



The role of weekly need-based experiences and self-criticism in predicting weekly academic (mal)adjustment



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ABSTRACT

The present study aims to examine the role of both adolescents' weekly experiences of psychological need satisfaction and frustration and adolescents' self-criticism in their weekly variation in academic adjustment. A sample of 82 adolescents (mean age = 12.45 years; 42% female) provided weekly assessments of the psychological needs and academic adjustment during three consecutive weeks. Multilevel analyses indicated that weekly variation in need satisfaction related positively to weekly variation in positive affect, engagement, and autonomous motivation, while weekly variation in need frustration related positively to weekly variation in negative affect, disaffection, and controlled motivation. Self-criticism was negatively related to positive affect and autonomous motivation and positively to disaffection and controlled motivation. Further, need-based experiences played a mediating role in the relation between self-criticism and academic (mal)adjustment at the level of between-person differences. Moderation analyses did not reveal any evidence for self-criticism as a potentially amplifying factor in the relation between need-based experiences and academic (mal)adjustment. These findings point to the importance of need-based experiences in explaining the impact of self-criticism on academic (mal)adjustment.

1. Introduction

Secondary school students differ substantially in their enthusiasm to participate in school activities and to prepare their classes. Some of them are eager to learn new skills and engage in assigned tasks with interest and even passion, while others count the minutes until the bell rings. They put minimal effort in the classroom activities and they primarily prepare their classes because they feel compelled to do so (Brooks & Magnusson, 2006). For such students with controlled motivation, school is a daunting duty rather than a place where they can actualize their full potential. Although substantial between-student differences exist in motivation and academic adjustment more generally, students also show considerable variation within their own motivation and adjustment across time. In some periods, students may feel more stressed or they may show more interest in the learning material than in other periods (Campbell, Soenens, Beyers, & Vansteenkiste, 2018).

Such short-term variations in academic adjustment may especially

be observed in early adolescence, a life period marked by substantial biological and social changes, resulting in more volatile experiences (Steinberg & Morris, 2001). Consistent with the notion that early adolescents' adjustment to school is constantly in flux, studies have begun to document short-term (i.e., weekly or even daily) variability in important indicators and correlates of academic adjustment such as engagement (Bakker, Vergel, & Kuntze, 2015), motivation (Patall, Vasquez, Steingut, Trimble, & Pituch, 2016), and academic emotions (Ketonen, Dietrich, Moeller, Salmela-Aro, & Lonka, 2018). Given this substantial short-term variability in students' motivation and academic adjustment, it is important to identify its sources. To explain the within-person variation in motivation and academic adjustment, in this study we rely on Self-Determination Theory (SDT; Ryan & Deci, 2017) and, more specifically, on the concept of basic psychological needs.

Because dynamics at the level of short-term within-person variation can also be affected by differences between individuals (Fleeson, 2001), our second aim was to address the role of self-criticism as a predictor of students' psychological need-based experiences, and academic

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adjustment (Blatt, 1995). Self-criticism is a personality dimension characterized by the setting of excessively high standards in combination with harsh self-scrutiny (Blatt, Dafflitti, & Quinlan, 1976). Self-criticism is a robust predictor of emotional maladjustment, including symptoms of depression, anxiety and disordered eating (Bieling, Israeli, Smith, & Antony, 2003; Dunkley, Blankstein, Zuroff, Lecce, & Hui, 2006; Stoeber & Otto, 2006). In the present study, we aimed to examine whether students high on this personality dimension would display more difficulties in academic adjustment (Shahar, Kanitzki, Shulman, & Blatt, 2006), a relation that may be accounted for by diminished weekly experiences of need satisfaction and elevated experiences of frustration of the psychological needs.

1.1. Basic psychological needs and academic adjustment

According to Basic Psychological Need Theory (BPNT; Ryan & Deci, 2017; Vansteenkiste, Niemiec, & Soenens, 2010), one of Self-Determination Theory's six mini-theories, every person has three basic psychological needs. Given their inherent character, these needs are said to carry universal importance for individuals' motivation and psychosocial adjustment (Ryan & Deci, 2017). First, *the need for autonomy* refers to the experience of volition and psychological freedom when engaging in an activity. If students, for example, perceive their school subjects as fitting with their interests, or their teachers do an effort to understand their perspective, or students experience a sense of choice when working on tasks, they are more likely to experience a sense of autonomy. Next, *the need for relatedness* refers to feeling connected with others and having a sense of belonging (Baumeister & Leary, 1995). Students' need for relatedness will be more fulfilled when they develop warm and supportive relationships with their classmates and teachers. Last, *the need for competence* involves the experience of effectiveness and mastery in dealing with challenging situations. Students who feel capable of succeeding in their learning goals will derive a sense of competence from doing so.

Abundant research has shown need satisfaction to relate positively to well-being in different developmental phases, including adolescence (Veronneau, Koestner, & Abela, 2005; Van der Kaap-Deeder, Vansteenkiste, Soenens, & Mabbe, 2017). Although adolescents experience different degrees of need satisfaction in various life domains, including school, home, and peer relations, especially school-related need satisfaction appeared predictive of adolescents' teacher-rated adjustment (Ahmad, Vansteenkiste, & Soenens, 2013) and drop-out intentions (Milyavskaya et al., 2009). Studies that exclusively focus on the educational domain found need satisfaction to predict autonomous or volitional motivation (Reeve & Sickenius, 1994; Standage, Gillison, Ntoumanis, & Treasure, 2012), behavioral effort for class-related tasks (Taylor, Ntoumanis, Standage, & Spray, 2010), class-related positive affect (e.g. vitality; Mouratidis, Vansteenkiste, Sideridis, & Lens, 2011) and academic achievement (Jang, Reeve, Ryan, & Kim, 2009).

The basic psychological needs are thought to be highly dynamic in nature (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000). Although most research has focused on between-student differences in need satisfaction, a few studies began to consider short-term changes, with the studied time period extending from a specific class, over a single day, to a week. For instance, Mouratidis et al. (2011) found that within-class experiences of need support were related to more class-specific vitality. Van der Kaap-Deeder et al. (2017) found that daily fluctuations in perceived autonomy support related to fluctuations in need satisfaction in primary school children. Outside the educational domain, Campbell, Soenens, et al. (2018) and Verstuyf, Vansteenkiste, Soenens, Boone, and Mouratidis (2013) found evidence for within-person variations in need satisfaction in adolescents. Given the paucity of studies addressing short-term fluctuations in need satisfaction in relation to students' academic functioning, additional research is called for.

To capture the full spectrum of students' school-related experiences, research needs to attend also to students' experiences of need

frustration, the so-called “dark side” of students' need-based experiences (Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011; Haerens, Aelterman, Vansteenkiste, Soenens, & Van Petegem, 2015). Autonomy frustration manifests through feelings of pressure and conflict; relatedness frustration entails feelings of loneliness and social alienation, and competence frustration involves a sense of failure and personal inadequacy (Vansteenkiste & Ryan, 2013). Importantly, within BPNT, the presence of need frustration is said to be distinct from the absence of need satisfaction. While experiences of low (i.e., deprived) need satisfaction arise in contexts that provide little support for the needs (e.g., teachers who provide little choice), experiences of need frustration follow from a more direct thwarting of individuals' needs (e.g., teachers who engage in a punitive and harsh instructional style) (Ryan & Deci, 2017).

Because psychological need frustration represents a stronger and more direct threat to individuals' need-based functioning than need deprivation, it is hypothesized to be more strongly predictive of maladjustment, ill-being, and even psychopathology (Vansteenkiste & Ryan, 2013). Consistent with this notion, a rapidly growing body of research found need frustration to relate positively to diverse indicators of adolescent maladjustment, including eating pathology (Boone, Vansteenkiste, Soenens, Van der Kaap-Deeder, & Verstuyf, 2014; Verstuyf et al., 2013), poor sleep quality (Campbell, Vansteenkiste, Soenens, Vandenkerckhove, & Mouratidis, under review), depressive symptoms (Campbell, Boone, Vansteenkiste, & Soenens, 2018), and externalizing problems (Van Petegem, Soenens, Vansteenkiste, & Beyers, 2015). Notably, in several studies among adolescent samples, need frustration yielded this unique relation to maladjustment over and above the contribution of need satisfaction (Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani, 2011). Need satisfaction, on the other hand, has been found to relate primarily to well-being and positive adjustment (Cordeiro, Paixão, Lens, Lacante, & Luyckx, 2016). A limited number of studies began to demonstrate similar findings in the educational domain. For instance, need frustration in high school students has been found to be predictive of poor motivation (Haerens et al., 2015) and more classroom disengagement (Jang, Kim, & Reeve, 2016). The few education-relevant studies exclusively focused on between-student differences, leaving the question unanswered whether need frustration plays a distinct and supplementary role (beyond need satisfaction) in the prediction of students' short-term variation in academic maladjustment.

1.2. Self-criticism, need-based experiences, and academic adjustment

While it is important to chart processes at the level of students' within-person functioning, these processes do not develop in isolation from characteristics at the level of between-student (i.e., inter-individual) differences. Theory and research in the domain of personality psychology increasingly point out that traits (i.e., dispositional characteristics reflecting stable interindividual differences) can affect state processes (i.e., more fleeting and short-term changes) (Fleeson, 2001; Funder, 2006). Specifically, trait characteristics (including self-criticism) can affect state dynamics (including weekly variation in, academic adjustment) by directly predicting state levels of experiences (with self-criticism for instance eliciting more need frustration and subsequent maladjustment) and/or by qualifying effects of state experiences on outcomes (with self-criticism possibly moderating associations between needs-based experiences and academic adjustment).

