Measures

The study was conducted in two phases, a pre-diary phase that was conducted in October 2018 (six weeks into the academic year) and a 5-week diary phase which started one week later. All the instruments of both phases were adapted from their original English into Turkish by two Turkish researchers fluent in English through a translation and back translation procedure following Hambleton's (1994) guidelines and recommendations. Students and teachers indicated in paper and pencil surveys their agreement with each of the instruments' item on a five-point Likert-type scale (1 = *Strongly disagree*; 5 = *Strongly agree*).

Pre-Diary Proactive Personality

We used 17 items referring to proactive personality (Bateman & Crant, 1993) to assess students' beliefs about their perceived personal attributes related to proactivity. An example item reads, "I am always looking for better ways to do things" ($\alpha = .82$).

Pre-Diary Autonomous and Controlled Motivation

We used 20 items from the Relative Autonomy Index (RAI; Sheldon et al., 2017) to assess three types of controlled and two types of autonomous motivation with respect to the specific subject matter during which the diary phase took place (i.e., Turkish Literature or Math or Science or

Social Sciences or Visual Arts). After reading the stem question “Why do you try to do well in your (math or other subject matter) class?”, participants answered four items tapping into external regulation (e.g., “Because important people (i.e., parents, teachers) will like me better if I do so”; $\alpha = .74$), negative introjected regulation (e.g., “Because I would feel guilty if I didn’t do it”; $\alpha = .77$), positive introjected regulation (e.g., “Because I want to feel proud of myself”; $\alpha = .79$), identified regulation (4 items; “Because I strongly value it”; $\alpha = .81$), and intrinsic motivation (e.g., “Because I enjoy it”; $\alpha = .88$). In line with SDT theorizing (Ryan & Deci, 2017), the external, introjected negative, and introjected positive items were aggregated to form a controlled motivation composite score ($\alpha = .81$). Likewise, the identified and intrinsic items were aggregated to form an autonomous motivation composite score ($\alpha = .91$).

Week-to-Week Teacher-Reported Students’ Agentic and Behavioral Engagement

We used two items from Reeve (2013) and Reeve and Tseng (2011) to assess teachers’ perceptions of students’ agentic and behavioral engagement during a particular class session on the same weekday and time for five consecutive weeks. Each teacher was asked to rate for each of his/her students on one item referring to agentic engagement (i.e., “During this class, student X expressed her/his preferences, opinions or questions”) and one item referring to students’ behavioral engagement (i.e., “During this class, student X worked very hard”).

Week-to-Week Student-Reported Behavioral and Agentic Engagement

To assess students’ self-reported behavioral and agentic engagement during a specific class session on the same weekday and time for five consecutive weeks, we adapted five items from Reeve and Tseng (2011). All students answered two items related to their behavioral engagement (specifically, “I paid attention”, “I worked very hard”) and three items related to their agentic engagement (specifically, “I expressed my preferences, opinions or questions”, “I asked questions to help me learn”, and “When I needed something, I asked my teacher for it”). To properly calculate the internal consistency of the scales, we followed the recommendations provided by Geldhof et al. (2014) to control for the shared variance in participants’ responses (as each student answered five times to the same questions). The internal consistency at the between-person level, after controlling for the shared variance at the within person level was acceptable both for agentic engagement ($\alpha_{\text{between}} = .93$) and behavioral engagement ($\alpha_{\text{between}} = .87$).

Week-to-Week Student-Reported Perceived Autonomy Support

To assess students’ perceptions of teachers’ autonomy support during the specific class session, we used the 6-item Learning Climate Questionnaire (Williams & Deci, 1996). An example item reads, “During this lesson, my teacher provided me with choices and options”. The internal consistency for the scale after accounting for shared variance due to repeated measures was acceptable ($\alpha_{\text{between}} = .98$).