Herein, we focused on a trait personality dimension highly relevant to students' need-based experiences and academic outcomes, that is, self-criticism. Self-criticism is conceptualized as a personality characteristic involving very high standards, concerns about failure and harsh self-scrutiny (Blatt, 1995, 2004; Hamachek, 1978). In contradiction to personal standards perfectionism which involves the setting of high standards and goals per se, self-criticism is characterized by negative self-evaluation (Blatt, 2004). Self-critical individuals are often

preoccupied with academic achievement but experience an inability to derive satisfaction from successful performance (Luyten, Blatt, Van Houdenhove, & Corveleyn, 2006). Because self-criticism predicts a wide range of psychological difficulties in adolescents, including negative affect (Harvey et al., 2015), eating problems (Boone et al., 2014), depressive symptoms (Hewitt et al., 2002), and anxiety (Essau, Leung, Conradt, Cheng, & Wong, 2008; O'Connor, Rasmussen, & Hawton, 2010), it has been suggested (Blatt & Luyten, 2009) and empirically demonstrated (Campbell, Boone, et al., 2018) that self-criticism is a transdiagnostic vulnerability to maladjustment.

In the context of school, self-critical students have a tendency to set unrealistically high standards for performance and to engage in harsh, negative self-evaluations when encountering setbacks and failure (Vansteenkiste, Smeets, et al., 2010). The relation between self-criticism and affect, motivation, and engagement at school has been well-documented, although most of these studies employed a between-person design. For instance, self-criticism was found to relate to stress, depression and anxiety in secondary school (Einstein, Lovibond, & Gaston, 2000; Stoeber & Rambow, 2007) and to more negative mood both prior to and following examinations (Bieling et al., 2003; Brown et al., 1999). In terms of motivational outcomes, self-criticism is also related to less autonomous or volitional and more controlled or pressured forms of academic motivation (Miquelon, Vallerand, Grouzet, & Cardinal, 2005; Shahar, Henrick, Blatt, Ryan, & Little, 2003; Stoeber, Damian, & Madigan, 2018), indicating that students high on self-criticism feel coerced to do well at school in general and to outperform their classmates in particular (Vansteenkiste, Smeets, et al., 2010). Although research on self-criticism and school engagement is scarcer, a cross-sectional study showed that it is negatively related to engagement in junior high school students (Shih, 2012). Yet, Damian, Stoeber, Negru-Subtirica, and Băban (2017) could not confirm this relation in a longitudinal study, in which self-critical perfectionism appeared to be unrelated to school engagement over a 4- to 5- month period among high school students.

Although extant research convincingly demonstrates that self-criticism is a personality factor that confers vulnerability for poor motivational functioning and adjustment difficulties at school, few studies, if any, have examined the role of self-criticism in the prediction of state levels of student adjustment. Also, the study of the dynamic interplay between self-criticism and need-based experiences can be deepened by examining both the potential pro-active and reactive role of self-criticism in need-based experiences. In doing so, the present study considers both mediation and moderation models. Specifically, in terms of its pro-active role, a mediation model is proposed in which self-criticism may predict lower weekly need satisfaction and higher need frustration across time, with these experiences in turn relating to lower weekly adjustment and higher maladjustment. This prediction is consistent with the notion that self-critical individuals may actively generate negative experiences (Priel & Shahar, 2000) and has received initial confirmation in a handful studies (e.g., Boone et al., 2014). Specifically, as self-critical individuals set unrealistically high standards and push themselves into action, they are more likely to experience both failure (i.e., competence frustration) and pressure (i.e., autonomy frustration) in their goal pursuit. Also, the competitive attitude that often accompanies self-critical perfectionism (Habke & Flynn, 2002) may come with a more defensive interpersonal style (Dunkley et al., 2006) at the expense of building close and warm relationships with significant others. Although previous research has shown that need frustration mediates the relation between self-criticism and several types of psychopathology (Boone et al., 2014; Campbell, Boone, et al., 2018), no research up to now explored the mediating role of the needs in the context of academic adjustment.

In terms of the potential reactive role of self-criticism, we sought to examine a moderation model in which self-criticism could affect students' susceptibility to the effects of need-based experiences. This hypothesis is informed by previous research showing that individuals

scoring high on self-criticism display greater reactivity to stress (Dunkley, Zuroff, & Blankstein, 2003; Mandel, Dunkley, & Moroz, 2015) and the fact that need frustration relates to stress (Campbell et al., 2017; Campbell, Soenens, et al., 2018). Self-critical individuals may suffer more from stressful events because they are less able to cope adequately with such events (Richardson & Rice, 2015). Similarly, self-criticism may both amplify students' vulnerability to the maladjustment cost associated with weekly need frustration and dampen the benefits one can reap from experienced need satisfaction. Consistent with this idea, van der Kaap-Deeder et al. (2016) found self-critical individuals to dwell more over and cope less well with an experimentally induced thwarting of their need for competence, that is, the provision of negative feedback.

1.3. The present study

The general aim of this study was to gain more insight in students' academic adjustment by looking at the role of both weekly variation in need-based experiences and between-student differences in self-criticism. To do so, after a baseline assessment tapping into between-student differences in self-criticism, we followed students during three consecutive weeks, asking them to report on their weekly need-based experiences as well as their weekly academic (mal)adjustment. Three main research questions guided the study, which led to the formulation of three hypotheses. First, we investigated whether week-to-week variability in need satisfaction and need frustration would relate to week-to-week variation in academic adjustment and academic maladjustment. Thereby, we expected that students' weekly need satisfaction would be mainly and positively associated with weekly adjustment, while weekly need frustration would be mainly and positively associated with weekly maladjustment (Hypothesis 1; Haerens et al., 2015; Vansteenkiste & Ryan, 2013). Second, we examined whether between-student differences in self-criticism would relate to between-student differences in academic (mal)adjustment across the three weeks and whether these associations would be mediated by between-student differences in accumulated need-based experiences across the three-week period. Thereby, we hypothesized that highly self-critical students would experience more need frustration and less need satisfaction, which in turn would relate to more academic (mal)adjustment (Hypothesis 2; Boone et al., 2014; Campbell, Boone, et al., 2018). Third, we tested the moderating role of self-criticism in the relation between both need satisfaction and need frustration on the one hand, and academic (mal)adjustment on the other hand. Based on stress-reactivity models (e.g., Hewitt & Flett, 1993), we expected that associations between need frustration and maladjustment would be amplified among adolescents high in self-criticism, while associations between weekly need satisfaction and weekly adjustment would be attenuated (Hypothesis 3).

Although previous research mostly focused on one particular aspect of academic adjustment, we adopted a broader view, including students' affect, motivation, and engagement. This choice is informed by the fact that these indicators represent three different domains of adjustment (i.e., the emotional, motivational, and behavioral domain, respectively) and, as such, provide a richer picture of students' adjustment. Further, theory and research have identified both the bright and dark sides of each of these concepts. Specifically, engagement (i.e., investment of effort into school-based tasks) can be contrasted with disaffection (i.e., passivity and giving up) (Skinner, Kindermann, & Furrer, 2009), autonomous motivation (i.e., self-endorsed and volitional reasons for activity engagement) can be contrasted with controlled motivation (i.e., pressuring reasons for school-based activities) (Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009), and positive affect (i.e., experiences such as happiness, enthusiasm, and energy) can be contrasted with negative affect (i.e., experiences such as anxiety, stress, and depression) (Pekrun, Goetz, Titz, & Perry, 2002). Finally, research has shown that engagement (Fredricks, Blumenfeld, & Paris,

2004), quality of motivation (Murayama, Pekrun, Lichtenfeld, & vom Hofe, 2013), and quality of affect in the school context (Roeser, Eccles, & Sameroff, 1998) each display systematic and well-documented associations with achievement.

2. Method

2.1. Participants and procedure

Participants were 82 early-adolescents (58% boys), aged 12–15 years old ($M = 12.45$ years, $SD = 0.57$). All participants were enrolled in an academic track and were in the 8th or 9th grade. They came from four classes ($M_{\text{class size}} = 20.5$ students; $SD_{\text{class size}} = 1.16$) in one secondary school in Flanders (Belgium). Teachers provided the students a letter with information about the study. All parents and students were asked to give their active informed consent for participation in the study. Response rate was high (98.7%), as only one parent out of 83 did not give informed consent for his or her child to participate. Each participant received two cinema vouchers in return for participation in this study. The assessment consisted of paper-and-pencil questionnaires, accompanied by a written explanation of the questionnaire, administered by the class teacher. The teacher made sure that all students were quiet and only looked at their own sheet. We asked teachers to inform us when questions arose during testing, but no questions were reported except very practical ones (e.g., How much time do we have left? What do we have to do after completing the questionnaires?). The data collection took place in February 2017. The study procedures were approved by the ethics committee of the researchers' university.

The study was conducted in the context of an evaluation of a new assessment policy in this school. Specifically, the school introduced unexpected tests during three weeks (while the use of unexpected tests was not common practice at this school before). Students reported on their need-based experiences before, during, and after this period of unexpected testing. During a three-week period, all students got unexpected tests for two main courses, namely mathematics and French or Latin. The number and type of tests was the same for all students. These particular courses were chosen because they were main courses that were taught at least 4 h a week. The choice for French or Latin depended on students' major (classical languages versus modern languages). During all five assessments (one assessment before the period of unexpected, three assessments during the 3-week period of testing, and one assessment after the testing period), adolescents completed study questionnaires during a regular class hour on a Friday afternoon. For the purpose of the current study (in which the role of unexpected tests in students' adjustment was not a research aim), we relied only on the data obtained during the 3-week period of unexpected testing. We took this approach because during this period the tests taken by students were standardized (such that differences in experiences could not be due to differences in the number and type of tests students received). Also, the full battery of measures needed to test our hypotheses were assessed only during the 3-week period of unexpected tests. The assessments before and after the 3-week period contained only the measure of need-based experiences (and not the measures of students adjustment).¹

¹ A repeated measures ANOVA with psychological need satisfaction and need frustration as outcomes and with time (i.e., the 5 assessment points) as a within-subject predictor indicated that there was no effect of time on need frustration, $F(4, 74) = 2.27$; $p > .05$; yet, there was an effect of time on need satisfaction, $F(4, 74) = 3.90$; $p < .01$; follow-up analyses indicate that students reported a decrease in need satisfaction between the week prior to the unexpected tests ($M = 3.74$) and the weeks of unexpected testing ($M = 3.50$; $M = 3.59$; $M = 3.57$).

2.2. Measures

2.2.1. Person-level measure

2.2.1.1. Self-criticism. We used the self-criticism subscale of the Depressive Experiences Questionnaire for Adolescents (DEQ-A; Blatt, Schaffer, Bers, & Quinlan, 1992). Students filled out this measure prior to the weekly assessments. The DEQ-A is an adaptation of the original DEQ for adults (Blatt et al., 1976), in which the items were rephrased and simplified to make it more appropriate for adolescents. The DEQ-A is a self-report instrument that assesses self-criticism, dependency and efficacy using 66 items that were rated on a 7-point Likert scale ranging from 1 (*Totally disagree*) to 7 (*Totally agree*). An example item is: "I often find that I fall short of what I expect of myself". The dependency and efficacy scores were not used for the purpose of this study. Much like the original DEQ, the DEQ-A is scored using weighted factor scores (Zuroff, Mongrain, & Santor, 2004). Participants' item scores are transformed to z-scores using means and standard deviations from a large sample originally collected by Blatt et al. (1992). These z-scores are then weighted by factor coefficient scores that were also derived from this larger sample and averaged to form scores for self-criticism. Because of the complex scoring procedure, Cronbach's alpha cannot be computed for the present study. However, previous research showed that the DEQ has a clear and replicable internal structure and that the scales have substantial test-retest reliability in adolescents (Blatt et al., 1992). The Dutch version of the questionnaire has comparable psychometric characteristics as the original version (Luyten, Corveleyn, & Blatt, 1997).

2.2.2. Week-level measures

2.2.2.1. Need satisfaction and frustration. A shortened 12-item version of the Basic Psychological Need Satisfaction and Need Frustration (BPNSFS; Chen et al., 2015) was used to measure the satisfaction (two items per need) and frustration (two items per need) of each of the three basic psychological needs. The BPNSFS consists of six subscales, namely autonomy satisfaction, autonomy frustration, relatedness satisfaction, relatedness frustration, competence satisfaction and competence frustration. The scale was slightly adapted to the academic context such that the items focused on adolescents' need-based experiences in school rather than in their life in general. Specifically, we added the stem "Last week at school..." to each item and we changed the relatedness items as to make them refer to the relationship with the teacher and classmates (e.g., "I experienced a warm feeling with the people I spent time with." was changed into "I experienced a warm feeling with the fellow students and teachers I spent time with."). Items were rated on a 5-point Likert scale, ranging from 1 (*Totally disagree*) to 5 (*Totally agree*).

For the present study, the six items tapping into need satisfaction were averaged and the six items tapping into need frustration were averaged to create general scores for need satisfaction and need frustration. Over the three measurements, the Cronbach's alpha for need satisfaction ranged between 0.53 and 0.67, and for need frustration between 0.63 and 0.75. An overview of all items and Cronbach's alphas can be found below in Table 3 in the Appendix.

2.2.2.2. Motivation. Students' motivation was assessed by means of 6 items adapted from the Self-Regulation Questionnaire Academic (SRQ-A; Ryan & Connell, 1989; Vansteenkiste et al., 2009). The SRQ-A has been found to be both valid and reliable, with the items falling apart into an autonomous and controlled motivation factor in factor analyses (Vansteenkiste et al., 2009), with the scales yielding adequate internal consistency and with the scales being related in theoretically predicted ways to a host of learning outcomes and self-regulation indicators (de Bilde, Vansteenkiste, & Lens, 2011; Soenens, Sierens, Vansteenkiste, Dochy, & Goossens, 2012; Vansteenkiste et al., 2012). Students rated their motivation towards last week's mathematics and French or Latin courses separately. We used the stem "Last week I put effort in my

Table 1

Descriptives and correlations between the study variables (aggregated over the three weeks).

	1	2	3	4	5	6	7	8	9
1. Self-criticism	1								
2. Need satisfaction	−0.34**	1							
3. Need frustration	0.33**	−0.60***	1						
4. Positive affect	−0.33**	0.48***	−0.35**	1					
5. Negative affect	0.21	−0.47***	0.64***	−0.29**	1				
6. Engagement	−0.12	0.52***	−0.34**	0.34*	−0.28*	1			
7. Disaffection	0.22	−0.36***	0.52***	−0.25*	0.34**	−0.52***	1		
8. Autonomous motivation	−0.29*	0.47***	−0.37**	0.55***	−0.29*	0.50***	−0.43***	1	
9. Controlled motivation	0.28*	−0.11	0.49***	−0.06	0.36**	0.38**	0.38**	−0.02	1
Mean (Standard deviation)	−0.38 (0.74)	3.55 (0.43)	2.44 (0.59)	3.51 (0.69)	2.64 (0.77)	3.05 (0.49)	1.92 (0.54)	3.05 (0.78)	3.00 (0.73)
Intra-Class Correlation	–	0.44	0.36	0.32	0.35	0.27	0.25	0.25	0.31

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

mathematics/French/Latin class because ...” followed by items tapping into autonomous motivation (3 items; e.g., “... I thought it was interesting”) and controlled motivation (3 items; e.g., “... others pressured me to do so”). As students' motivation for mathematics and French or Latin was moderately correlated ($r = 0.51$), we combined (i.e., averaged) the motivation scores for the different courses in one variable that we used in the analyses. This combined score reflects students more global motivation for school during the week. Supplementary analyses showed that associations between motivation and the other study variables were similar across the two school subjects. Detailed information about these supplementary analyses can be found in the [Appendix](#). Items were scored on a 5-point Likert scale, ranging from 1 (*Not at all*) to 5 (*Very much*). Over the three measurements, the Cronbach's alpha for autonomous motivation ranged between 0.82 and 0.85, and for controlled motivation between 0.56 and 0.65.

2.2.2.3. Positive and negative affect. To measure positive and negative affect, respondents completed a shortened version of the Positive and Negative Affect Schedule (PANAS; [Watson, Clark, & Tellegen, 1988](#)). This questionnaire consists of four positive (i.e., enthusiastic, interested, happy, energetic) and four negative (i.e., anxious, irritated, nervous, tired) mood states. Participants had to indicate on a 5-point rating scale, ranging from 1 (*Not at all*) to 5 (*Very strong*), how often they had experienced these emotions in the past week at school. Cronbach's alpha ranged between 0.72 and 0.82 for positive affect and 0.72 and 0.77 for negative affect.

2.2.2.4. Behavioral engagement and disaffection. Participants filled out the behavioral engagement subscale of the Engagement vs. Disaffection with Learning - Student Report ([Skinner et al., 2009](#)). We used three items that tapped into students' positive engagement (e.g., “In class, I work as hard as I can.”). Three other items measured an absence (i.e., disaffection) of effort, attention, and persistence while initiating and participating in learning activities (e.g., “When I'm in class, my mind wanders.”). Behavioral engagement and disaffection were measured for the two school subjects separately. We averaged the motivation scores for the different courses in one variable that we used in the analyses, because students' engagement ($r = 0.50$) and disaffection ($r = 0.56$) for the two courses was moderately correlated. More information about the aggregation of these scores across subjects can again be found in the [Appendix](#). Each item was rated on a scale ranging from 1 (*Totally disagree*) to 4 (*Totally agree*). Cronbach's alpha ranged between 0.82 and 0.83 for positive engagement and between 0.77 and 0.83 for disaffection.

2.3. Plan of analyses

We used multilevel analyses to test our main models, as the data were hierarchically structured with 3 measurement times (i.e., Level 1) being nested within 82 adolescents (i.e., Level 2). The analyses were conducted with the statistical software package Mplus 7. All predictor variables at level 1 (i.e., need satisfaction and need frustration) were group-mean centered (i.e., centered around the person's mean) and the predictor variable at level 2 (i.e., self-criticism) was centered around the grand mean to facilitate convergence and interpretation.

There were 6.24% missing values in the total dataset. Little's MCAR test was not significant [$\chi^2(186) = 193.23, p > .05$], suggesting that the data were missing at random. As a consequence, we used full information maximum likelihood (FIML) to handle missing data in the structural equation models ([Little & Rubin, 1987](#)). To evaluate model fit, the Comparative Fit Index (CFI), the Standardized Root Mean Square Residual (SRMR) and the Root Mean Squared Error of Approximation (RMSEA) were used. Combined cut-off values of 0.90 for CFI, 0.08 for SRMR and 0.06 for RMSEA are considered as a good fit ([Kline, 2005](#)).

3. Results

3.1. Preliminary analyses

3.1.1. Descriptive statistics and correlations

In [Table 1](#), the descriptive statistics and the correlation coefficients (computed on measures aggregated over the three weeks), can be found. As expected, self-criticism was correlated positively with need frustration, negative affect and controlled motivation and negatively with need satisfaction, positive affect, and autonomous motivation. According to [Cohen's \(1988\)](#) conventions to interpret the strength of correlation coefficients, correlation coefficients in the order of 0.10 are considered as small, correlation coefficients in the order of 0.30 are medium and those of 0.50 or more are large in terms of effect size. Considered against these criteria, the correlations between self-criticism and the other variables mostly reflect medium associations. Further, need frustration is significantly correlated with all outcome variables, displaying large positive associations with academic maladjustment and medium negative associations with academic adjustment. An opposite pattern was found for need satisfaction (large associations with positive affect, negative affect, engagement and autonomous motivation and medium associations with disaffection), with the exception that it was unrelated to controlled motivation.

[Table 2](#) presents an overview of the group means over the three assessments. For descriptive purposes, repeated measures ANOVAs were conducted to examine whether all study variables display a significant change from week to week. Only one of them was significant

Table 2

Descriptives for the study variables over the three assessments.