Week-to-Week Student-Reported Perceived Structure

We used three items from the Teacher as Social Context Scale (Belmont et al., 1988) to assess students’ perception of teacher’s provision of structure during the specific class session of the 5-week diary study. One item was from the *expectations* subscale (i.e., “My teacher made it clear what he/she expected of me in the lesson”), one item was from the *adjustment/monitoring* subscale (“My teacher made sure I understood before he/she went on”), and one item was from the *help/support* subscale (i.e., “My teacher didn’t help me, even when I needed it”; reverse scored). The internal consistency for the scale, after accounting for shared variance due to repeated measures at the between-person level was $\alpha_{\text{between}} = .91$).

Procedure

The study was approved by the ethical committee of the corresponding institution. The teachers consented in their participation as well as the parents of the participating students. One of the coauthors, who was serving as international program coordinator at that particular school, assured that both teachers and students were blind to the research hypothesis. He also assured that participation in the completion of surveys was voluntary and that all information would remain confidential and used only for the purposes of the study. The pre-diary survey was administered to the students by one of the coauthors during a class session, while the diary surveys were administered to the students by the same researcher at the end of each corresponding class session. At the same time, teachers also reported their perceived agentic and behavioral engagement for each of their student. None of the informants had access to the answers of the others. During the course of the study, each class was carried out as planned in the regular school curricula.

Plan of Analysis

In a preliminary analysis, we inspected the descriptive statistics of our sample and the bivariate correlations among the variables of the study. We also tested for gender differences in any of the measured variables through a MANOVA. In the main analysis, we conducted multilevel analyses given the nested structure of the data as the five repeated measures (one for each week - Level 1; within-student) were nested into 249 students (Level 2; between-student), nested into 13 classes (Level 3; between-classroom). In that way, it was possible to examine week-to-week fluctuations of agentic and behavioral engagement, their week-to-week relations to perceived autonomy and structure, and their mean-level differences as a function of gender, proactive personality, and autonomous and controlled motivation, after controlling for likely classroom effects. Although no predictor was included at the classroom level (see supplementary analyses¹), we deemed it important to control for shared variance due to classroom membership in testing our hypotheses. All the multilevel analyses were conducted with HLM 6.03 software (Raudenbush & Bryk, 2002).

To test our hypotheses, we set up four different hierarchical three-level models, one for each dependent variable (i.e., teacher-reported and student-reported agentic and behavioral engagement). In Step 1, we examined the degree of week-to-week fluctuation of agentic and behavioral engagement. Next, in Step 2 (Model 1), we regressed week-to-week behavioral and agentic engagement (as assessed by teachers and students) on week-to-week perceived autonomy support and provision of structure at the within-student level (Level 1). Then, we examined to what extent mean level differences in agentic and behavioral engagement could be accounted for by gender and proactive personality (Step 3; Model 2), followed by autonomous and controlled motivation (Step 4; Model 3) at the between-student level (Level 2). We also tested for cross-level interactions. In that way, we explored whether the relations of perceived autonomy and structure to the dependent variables were moderated by gender, proactive personality, as well as autonomous and controlled motivation.

At the within-student level (Level 1), we entered group-mean centered perceived autonomy support and provision of structure, as suggested by Brincks et al. (2017). At the between-student level (Level 2) we included gender uncentered (males = 0 and females = 1) and proactive personality as well as autonomous and controlled motivation group-mean centered. The slopes of perceived autonomy support and structure (i.e., their relation to agentic and behavioral engagement) at Level 2 (student-level) and Level 3 (classroom-level) were initially estimated as randomly varying (i.e., as is these relations significantly vary from student to student and from classroom to classroom) but were fixed as non-randomly varying, unless their variance was statistically significant.

Table 1. Descriptive statistics and bivariate correlations of the measured variables of the study.