	Week 1	Week 2	Week 3	Effect of time	
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>F (X,X)</i>	<i>p</i>
Need satisfaction	3.48 (0.55)	3.58 (0.49)	3.56 (0.55)	1.66	> 0.05
Need frustration	2.44 (0.71)	2.36 (0.59)	2.46 (0.70)	2.25	> 0.05
Positive affect	3.51 (0.83)	3.52 (0.71)	3.50 (0.79)	0.13	> 0.05
Distress	2.54 (0.71)	2.44 (0.70)	2.47 (0.65)	2.18	> 0.05
Positive engagement	3.07 (0.53)	3.06 (0.55)	3.03 (0.54)	0.32	> 0.05
Disaffection	1.88 (0.55)	1.92 (0.62)	1.94 (0.59)	0.94	> 0.05
Autonomous motivation	3.11 (0.89)	3.00 (0.88)	2.99 (0.81)	1.25	> 0.05
Controlled motivation	3.03 (0.73)	2.99 (0.83)	2.97 (0.85)	0.21	> 0.05

Note. *M* = mean; *SD* = standard deviation.

($p < .05$), with negative affect decreasing over the three-week period. Such findings, pointing to high mean-level stability, do not preclude the possibility that students differ at the within-person level in their week-to-week variability, an issue that will be addressed in the main analyses using multilevel modeling.

3.1.2. Background variables

A MANCOVA was performed to examine the effects of age and gender on the study variables. The effect of both age ($F(10, 62) = 1.17$, $p > .05$) and gender ($F(10, 62) = 1.54$, $p > .05$) was not significant. Finally, we assessed the relation between class and the study variables using a MANOVA, with class as a predictor and all study variables as dependent variables. Results showed that class had no significant multivariate main effect, $F(27, 189) = 1.05$, $p > .05$, indicating that there were no differences in academic adjustment, need-based experiences and self-criticism between classes. As a result, we did not include age, gender and class as background variables in the main analyses.

3.1.3. Intra-class correlations (ICC)

Intra-class correlations represent the percentage of variance in a variable at a specific level. The ICCs with respect to the within-person level of all study variables that were measured multiple times (i.e., all variables except self-criticism) can be found in Table 1. The results indicate that there is substantial variance at the within-person level, ranging between 25% and 44%. In other words, students displayed substantial intra-individual variation in study variables from week to week. Given the significant within-person level variation in all study variables, a multilevel approach is warranted.

3.2. Primary analyses

3.2.1. Hypothesis 1: weekly variation in need-based experiences and weekly variation in academic (mal)adjustment

To investigate the unique relations between week-to-week variation in need-based experiences and the week-to-week variation in academic (mal)adjustment, we tested a model including paths from need satisfaction and need frustration to each of the six indicators. This model was tested at Level 1, that is, the level intra-individual (weekly) variation. We also added correlations between all dependent variables and between need satisfaction and need frustration. Because all possible paths were included and all dependent variables were allowed to correlate, the model was fully saturated and, by definition, had a perfect fit ($\chi^2(0) = 0.00$, $p > .05$; CFI = 1.00; SRMR = 0.00; RMSEA = 0.00). Results of this model, as displayed in Fig. 1, indicated that weekly need satisfaction was positively related to weekly positive affect, engagement, autonomous motivation but also controlled motivation, while it related negatively to weekly negative affect. In contrast, weekly need frustration was positively related to weekly negative affect, disaffection, and controlled motivation, while being unrelated to any of the positive indicators. When non-significant pathways were deleted, model fit was good ($\chi^2(4) = 4.13$, $p > .05$; CFI = 1; SRMR = 0.04;

RMSEA = 0.01). The results of this model suggest that, when students experience an increase in need satisfaction during a particular week (compared to their overall need satisfaction), they also display a corresponding increase in academic adjustment during that particular week, as well as a decrease in negative affect and an increase in controlled motivation. Conversely, a weekly increase in need frustration goes hand in hand with a weekly increase in academic maladjustment.

3.2.2. Hypothesis 2: mediating role of need-based experiences

Prior to investigating the mediating role of the psychological needs experiences in associations between self-criticism and the outcomes, we ran a model including associations between self-criticism and the outcomes. As self-criticism was measured only once, this model is tested at Level 2, that is, the between-person level of interindividual differences. Estimation of this model (see Fig. 2), which again had a perfect fit by definition, showed that self-criticism was related positively to negative affect, disaffection and controlled motivation, and negatively to positive affect and autonomous motivation. When non-significant pathways were deleted, model fit was $\chi^2(1) = 1.57$, $p > .05$; CFI = 1.00; SRMR = 0.00; RMSEA = 0.05. These results indicate that students with higher scores on self-criticism than other students report relatively more academic maladjustment and less academic adjustment compared to students scoring lower on self-criticism.

Next, we examined whether need experiences play a mediating role in the relation between self-criticism, as assessed at the onset of the study, and academic (mal)adjustment. To address this question, we specified a SEM model (see Fig. 3) in which we added paths at the between-person level from self-criticism to need satisfaction and need frustration, and from the two need-based experiences to each of the academic adjustment outcomes. Similar to the first model, all dependent variables were allowed to correlate. This model was again estimated at Level 2 (i.e., the level of between-person, interindividual differences). Specifically, we tested and compared two nested models, that is, a (full mediation) model in which associations between self-criticism and the academic outcomes were fully mediated (i.e., a model including only indirect associations through the need-based experiences) and a (partial mediation) model that included both indirect paths between self-criticism and the outcomes through the needs as well as direct paths from self-criticism to all outcomes. A comparison of these nested models showed that the fit of the partial mediation model was significantly better than the fit of the full mediation model ($\Delta\chi^2(6) = 12.74$, $p < .05$). Inspection of the partial mediation model showed that only the direct path between self-criticism and controlled motivation reached significance. Accordingly, the other five direct paths were dropped from the model. This final model ($\chi^2(5) = 6.81$, $p > .05$, CFI = 0.99, SRMR = 0.00 and RMSEA = 0.04) indicated that self-criticism was related to lower need satisfaction and more need frustration. In turn, need satisfaction was related positively to each of the adaptive outcomes (positive affect, engagement, and autonomous motivation) and need frustration was related positively to each of the negative outcomes (negative affect, disaffection, and controlled

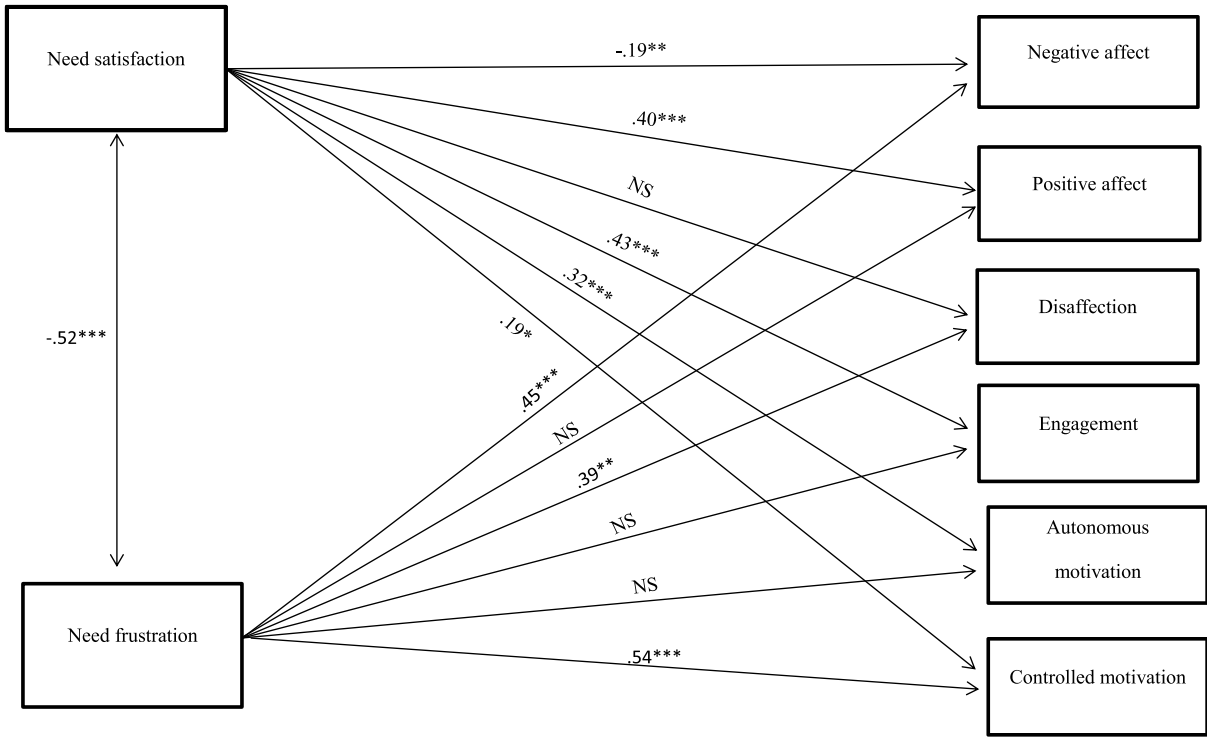


Fig. 1. Need satisfaction and need frustration as predictors of school adjustment. *** $p < .001$, ** $p < .01$, * $p < .05$. NS = not significant.

motivation). In addition to these indirect associations through the need-based experiences, self-criticism was related positively to controlled motivation.

In this final model, self-criticism yielded an indirect relation with negative affect ($b = 0.07$, $p < .05$), positive engagement ($b = 0.05$,

$p < .05$), and controlled motivation ($b = 0.09$, $p < .05$) via need frustration, while self-criticism yielded an indirect association with negative affect ($b = 0.07$, $p < .05$), positive affect ($b = -0.09$, $p < .01$), engagement ($b = -0.05$, $p < .01$), and autonomous motivation ($b = -0.05$, $p = .05$) via need satisfaction. Hence, while need

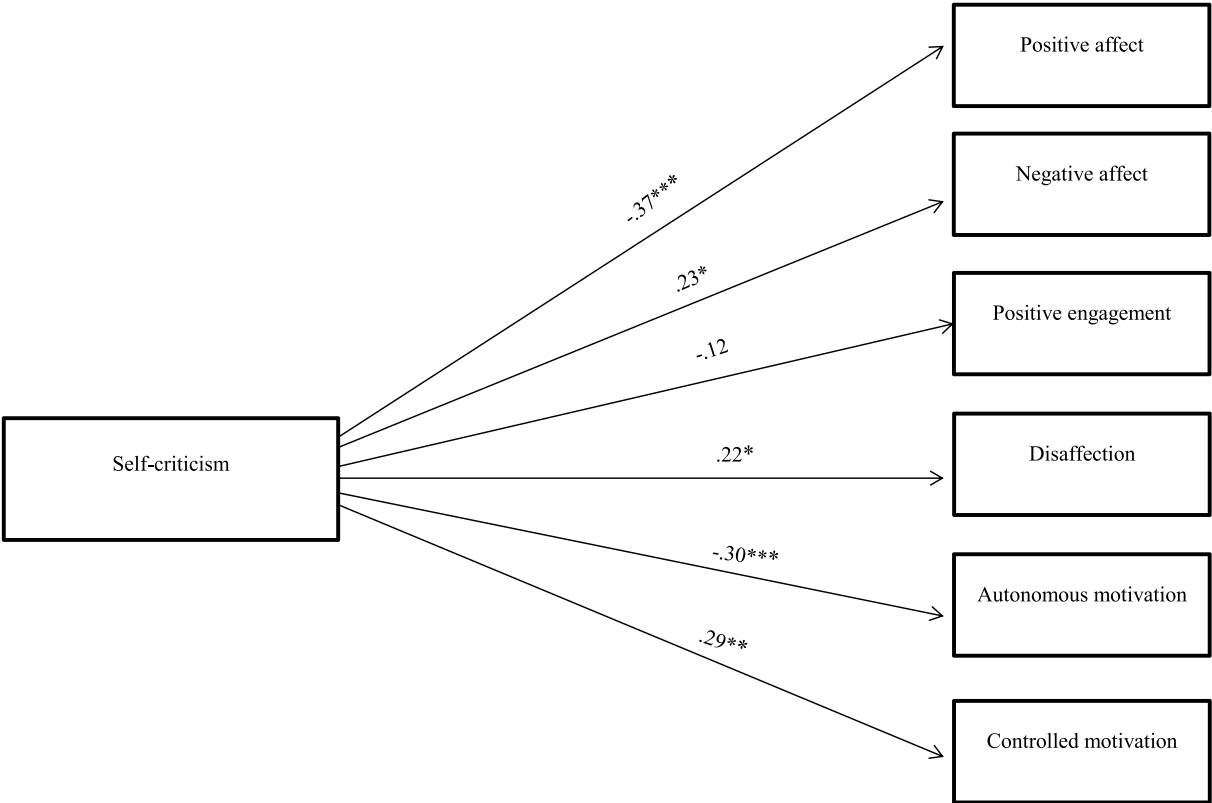


Fig. 2. Associations between self-criticism and academic adjustment. *** $p \leq .001$, ** $p \leq .01$, * $p \leq .05$.

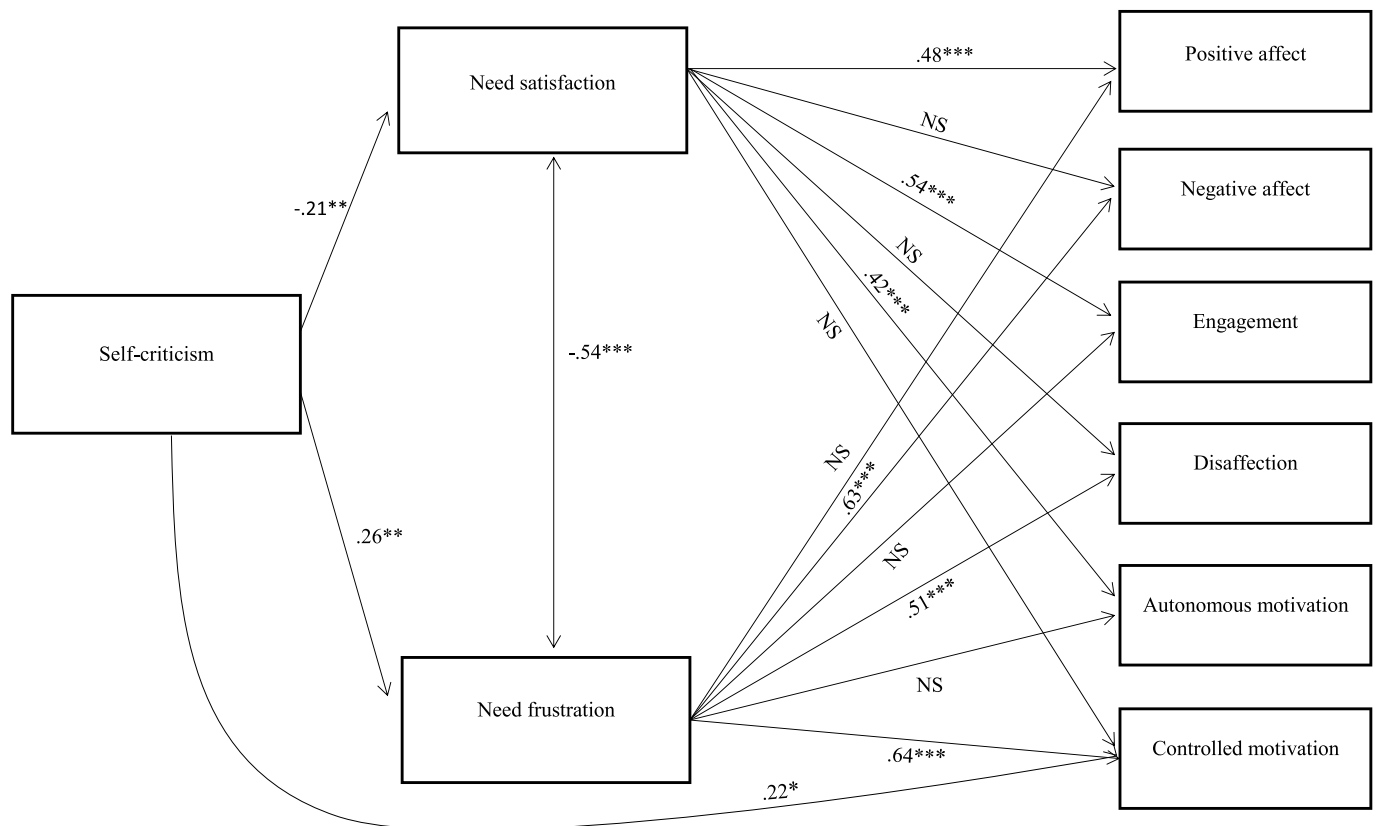


Fig. 3. The mediating role of need satisfaction and need frustration in the relation between self-criticism and academic adjustment. $***p < .001$, $**p < .01$, $*p < .05$. NS = not significant. Correlations between outcome variables were estimated but are not shown because of reasons of parsimony.

satisfaction could primarily account for the link between self-criticism and positive indicators, need frustration could mainly account for the link between self-criticism and negative indicators. Overall, most of the associations between self-criticism and the outcomes (except for controlled motivation) were fully mediated by the psychological needs experiences. The model explained 49% of the variance in negative affect, 35% of the variance in controlled motivation, 33% of the variance in disaffection, 31% of the variance in positive engagement, 29% of the variance in autonomous motivation and 27% of the variance in positive affect.

3.2.3. Hypothesis 3: the moderating role of self-criticism

Finally, we examined whether week-to-week associations between need-based experiences and (mal)adjustment depend on students' self-criticism levels, thereby testing cross-level interactions (with self-criticism representing a Level 2 moderator of associations between the needs and outcomes at Level 1). This moderating role of self-criticism was considered only in case there was significant variation around the slopes of the explanatory variables (i.e., need satisfaction and frustration) (Hox, 2010). There was only significant variation around one slope, that is, the slope representing the association between need satisfaction and positive affect ($b = 0.32$, $SE = 0.10$, $p < .01$). This means that the strength of the relation between weekly need satisfaction and weekly positive affect varies between students.² However, the

effect of self-criticism on the strength of this association was not significant ($p > .05$), indicating that self-criticism did not moderate this association. Overall, the data suggest that a moderation model fits these data less well than a mediation sequence.

In sum, we found evidence that weekly need-based experiences are related to weekly academic (mal)adjustment. Moreover, the basic psychological needs mediate the relation between self-criticism and academic (mal)adjustment. Finally, no interaction effects between self-criticism and the psychological needs were found in the prediction of academic (mal)adjustment.

4. Discussion

The goal of the present study was to examine whether week-to-week variation in academic adjustment is related to adolescents' weekly need-based experiences and to their self-criticism. While most studies on academic adjustment examined the role of between-person individual differences (Niemiec & Ryan, 2009), we studied variations in academic adjustment on a weekly basis. Consistent with emerging research showing that students' adaptation is highly dynamic (Bakker et al., 2015; Ketonen et al., 2018; Patall et al., 2016), we found evidence for substantial week-to-week variation in students' academic (mal)adjustment. Given this observation, it was deemed important to identify antecedents of weekly motivation and (mal)adjustment, thereby attending to the role of both dynamic and more stable, personality-based predictors and their complex interplay.

(footnote continued)

and academic adjustment was not significant. These findings indicate that self-criticism plays a more important role in predicting school (mal)adjustment than dependency.