Variables	1	2	3	4	5	6	7	8	9	10	M	SD	ICC
1. Gender	–										–	–	–
2. Proactivity	.13*	–									3.58	0.52	- / .99 / .01
3. Autonomous motivation	.07	.46**	–								3.86	0.91	- / .80 / .20
4. Controlled motivation	-.01	.30**	.27**	–							3.18	0.73	- / 1.00 / .00
5. Perceived autonomy support	.18**	.18**	.36**	.08	–						4.32	0.69	.32/ .53/ .15
6. Perceived structure	.13*	.20**	.29**	.05	.91**	–					4.41	0.64	.37/ .47/ .15
7. Agentic engagement (S)	.14*	.33**	.50**	.14*	.67**	.60**	–				4.27	0.67	.40/ .52/ .08
8. Behavioral engagement (S)	.21**	.26**	.48**	.14*	.54**	.51**	.71**	–			4.35	0.66	.35/ .54/ .11
9. Agentic engagement (T)	.08	.10	.23**	-.10	.30**	.32**	.45**	.41**	–		3.99	0.76	.40/ .52/ .08
10. Behavioral engagement (T)	.19**	.15*	.20**	-.05	.41**	.41**	.43**	.55**	.70**	–	3.90	0.86	.28/ .62/ .10

Note. * $p < .05$. ** $p < .01$. S = Student; T = Teacher; Gender was coded as 0 = males; 1 = females. The weekly measures at the within-person level are shown in the upper diagonal and their aggregate scores along with the other between-person measures at the lower diagonal. The first, second, and third value for ICC (Intraclass Correlation Coefficient) stand, respectively for the intrapersonal, between-student, and between-classroom level.

Results

Preliminary Analyses

Descriptive statistics and bivariate correlations at the within-student and between-student level (as aggregate scores) are presented in Table 1. Inspection of Table 1 shows that proactive personality was positively related to both autonomous and controlled motivation as well as to the mean score of the five-week assessment of perceived autonomy support and provision of structure, student-reported agentic and behavioral engagement and teacher-reported behavioral (but not agentic) engagement. Autonomous motivation was positively related to the mean scores of all the diary variables. Controlled motivation was positively related to student-reported behavioral and agentic engagement. Gender was positively and significantly related with some of the study's variables and MANOVA verified significant gender differences (Wilk's $\Lambda = 0.919$, $F[9, 217] = 2.12$, $p = .029$). Gender, therefore, was included as a covariate in the main analyses.

Main Analyses

Week-to-Week Fluctuation of Students' Engagement

Inspection of the Intraclass Correlation Coefficient (ICC – see Table 1, right column) revealed that there was a considerable variability both at the within-student and between-student level. For instance, the ICC for teacher-reported agentic engagement shows that approximately 40% of the variance was due to between-week differences, while 52% of the variance was due to between-student differences. Interestingly, a noteworthy amount of variance was due to between-classroom differences (8%). The considerable amount of week-to-week fluctuation of engagement underscores the fluctuant state of students' academic-related behaviors and the necessity to examine such phenomenal not only from the between-person perspective but also from a more dynamic, week-to-week or day-to-day perspective.

Teacher-Reported Week-to-Week Engagement

The prediction of teacher-reported week-to-week students' agentic and behavioral engagement are shown in Table 2 and depicted in Figure 2^{1,2}. The week-to-week perceived autonomy support (as rated by the students) positively predicted students' agentic engagement (as rated by the teachers) after controlling for students' gender, proactive personality and autonomous and controlled motivation (in Model 3: $\gamma_{100} = 0.19$; $SE = 0.08$, $p = .022$). Nevertheless, week-to-week students'

Table 2. Week-to-week teacher-reported agentic and behavioral engagement.