² As the students also filled in the dependency subscale of the DEQ-A questionnaire, we conducted the same analyses with dependency (instead of self-criticism). We found a significant direct effect of dependency on need frustration ($b = 0.22$, $p < .05$), but no direct effect from dependency on need satisfaction ($b = 0.06$, $p > .05$). All indirect effects via need frustration and need satisfaction between dependency and academic adjustment were not significant ($p > .05$). Further, the effect of dependency on the relation between the needs

4.1. Associations between need satisfaction, need frustration and academic adjustment

Our first hypothesis stated that weekly variation in need satisfaction and need frustration would be meaningfully related to weekly variation in motivation and academic adjustment. According to the dual pathway model in SDT (Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011; Jang et al., 2016; Vansteenkiste & Ryan, 2013), need satisfaction would be primarily associated with adaptive outcomes (positive affect, autonomous motivation, engagement) and need frustration would yield a unique relation with maladaptive outcomes (negative affect, controlled motivation, disaffection).

The results were largely consistent with these hypotheses: during weeks that adolescents experienced more need satisfaction, they also reported more weekly positive affect, behavioral engagement, and autonomous motivation. These findings are in line with previous studies that found associations between need satisfaction and indicators of school functioning at the between-person level (Niemic & Ryan, 2009). In accordance with SDT's claim that need satisfaction energizes behavior (Ryan & Deci, 2008), the study indicates that at times students' needs are more satisfied, they feel more comfortable at school, they work harder in class, and are more interested in the learning material. Somewhat unexpectedly, need satisfaction was also positively related to controlled motivation. Although this relation is not theoretically predicted, this association has already been found in a few previous studies (Haerens et al., 2015; Silva et al., 2010; Zhou, Ma, & Deci, 2009). It should be noted, however, that the association between need satisfaction and autonomous motivation was much more pronounced than the association between need satisfaction and controlled motivation. Moreover, controlled motivation was predicted by both need satisfaction and need frustration. This finding is meaningful because it testifies to the ambivalence inherent to controlled motivation: students with controlled motivation seem to encounter both satisfying and frustrating experiences, with this combination of experiences heightening the quantity of their motivation but not the quality of motivation. Indeed, while controlled motivation can be a powerful source of motivation (at least in the short-term and for superficial learning outcomes), it is not a high-quality source of motivation and it fails to foster long-term commitment and deep-level learning (Niemic & Ryan, 2009; Vansteenkiste et al., 2009).

As hypothesized, weekly variation in adolescents' need frustration was associated with weekly variation in negative affect, controlled motivation and disaffection. The findings indicate that experiences of coercion, disconnection and ineffectiveness interfere with students' functioning in secondary school. During weeks students' psychological needs are more frustrated, they experience more negative affect, they feel more pressured to complete their tasks, and they are more likely to be passive and to lack initiation in class. This finding is in line with previous work (e.g., van der Kaap-Deeder et al., 2015) indicating that need frustration contributes to controlled motivation (Haerens et al., 2015), reduces individuals' energy levels (i.e., vitality and the feeling of being alive, Ryan & Frederick, 1997) and even increases the likelihood that adolescents engage in oppositional defiance (Van Petegem et al., 2015). The behavioral disengagement displayed by students during weeks characterized by high need frustration can indeed be the result of a combination of a lack of energy and a tendency to do the opposite of what teachers expect. Overall, the present results extend previous research by revealing the distinction between a bright and a dark motivational pathway at intra-individual level of adolescents' weekly academic adjustment. One exception to this pattern concerns the supplementary unique association between weekly variation in low need satisfaction and weekly variation in negative affect. Although high weekly need frustration related more strongly to negative affect, the presence of low need satisfaction was presumably sufficient to come with a more negative feelings.

4.2. The role of self-criticism in the relation between the needs and academic adjustment

Several studies have shown that self-criticism predicts maladaptive school outcomes, such as higher levels of stress, anxiety and controlled motivation (Shahar et al., 2003; Stoeber & Rambow, 2007; Vansteenkiste, Smeets, et al., 2010). The current study extends these studies by showing that self-criticism is related to problems in diverse areas of students' adjustment, including poor motivational, behavioral, and affective functioning. Moreover, because students reported on their motivation, behaviors, and experiences on a short-term basis (with recall bias less likely affecting students' reports than more dispositional reports of academic functioning; Althubaiti, 2016) and because self-criticism was assessed prior to students' weekly reports, the current study yielded some of the most conclusive evidence to date that self-criticism actually forecasts academic maladjustment. The findings illustrate how a trait (i.e., self-criticism) may be directly related to state levels of experiences (i.e., need satisfaction and need frustration) (Funder, 2006). A logical next step, then, was to examine the explanatory role of psychological needs experiences in these effects of self-criticism.

Theory (Luyten & Blatt, 2016) and previous research (Boone et al., 2014; van der Kaap-Deeder et al., 2016) have shown that self-criticism is related to lower need satisfaction and to higher need frustration. To gain more insight in the association between self-criticism and students' motivation and (mal)adjustment, we tested a mediation model in which need frustration and satisfaction play a mediating role in this association. We found rather consistent support for the proposed mediation model, with need satisfaction and need frustration accounting for most of the associations between self-criticism and the indicators of academic (mal)adjustment. These results, in combination with previous findings (Boone et al., 2014; Campbell, Boone, et al., 2018; van der Kaap-Deeder et al., 2016), underscore the role of need-based experiences as an underlying mechanism through which self-criticism translates into mal-functioning.

It still remains unclear which underlying processes could be responsible for this effect. First, self-criticism could affect *situation selection*. For example, self-critical students might actively seek more competitive and highly demanding environments and thus be more exposed to stressful events. Second, they might *elicit* more negative reactions in their environment. Indeed, the distant or even hostile interpersonal style of self-critical students could evoke more negative reactions from the environment and hamper peer relation quality and teacher-student relationships (Boone et al., 2014; Ommundsen, Roberts, Lemyre, & Miller, 2005). Another option is that self-criticism only influences the *perception* of situation. Students with an overly self-critical perspective would be more likely to interpret an ambiguous remark of a teacher as a negative reaction, or might see an average exam result sooner as a failure (De Muynck, Vansteenkiste, Vandenkerckhove, & Soenens, 2018; van der Kaap-Deeder et al., 2016). Each of these mechanisms, which could also operate simultaneously, suggests a proactive influence of students on the crafting and appraisal of their own environment.

In addition to the possibility that self-criticism proactively generates certain experiences (as reflected in the mediation model), we also considered the possibility that self-criticism would reactively interact with need-based experiences. Specifically, we tested the moderating role of self-criticism in associations between need-based experiences and the outcomes, thereby examining the possibility that associations between need frustration and problematic outcomes are amplified when students report high self-criticism. In contrast to previous research showing that self-critical individuals are more reactive to daily stressors than non-perfectionists (Dunkley et al., 2003; Kopala-Sibley, Klein, Perlman, & Kotov, 2017), we did not find support for a moderation model in the present study. We could even only test one moderation effect because there was only one random slope, indicating that the strength of associations between need-based experiences and the

outcomes was largely equal for all participants. Previous research supporting the stress-reactivity model (e.g., Chang & Rand, 2000) differed from the present study in terms of antecedents (stressful events instead of need-based experiences) and outcomes (psychological difficulties instead of academic adjustment). We speculate that there is more room for individual differences in the reaction to stressful life events than in the reaction to need frustration (which already involves a negative appraisal of potentially stressful situations). We should also be cautious in our interpretation because our sample size ($N = 82$) might have been too small to detect significant interaction effects. It is important that future studies replicate the current findings with a more extended sample. For now, our findings are more consistent with the notion that self-criticism generates more need frustrating experiences than with the notion that self-criticism reactively interacts with such experiences (Priel & Shahar, 2000).

4.3. Limitations and suggestions for future research

A number of limitations need to be kept in mind when interpreting the findings of the present study. First, all concepts were measured through self-report questionnaires. As need satisfaction and frustration, as well as the motivational and affective indicators of academic adjustment represent rather subjective inner experiences, students themselves are the most appropriate informants. However, relations between the needs and academic adjustment could be due to shared method variance or to response tendencies. Future studies could supplement the self-report data by teacher ratings or observational measures of academic adjustment, especially for assessing engagement and disaffection as well as students' achievement (Van den Berghe, Cardon, Tallir, Kirk, & Haerens, 2016).

Next, self-criticism was measured only once, at the onset of the study. As a consequence, we could only examine the effects of trait self-criticism on the outcomes. However, there is also evidence for variations in self-criticism within individuals on a short-term basis (Boone et al., 2012; Zuroff, Sadikaj, Kelly, & Leybman, 2016). Future studies could include state measures of self-criticism in order to test all relations at the within-person level.

Future research could also include a broader range of antecedents of need-based experiences. In the present study, we included self-criticism as a predictor of need frustration. Future research could also include positive personality features that might foster need satisfaction and buffer against need frustration. Mindfulness or self-compassion might be good candidates. As mindfulness involves a higher receptivity for present experiences, mindful students may derive more need satisfaction from everyday school experiences (Brown & Ryan, 2003). Future studies could also include a broader range of school subjects in order to look at between-subject differences in academic adjustment (see Chanal & Guay, 2015). As we only used the composite score of need satisfaction and frustration in our analyses, future research could also examine the effects of the three separate needs.

Further, the reliability of some of the measures, and of the need satisfaction measure in particular, was modest. Because of the intensive and short-term assessment of the study variables, we had to rely on a limited number of items for each scale, which may have affected the obtained reliability. We advise that future research would use the full 24-item version of the BPNSNF scale. As Cronbach's alpha is sensitive to sample size, our small sample size might have affected the reliability. Furthermore, the items assessing relatedness were formulated rather broadly as they applied to fellow students as well as to the teacher. Future research addressing the role of the need for relatedness in particular would do well to include items tapping specifically into relatedness within student-teacher relationships and student-peer relationships. Although most of the associations were still in line with theoretical expectations and previous research, the effects of the less reliable variables should be interpreted with caution. The homogeneity of the sample (i.e., all participants were recruited from one school in

the academic track) might also limit the generalizability of the results. As such, it is important to replicate and extend the current findings in larger and more heterogeneous samples of students. The relatively small sample size also did not allow us to examine gender differences in depth. While previous studies on larger samples documented gender differences in academic adjustment, with boys for instance scoring higher than girls on homework motivation and efforts for mathematics and with girls scoring higher than boys on motivation for languages (e.g., Trautwein, Ludtke, Schnyder, & Niggli, 2006), we did not find evidence for such gender differences in the current study. Research in larger samples would be ideally suited not only to examine mean-level gender differences with more statistical power but also to examine whether the associations obtained in the current study apply equally to male and female students.

Finally, the study design prevented us to draw conclusions about the direction of effects in the associations between the variables. While we modelled need satisfaction as a predictor of academic adjustment, it may also be possible that during weeks where students display elevated engagement they are better capable to have their psychological needs met (see Van den Berghe et al., 2016). Future research with more assessment points across weeks or even within the week would allow for a better test of the undoubtedly transactional associations between the psychological needs and academic adjustment. Such research with multiple (perhaps even daily) assessments within a week could also help to determine natural variation in students' needs-based experiences and adjustment in the course of a week. While we measured students' experiences on Friday, perhaps their experiences are different in the beginning or the middle of the week, an issue that remains to be examined. Such studies could possibly also include a wider number of classes as to decompose the observed variance in need-based functioning in three different levels, that is, the class-level, the between-student level, and the within-student (weekly or daily) level.

4.4. Conclusion and implications

This study showed that weekly fluctuations in need-based experiences are associated with weekly fluctuations in motivation and academic adjustment. When students' needs for autonomy, relatedness and competence are satisfied, students feel better at school, work harder in class, and are more autonomously motivated. Weekly need frustration, however, is associated with more negative affect, more disaffection and controlled motivational functioning. At the between-person level, we found that self-criticism is related to academic maladjustment through its associations with heightened need frustration and lowered need satisfaction. These findings point to the importance of need-based experiences in explaining the impact of self-criticism on academic maladjustment.

There are several practical implications that can be drawn from the results of this study. First, the significant fluctuations in academic adjustment indicate that well-being at school, engagement, and motivation are dynamic concepts. Instead of only making a distinction between the better adjusted students and the poorly adjusted students in a class or school (i.e., between-person differences), teachers and counsellors should also look at ups and downs in adjustment and motivational functioning within one student (i.e., within-person differences). As there is considerable variation in academic adjustment, one week is not the same as the other. As a result, every week is a new week, with both opportunities to raise autonomous motivation and engagement and risks to become demotivated and disengaged. Also students with generally lower academic adjustment probably do not experience every week as equally bad. For them, it could be interesting to explore their ups and downs, in order to identify what kind of triggers make them feel slightly better at school. Next, our findings underscore the importance of need satisfaction to foster students' academic adjustment. The school plays an important role in creating a need-supportive environment where students can thrive (e.g., De Meyer et al., 2016; Ryan

& Deci, 2017). An autonomy-supportive teaching style, involving the teacher to adopt the students' perspective and highlight the relevance of the study tasks, has been shown to increase students' need satisfaction (Vansteenkiste, Niemiec, et al., 2010). A need-supportive teaching style does not only have an impact on affective and motivational outcomes, but it also fosters engagement at school (Reeve, Jang, Carrell, Jeon, & Barch, 2004). Teachers should not only be informed about the importance of autonomy-supportive teaching, but also about the detrimental effects of controlling (or need-thwarting) teaching and how they can refrain from these practices (De Meyer et al., 2014). Also more structural changes in the school environment can be effective, for example by developing a more need-supportive evaluation policy and by strengthening students' participation at school and reinventing school rules and regulations. Finally, we found that self-critical students experience more need frustration and, in turn, report more academic maladjustment. Therefore, teachers and school psychologists should pay attention to this vulnerable group. Self-critical students could be

targeted in prevention or intervention programs, in order to foster resilience. More specifically, counsellors could help self-critical students to reduce their tendency to engage in negative self-evaluations (Boone, Soenens, Braet, & Goossens, 2010). Acceptance and Commitment Therapy (ACT; Luoma & Platt, 2015) or compassion-focused therapy (Gilbert, 2010) are promising routes to reduce self-criticism.

Declarations of interest

None.

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Appendix

1. Additional information about the scale assessing need satisfaction and need frustration

Because the present study is among the first to use a 12-item version of the BPNSNF on a weekly basis, we provide some additional information about this version of the BPNSNF. Previous research using a weekly assessment among university students (Campbell, Boone, et al., 2018) and a daily assessment among adolescents (Van der Kaap-Deeder et al., 2017) indicated that need satisfaction and need frustration yielded unique predictive validity in the prediction of individuals' weekly stress, sleep, and well-being. While Chen et al. (2015) developed a 24-item version, both Van der Kaap-Deeder et al. (2017) and Mabbe, Soenens, Vansteenkiste, Van der Kaap-Deeder, and Mouratidis (2018) made use of a shortened 12-item version, which is also used in the present study. A multilevel confirmatory factor analysis which allows studying the internal structure of the scale at both the within-person and between-person level, showed that a two-factor solution separating need satisfaction from need frustration, yields a better fit compared to a single-factor solution (Mabbe et al., 2018). Table 3 shows all items and Cronbach's alpha values of the scales in the BPNSNF scale as used in the current study.

Table 3

Overview of the items and Cronbach's alphas for the BPNSNF questionnaire.

		T1	T2	T3
Autonomy satisfaction	1... I felt a sense of choice and freedom in the things I did in class.	$\alpha = 0.66$	$\alpha = 0.53$	$\alpha = 0.67$
	2... I felt that my decisions reflect what I really wanted.			
Relatedness satisfaction	3... I felt connected with my friends at school.			
	4... I experienced a warm feeling with the fellow students and teachers I spend time with.			
Competence satisfaction	5... I felt confident that I could do things well at school.			
	6... I felt competent in what I did at school.			
Autonomy frustration	7... most of the things I did at school felt like 'I had to'.	$\alpha = 0.75$	$\alpha = 0.63$	$\alpha = 0.75$
	8... I felt forced to do many things I wouldn't choose to do in class.			
Relatedness frustration	9... I felt excluded from the group fellow students I want to belong to.			
	10... I felt that teachers and fellow students were cold and distant towards me.			
Competence frustration	11... I felt disappointed with my performances at school.			
	12... I felt insecure about my abilities.			

Table 4

Correlations between self-criticism and the needs and engagement and motivation for the two school subjects.

	Autonomous motivation			Controlled motivation			Engagement			Disaffection		
	Maths	French/Latin	z	Maths	French/Latin	z	Maths	French/Latin	z	Maths	French/Latin	z
Self-criticism	−0.32**	−0.19	−1.42	0.33**	0.23*	−0.94	−0.20	0.01	−2.09*	0.31**	0.07	2.64**
Satisfaction												
Autonomy	0.560***	0.48***	1.02	−0.16	−0.06	−0.91	0.47***	0.47***	0.00	−0.31**	−0.20	−1.22
Relatedness	0.28*	0.30**	−0.22	−0.21	−0.28*	0.65	0.12	0.24*	−1.21	−0.23	−0.15	−0.87
Competence	0.33**	0.25*	0.88	−0.03	0.08	−0.99	0.32**	0.34**	−0.21	−0.32**	−0.25*	−0.78
Frustration												
Autonomy	−0.44***	−0.37**	−0.82	0.57***	0.56***	0.12	−0.30**	−0.33**	0.31	0.47***	0.42***	0.61
Relatedness	−0.08	−0.23*	1.60	0.32**	0.29*	0.29	−0.20	−0.22	0.20	0.30*	0.26*	0.45
Competence	−0.21	−0.23*	0.22	0.30**	0.22	0.75	−0.13	−0.22	0.90	0.41***	0.37**	0.47***

Note. * $p < .05$. ** $p < .01$. *** $p < .001$. The z-scores indicate significant differences between the correlation coefficients.