Fixed coefficients	Teacher-reported Agentic Engagement						Teacher-reported Behavioral Engagement					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
Intercept, γ_{000}	4.00	(0.08)	3.95	(0.09)	3.96	(0.09)	3.93	(0.10)	3.78	(0.12)	3.79	(0.11)
<i>Week-to-week predictors</i>												
Perceived autonomy support, γ_{100}	0.14†	(0.07)	0.22*	(0.10)	0.19*	(0.08)	0.08	(0.10)	0.12	(0.12)	0.12	(0.09)
Perceived structure, γ_{200}	-0.01	(0.07)	0.01	(0.08)	0.03	(0.09)	0.03	(0.08)	0.06	(0.09)	0.05	(0.09)
<i>Student-level predictors</i>												
Gender (males vs. females), γ_{010}	-	-	0.11	(0.13)	0.08	(0.09)	-	-	0.29*	(0.13)	0.27**	(0.10)
Proactivity, γ_{020}	-	-	0.12†	(0.07)	0.04	(0.09)	-	-	0.10	(0.08)	0.03	(0.11)
Autonomous motivation, γ_{030}	-	-	-	-	0.24**	(0.06)	-	-	-	-	0.23*	(0.07)
Controlled motivation, γ_{040}	-	-	-	-	-0.19**	(0.07)	-	-	-	-	-0.19*	(0.07)
<i>% Variance Explained at the</i>												
Within-student level	10.68%	-	-	-	-	-	5.01%	-	-	-	-	-
Between-student level	-	-	1.72%	-	9.56%	-	-	-	4.39%	-	6.56%	-
Random slopes	Variance components						Variance components					
Intercept (classroom level), u_{0j}	0.07**	-	0.07**	-	0.07**	-	0.09**	-	0.09**	-	0.09**	-
Intercept (student level), r_{0j}	0.44**	-	0.43**	-	0.39**	-	0.60**	-	0.57**	-	0.73**	-
Perceived autonomy support, r_{1j}	-	-	-	-	-	-	-	-	-	-	-	-
Perceived structure, r_{2j}	0.15**	-	0.15**	-	0.13**	-	-	-	-	-	-	-
Level-1 residuals, e_{ij}	0.30	-	0.29	-	0.29	-	0.26	-	0.25	-	0.50	-

Note. † $p < .10$. * $p < .05$. ** $p < .01$.

Between-person

Pre-diary proactive personality

Pre-diary autonomous motivation

Pre-diary controlled motivation

Week-to-week

Week-to-week student-reported structure

Week-to-week student-reported autonomy support

Week-to-week **teacher-reported behavioral engagement**

Week-to-week **teacher-reported agentic engagement**

0.23**
0.24**
- 0.19**
- 0.19**

0.19*

Figure 2. The prediction of teacher-reported week-to-week agentic and behavioral engagement. Gender is not shown for sake of clarity.

Table 3. Week-to-week student-reported agentic and behavioral engagement.

Fixed coefficients	Student-reported Agentic Engagement						Student-reported Behavioral Engagement					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
Intercept, γ_{000}	4.27	(0.07)	4.21	(0.09)	4.21	(0.08)	4.36	(0.08)	4.23	(0.11)	4.23	(0.09)
<i>Week-to-week predictors</i>												
Perceived autonomy support, γ_{100}	0.38**	(0.08)	0.25**	(0.05)	0.25**	(0.08)	0.16**	(0.05)	0.17**	(0.05)	0.17*	(0.07)
Perceived structure, γ_{200}	0.14*	(0.06)	0.13†	(0.07)	0.14†	(0.08)	0.16**	(0.05)	0.18**	(0.05)	0.18*	(0.08)
<i>Student-level predictors</i>												
Gender (males vs. females), γ_{010}	–	–	0.12†	(0.07)	0.11	(0.07)	–	–	0.24*	(0.10)	0.23**	(0.07)
Proactivity, γ_{020}	–	–	0.35**	(0.08)	0.16*	(0.08)	–	–	0.22**	(0.09)	0.03	(0.08)
Autonomous motivation, γ_{030}	–	–	–	–	0.32**	(0.05)	–	–	–	–	0.30**	(0.05)
Controlled motivation, γ_{040}	–	–	–	–	–0.05	(0.05)	–	–	–	–	–0.01	(0.05)
<i>% Variance Explained at the</i>												
Within-student level	38.27%		–		–		24.24%		–		–	
Between-student level	–		11.51%		16.79%		–		9.77%		15.80%	
<i>Random slopes</i>												
	Variance components						Variance components					
Intercept (classroom level), u_{0j}	0.05**		0.05**		0.05**		0.06**		0.06**		0.07**	
Intercept (student level), r_{0j}	0.37**		0.32**		0.27**		0.34**		0.30**		0.26**	
Perceived autonomy support, r_{1j}	0.20**		0.15**		0.15**		0.09**		0.08**		0.08**	
Perceived structure, r_{2j}	0.19**		0.20**		0.19**		0.14**		0.14**		0.14**	
Level-1 residuals, e_{ij}	0.16		0.16		0.16		0.16		0.16		0.16	