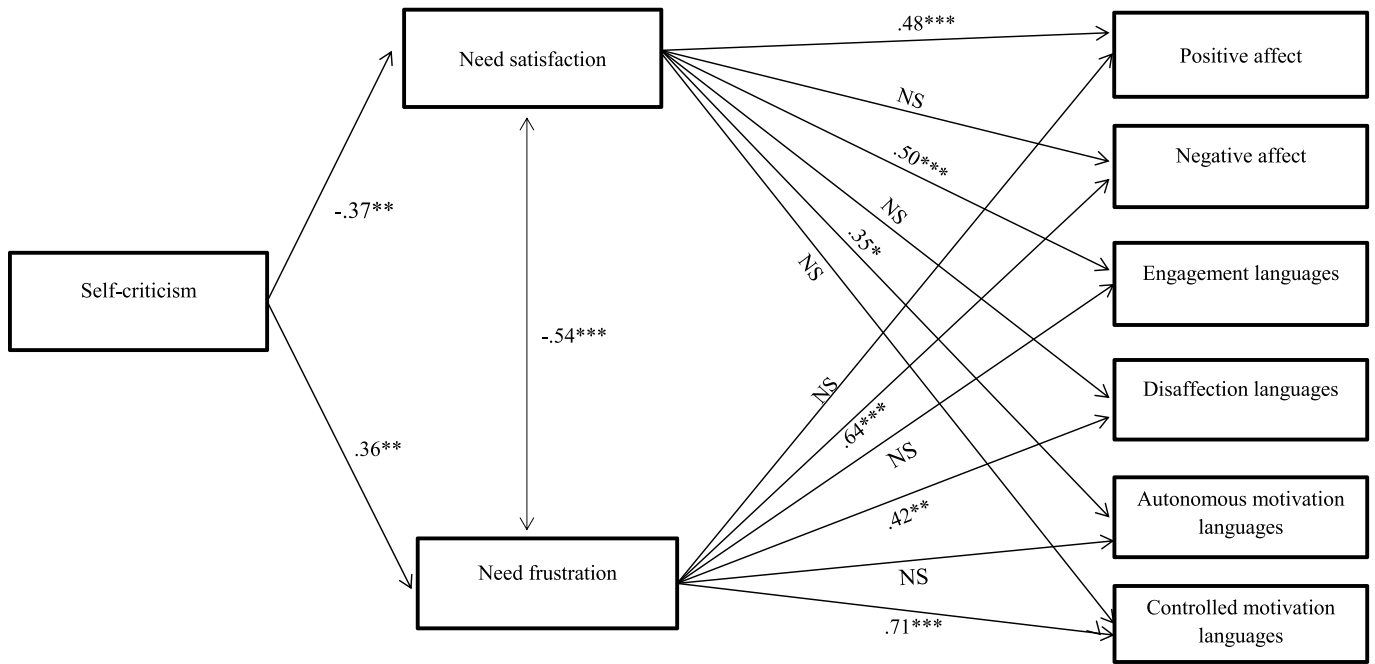


Fig. 4. The mediating role of need satisfaction and need frustration in the relation between self-criticism and academic adjustment for languages. $^{***}p < .001$, $^{**}p < .01$, $^{*}p < .05$. NS = not significant.

2. Confirmatory factor analyses for need satisfaction and need frustration

We conducted a series of Confirmatory Factor Analyses (CFAs) because such analyses allow one to formally compare the presumed 2-factor structure of the needs questionnaire to a 1-factor solution. Within each week, the fit of a 2-factor model tended to be higher than the fit of a 1-factor solution ($\Delta \chi^2(1) = 3.15$, $p = .075$ in Week 1, $\Delta \chi^2(1) = 10.68$, $p < .01$ in Week 2, $\Delta \chi^2(1) = 3.51$, $p = .061$ in Week 3), although the difference was only marginally significant in Week 1 and Week 2 (probably due to the limited sample size). The factor loadings of the 2-factor solutions can be found in Table 6. All items had significant loadings on their corresponding factor, except for 4 items in Week 2 (i.e., the items with loadings < 0.30).

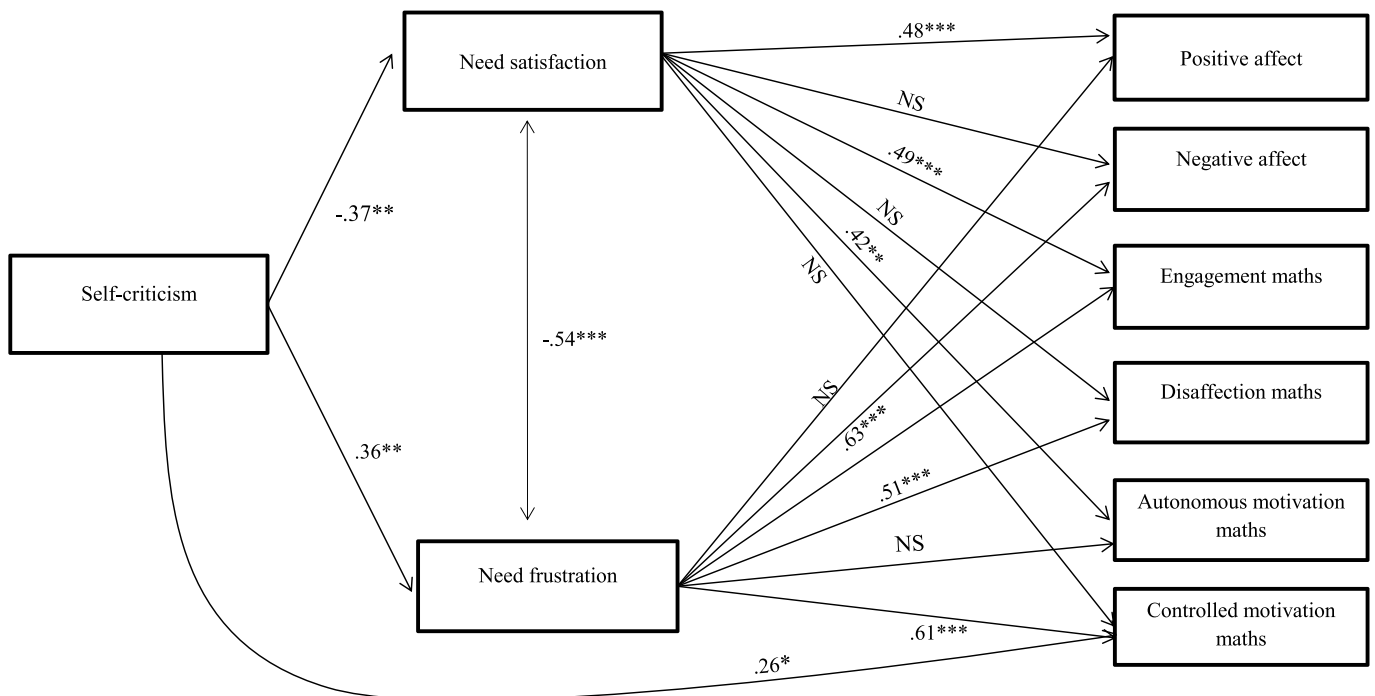


Fig. 5. The mediating role of need satisfaction and need frustration in the relation between self-criticism and academic adjustment for mathematics. $^{***}p < .001$, $^{**}p < .01$, $^{*}p < .05$. NS = not significant.

Table 5
Correlations between self-criticism, academic adjustment and each of the separate needs.

	Need satisfaction			Need frustration		
	Autonomy	Relatedness	Competence	Autonomy	Relatedness	Competence
Self-criticism	−0.29 ^a	−0.28 ^a	−0.23 ^a	0.37 ^{ab}	0.18 ^a	0.22 ^{1a}
Positive affect	0.46 ^{***a}	0.32 ^{***a}	0.32 ^{***a}	−0.39 ^{***a}	−0.21 ^a	−0.21 ^a
Negative affect	−0.48 ^{***a}	−0.23 ^b	−0.36 ^{***ab}	0.48 ^{***ab}	0.39 ^{***a}	0.65 ^{***b}
Engagement	0.53 ^{***a}	0.32 ^{***a}	0.37 ^{***a}	−0.36 ^{***a}	−0.24 ^a	−0.20 ^a
Disaffection	−0.28 ^a	−0.27 ^a	−0.31 ^a	0.49 ^{***a}	0.30 ^b	0.43 ^{***ab}
Autonomous motivation	0.58 ^{***a}	0.19 ^b	0.32 ^{***b}	−0.46 ^{***a}	−0.17 ^b	−0.24 ^b
Controlled motivation	−0.11 ^a	−0.19 ^a	0.03 ^a	0.58 ^{***a}	0.31 ^{***b}	0.26 ^{***b}

Note. ^{*} $p < .05$. ^{**} $p < .01$. ^{***} $p < .001$ for the significance of the correlations. Z-tests were conducted with different superscripts (a, b, c) referring to significant differences between correlations ($p < .05$).

Table 6
Confirmatory factor analyses for need satisfaction and need frustration.

		T1	T2	T3
Autonomy satisfaction	1... I felt a sense of choice and freedom in the things I did in class.	0.54	0.64	0.48
	2... I felt that my decisions reflect what I really wanted.	0.59	0.24	0.38
Relatedness satisfaction	3... I felt connected with my friends at school.	0.34	0.20	0.40
	4... I experienced a warm feeling with the fellow students and teachers I spend time with.	0.51	0.22	0.67
Competence satisfaction	5... I felt confident that I could do things well at school.	0.65	0.73	0.60
	6... I felt competent in what I did at school.	0.38	0.35	0.47
Autonomy frustration	7... most of the things I did at school felt like 'I had to'.	0.58	0.69	0.57
	8... I felt forced to do many things I wouldn't choose to do in class.	0.71	0.75	0.57
Relatedness frustration	9... I felt excluded from the group fellow students I want to belong to.	0.51	0.25	0.37
	10... I felt that teachers and fellow students were cold and distant towards me.	0.74	0.41	0.70
Competence frustration	11... I felt disappointed with my performances at school.	0.48	0.41	0.51
	12... I felt insecure about my abilities.	0.39	0.31	0.78

3. Ancillary analyses examining differences between school subjects

For motivation and engagement, students reported about their experiences for mathematics and French/Latin separately. Table 4 shows that the relations between self-criticism and the needs on the one hand and between engagement and motivation on the other hand are similar for both subjects. A z-test to formally compare the correlation coefficients (Steiger, 1980) indicated that there were no significant differences in the correlations with the needs between both subjects. Only two correlations with self-criticism (i.e., the correlations between self-criticism and engagement and between self-criticism and disaffection) differed between the two subjects. Furthermore, we also tested SEM-models for mathematics and French/Latin separately. The results (see Figs. 4 and 5) showed that the relations between the needs and academic adjustment were similar for the two subjects. The only difference was that the direct path from self-criticism to controlled motivation only holds for mathematics and not for languages. Therefore, we chose to collapse the scales across the two subjects.

4. Correlations between self-criticism, academic adjustment and each of the separate needs

Table 5 shows the correlations between self-criticism, academic adjustment and each of the separate needs. Z-tests formally comparing the correlations between each of the separate need-based experiences and academic (mal)adjustment indicated that most of the associations were consistent across the three needs. There were only a few exceptions: autonomy satisfaction and autonomy frustration were associated more strongly with some of the study variables than competence and relatedness. Also competence frustration was related more strongly to negative affect than relatedness frustration. However, all correlation coefficients point in the same direction across the three needs.

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