Note. † $p < .10$. * $p < .05$. ** $p < .01$.

perceptions of structure failed to predict teacher-rated agentic engagement. The same non-significant effect was true for both predictors regarding behavioral engagement. Taken together these findings provide partial support to cross-informant Hypothesis 1a (autonomy support) but not to cross-informant Hypothesis 1b (structure).

At the between-student level, autonomous motivation emerged as a positive predictor and controlled motivation as a negative predictor of mean levels of both agentic and behavioral engagement (see Table 2, Model 3). Proactive personality did not predict either agentic or behavioral engagement. These findings were in line with the cross-informant Hypothesis 2b (autonomous motivation, controlled motivation), but did not support the cross-informant Hypothesis 2a (proactive personality). The findings also support cross-informant Hypothesis 3.

The extent to which students' gender, proactive personality, and autonomous and controlled motivation moderated the week-to-week relations of teacher-reported engagement to student-reported perceived autonomy support and structure (Research Question 1) was examined through the cross-level interactions. None of the between-student predictors moderated any of the week-to-week relations.

Student-Reported Week-to-Week Engagement

The prediction of student-reported week-to-week agentic and behavioral engagement are shown in Table 3 and Figure 3^{1,2}. The week-to-week perceived autonomy support and structure (as rated by the students) positively predicted student-reported agentic or behavioral engagement (although the prediction was marginally significant between perceived structure and agentic engagement) after controlling for students' gender, proactive personality and autonomous and controlled motivation (see Table 3, Model 3). These findings provide support to same-informant Hypotheses 1a and 1b.

At the between-student level, autonomous motivation emerged as a positive predictor of mean levels of both agentic and behavioral engagement (see Table 3, Model 3). This finding partially supports same-informant Hypothesis 2b as controlled motivation was not a significant negative

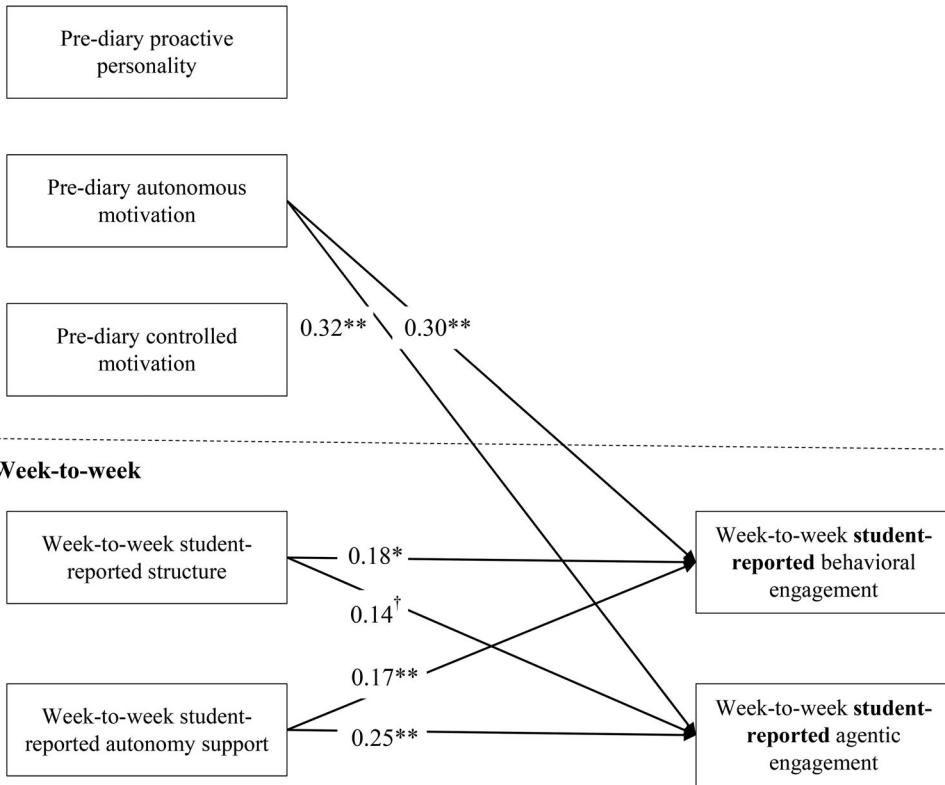
Between-person

Figure 3. The prediction of student-reported week-to-week agentic and behavioral engagement. Gender is not shown for sake of clarity.

predictor. Proactive personality predicted only agentic, but not behavioral engagement, partially supporting the same-informant Hypothesis 2a. Finally, autonomous motivation predicted stronger agentic and behavioral engagement than proactive personality. This finding supports same-informant Hypothesis 3.

Supplemental Moderator Analyses

The extent to which students' gender, proactive personality, and autonomous and controlled motivation moderated the week-to-week relations of student-reported engagement to perceived autonomy support and structure (Research Question 1) was examined through the cross-level interactions. None of the between-student predictors moderated any of the week-to-week relations except gender which moderated the relation of perceived autonomy to student-reported agentic engagement ($\gamma_{110} = 0.30$, $SE = 0.12$, $z = 2.46$, $p = .015$); not shown in Table 2 for reasons of parsimony). A test of simple slopes showed that the week-to-week positive relation between perceived autonomy support and student-reported agentic engagement was stronger among females ($\gamma_{110} = 0.55$, $SE = 0.09$, $z = 5.90$, $p < .001$) than males ($\gamma_{110} = 0.25$, $SE = 0.08$, $z = 3.12$, $p = .002$).

Discussion

The purpose of the present study was to describe the class-session to class-session interplay between teacher and student for the prediction of the most observable aspects of engagement,

agentic and behavioral engagement. First, we investigated to what extent the week-to-week students' agentic and behavioral engagement (reported by both the teacher and student) are predicted by perceived teacher autonomy support and provision of structure. Second, we investigated to what extent students' initial levels of proactive personality and quality of motivation (i.e., autonomous versus controlled motivation) predicted students' week-to-week agentic and behavioral engagement. Third, we examined whether students' personal background (i.e., initial levels of personal attributes) interacted with the teaching environment (i.e., autonomy support and provision of structure) in the prediction of the week-to-week agentic and behavioral engagement.

Before discussing to what extent the data supported our hypotheses, it is important to highlight the high correlation between perceived autonomy and structure (especially at the between-person level; see Table 1). Similarly, high correlations have been observed in previous studies which have focused on the between-person differences where students provided aggregate accounts of their teachers' behaviors (e.g., Aelterman et al., 2019; Mouratidis et al., 2018; Sierens et al., 2009). These findings imply that teachers who are autonomy supportive tend also to provide structure. Given that these perceptions were assessed in our study at a situational level (i.e., how students perceived their teacher in a given class hour), the relatively high correlation at the within-person level may not come as a surprise. Future research may need to devise more refined scales assessing autonomy support and structure and, in that way, better empirically distinguish between separate the two constructs.

Teachers and students considerably agreed on how agentically engaged ($r = .45, p < .001$) and how behavioral engaged ($r = .55, p < .001$) students were at the between person-level (see Table 1). At the within-person level, this agreement was rather modest for agentic engagement and statistically nonsignificant for behavioral engagement. This is an interesting finding in itself as it implies that although the two informants may construe a different reality in each learning session, they may tend to relatively agree in the long run about how much students are eventually engaged.

Regarding the relation of teacher autonomy support to student engagement (Hypothesis 1a) and following Patall et al. (2019), we found that the week-to-week perceived autonomy support predicted student-reported agentic and behavioral engagement. More interestingly, students' perceived autonomy support predicted teacher-reported agentic engagement but not teacher-reported behavioral engagement. This finding shows the dialectic relation between student initiative to express her opinion and preferences and teacher acknowledgment of the student's voice. It also shows that teacher's perception of student's hard effort (i.e., behavioral engagement) does not necessarily require students' sense of autonomy support. As Reeve (2013) pointed out, when students express their needs, pose questions and voice their preferences (i.e., are proactively engaged in class activities), it is more likely the teacher to reciprocate with autonomy-supportive teaching. In our study, we found that, indeed, when teachers perceived their students being agentically engaged in class activities, the students also perceive their teacher as autonomy supportive.

Regarding the relation of provision of structure to student engagement (Hypothesis 1 b), our findings showed that when students perceived themselves as agentically engaged and trying hard, they also perceived a well-structured classroom environment. However, this was not true for teacher-reported agentic or behavioral engagement. It seems that when the teachers see students posing questions and expressing needs or trying hard, they do not necessarily increase their classroom structure. According to our findings, it seems to exist a dialectic relation only between teacher perceived agentic engagement in students and student perceived autonomy support from teachers.

The findings also showed that teacher- and student-reported engagement varied from class-session to class-session and the same was true for student-reported teacher autonomy support and provision of structure. This intrapersonal approach to study the classroom experience from the perspective of either the teacher or the student provides additional information for the ongoing

classroom reality compared to the interpersonal approach that considers the learning phenomena as occurring in the same manner at all instances.

Regarding the relation of students' personal characteristics to their engagement (Hypotheses 2a, 2 b and 3), the findings showed that individual differences can also explain the ups and downs in students' agentic and behavioral engagement from class-session to class-session. Although proactive personality initially predicted student-reported agentic and behavioral engagement, when students' quality of motivation was also considered as predictor, mostly autonomous motivation predicted them. As for the teacher-reported engagement, controlled motivation negatively predicted it. These findings partially support our Hypothesis 2a and fully support our Hypothesis 2b. Furthermore, this finding supports our Hypothesis 3 according to which we were expecting quality of motivation in the specific course to be a stronger predictor of situational engagement compared to proactive personality.

We deemed it important to highlight that students' initial levels of autonomous and controlled motivation predicted positively and negatively, respectively, the week-to-week teacher-reported agentic and behavioral engagement. When students try to do well in a course because they find it interesting and personally meaningful, they are perceived as highly engaged by their teachers. Likewise, when they try to do well in a course because they are forced by others or for internally pressuring reasons (e.g., to avoid feeling guilty), they are perceived as less engaged by their teachers. This finding verifies from the perspective of an independent observer, the teacher, the adaptive nature of autonomous motivation and the maladaptive nature of controlled motivation over and above students' personality traits such as proactive personality. As we know from research findings that quality of motivation is also the outcome of students' need satisfaction in school environment (Deci & Ryan, 2008), we argue that a need-supportive classroom climate (i.e., a climate that support students' autonomy and competence through provision of structure) reveals a decisive factor for students' engagement that can minimize the impact of students' traits. Moreover, a need-supportive classroom climate creates a motivational background in students that enhances students' daily class engagement. While the teacher initiates a healthy need-supportive environment, he does not need to do all the work as students gain greater capacity to motivate and engage themselves.

As per exploratory Research Question 1, our findings showed that personal attributes did not moderate either the positive relation of perceived autonomy support and agentic or behavioral engagement or the positive relation of perceived structure and student-reported agentic and behavioral engagement. It seems that students' personal attributes and perceived classroom environment are independently related to students' engagement. However, gender interacted with perceived autonomy support in the prediction of student-reported agentic engagement. Girls experienced higher agentic engagement when they perceived high autonomy support compared to boys. Future research could further explore whether this finding can be replicated in other cultural environments or whether it is related to the Turkish context.

As our study highlighted the importance of perceived autonomy support for student- and teacher-reported agentic engagement, we suggest that this aspect of a teacher's motivational style be given special attention during initial teacher training and on-going professional development. In such professional learning opportunities, the importance of a well-structured learning environment receives strong attention (e.g., classroom management, student feedback; Mitchell et al., 2017; Prilop et al., 2020; Weber et al., 2018). We suggest that autonomy support deserves equal attention. It would be helpful for teachers to learn how to listen to students' preferences, take those expressions of interest into consideration, and give students a sense of choice and voice in classroom activities. The same recommendation may apply to the professional learning of principals, counselors and policy makers as well. Similarly, it may be equally helpful to encourage students to develop greater self-awareness of their needs and to learn how to express those needs during instructional opportunities (as per seminars and workshops for students). Empowering

students in this way can be expected to yield many important benefits, such as developing autonomous motivation and improving the quality of the teaching one receives.

Limitations and Future Research

There are a number of limitations in the study. First, the data were collected through self-reports and we cannot rule out the possibility of socially desirable answers from both teachers and students. Second, the correlational research design prevents causal inferences between the predictors and outcomes. Future experimental studies could better indicate to what extent high teacher autonomy support and provision of structure cause high student agentic and behavioral engagement. Third, regarding the week-to-week relation of perceived autonomy support and structure to student-reported engagement, it should be acknowledged that students' perception of their agentic and behavioral engagement might color their perception of the classroom climate (common method bias; Podsakoff et al., 2012). In future research, teacher reports of autonomy support and structure could be also assessed. Fourth, teachers reported week-to-week students' agentic and behavioral engagement through one item and reliability of the scale could not be tested. Fifth, our repeated measures did not correspond to consecutive sessions of each class, as data were collected week-to-week rather than day-to-day. This prevented us from reliably testing some carry-over effects. Future diary studies should take into consideration the advantage of consecutive repeated measures to test the dynamic relation between teacher style and agentic engagement. Sixth, the sample included data from only 13 classrooms. Future studies with greater statistical power (i.e., more classrooms) should test to what extent student and teacher reported engagement can be predicted by the classroom mean levels of autonomy support and structure. Seventh, as we investigated the interplay of teacher motivating style and student engagement, we need to highlight that teacher support of students' relatedness is an additional aspect of teacher motivating style that was not investigated as a predictor of student engagement in the present study. Likewise, as engagement is a multidimensional concept, the relation of emotional and cognitive engagement can be investigated in relation to teacher motivating style in future research. Eighth, only the proactive personality was tested as a candidate student trait predictor of student engagement. Future studies could test whether other personality traits such as conscientiousness are related to students' situational engagement over and above the proximal, context-specific predictor of students' quality of motivation in the specific subject matter. Finally, the study was carried out in one middle school in the urban area of Turkey and cultural or age factors could influence our results. For example, the obedience-oriented child rearing in Turkey (Kagitcibasi & Ataca, 2005) could prevent high agentic engagement.

Footnotes

1. As supplementary analyses, we also tested whether the subject matter predicted (at Level 3) any of the week-to-week rates of the four dependent variables (teacher-reported agentic engagement, teacher-reported behavioral engagement, student-reported agentic engagement, student-reported behavioral engagement). Subject matter was entered at Level 3 as a dummy variable (e.g., math vs. all the other subject matters) in all four models (therefore, 4 comparisons X 4 models). Only in one out of the 16 models the subject matter emerged as a statistically significant predictor. Specifically, Turkish literature teachers rated lower their students in agentic engagement than their colleagues in the other subject matters ($b = -0.40$, $p = .032$; $M_s = 3.66$ vs. 4.05). We consider this single statistical relation to capitalize on chance, given the multiple models we ran. Moreover, in all 16 re-run models, no change in the pattern of the relations emerged from those presented in the main analyses.

2. As one of the teachers taught in two classes, to address this potential dependency, we re-ran our models by excluding each time one of these two classes and compared the results of these 12 classes with the results of the 13 classes. No essential differences were found either for the models of teacher-reported engagement or for the models of student-reported engagement.

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