



## Research paper

## Need-supportive teaching in higher education: Configurations of autonomy support, structure, and involvement



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## HIGHLIGHTS

- Interplay among dimensions need-supportive teaching seems to be not orthogonal.
- Perceived need support is positively associated with autonomous motivation.
- Students perform better when they perceive their teachers as need supportive.

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## 1. Need-supportive teaching in higher education

Motivation to study is seen as one of the most important predictors of a successful educational career of students (Richardson, Abraham, & Bond, 2012). Students who are motivated to learn are more likely to engage in activities that will foster learning (Pintrich & Schunk, 2002), such as monitoring their learning progress and pro-actively asking for feedback. Therefore, interventions to increase students' success in higher education that focus on their motivation to study could be fruitful. A strong theoretical contribution to our understanding about motivation is Self-Determination Theory (SDT). According to Self-Determination Theory (SDT) the social context of a learning environment should support students' basic psychological needs for autonomy, competence, and relatedness to increase students' motivation and achievement (Reeve, 2002; Ryan & Deci, 2000a, 2000b). Especially, teachers are assumed to play an important role in motivating

students, by providing and demonstrating autonomy support, structure (i.e., support of competence), and involvement (i.e., support of relatedness; Skinner & Belmont, 1993; Stroet, Opdenakker, & Minnaert, 2013). In other words, need-supportive teaching is a powerful instrument for teachers to encourage students' motivation in order to increase students' achievement (see Fig. 1).

The association of need-supportive teaching with students' motivation and subsequent achievement has been described and studied often (e.g., Reeve, 2002; Stroet et al., 2013). Nevertheless, studies on the association of need-supportive teaching and motivation and achievement that include all three dimensions of need-supportive teaching are relatively scarce. Moreover, there is no consensus about the interplay among the three dimensions of need-supportive teaching and their unique importance for students' motivation and achievement (Stroet et al., 2013). Studying the dimensions of need-supportive teaching with a person-oriented approach (e.g., cluster analysis) instead of a variable-oriented approach (e.g., factor analysis), could provide new insights in the interplay among the dimensions (Vansteenkiste et al., 2012). The current study, therefore, aims to investigate the role of need-supportive teaching with a person-oriented approach in a higher education setting.

## 1.1. Students' motivation to study

Within the social context of a learning environment, especially students' interactions with and perceptions of their teacher are important (Roorda, Koomen, Spilt, & Oort, 2011). SDT provides a framework to understand how teacher behaviors function as nutrients or threat for students' motivation and achievement. According to SDT, teachers are more motivating when they are able to

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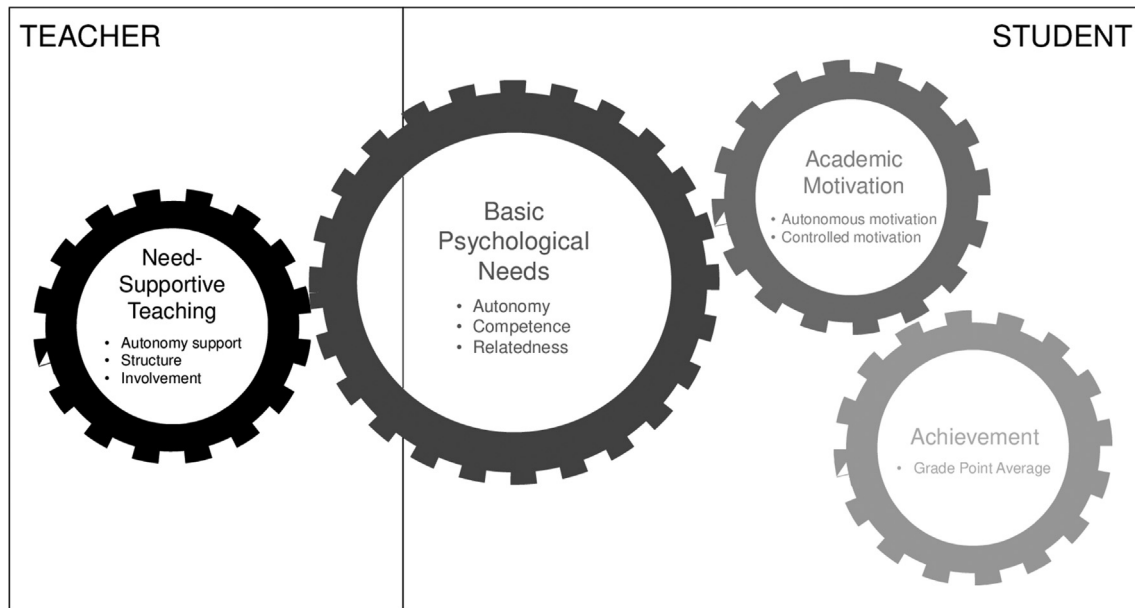


Fig. 1. Need-supportive teaching: Teachers' wheel to promote students' motivation and achievement by supporting students' basic psychological needs.

support students' basic psychological needs (Aelterman, Vansteenkiste, Van den Berghe, De Meyer, & Haerens, 2014). SDT distinguishes three basic psychological needs: need for autonomy, competence, and relatedness (Ryan & Deci, 2000b). Once these basic needs are fulfilled, students are more likely to experience self-determination and higher well-being (Ryan & Deci, 2000b), as their classroom activity is congruent with their inner motives and needs (Reeve, Jang, Carrell, Jeon, & Barch, 2004).

According to SDT, the quality of motivation is more important than the quantity of motivation (Deci & Ryan, 2008). Looking at the quality of motivation, the main distinction that is made in SDT is between autonomous and controlled motivation (Deci & Ryan, 2000, 2008; Ratelle, Guay, Vallerand, Larose, & Senécal, 2007; Ryan & Deci, 2000a, 2000b; Vansteenkiste, Lens, & Deci, 2006). Students are *autonomously motivated*, when they experience volition or when their actions are self-endorsed: They are studying for reasons that are inherent to the activity, for example pleasure or satisfaction (i.e., *intrinsic motivation*), or they identify themselves with the value of the activity, foresee personal relevance, or recognize the importance of the task (i.e., *identified regulation*). When external forces are involved and students experience pressure in their behavior and feelings, students' actions are regulated by *controlled motivation*: They are studying because of internal pressure, such as feelings of shame or guilt (i.e., *introjected regulation*) or they are prompted by deadlines, rewards, punishments, or other external pressures (i.e., *external regulation*). According to SDT, students can experience controlled motivation and autonomous motivation at the same time (Ratelle et al., 2007; Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009).

### 1.2. Teacher's motivating style: need-supportive teaching

As indicated above, students can become more autonomously motivated when their basic psychological needs are supported (Ryan & Deci, 2000b). The need for autonomy seems to be most important in motivating students, but when combined with feelings of relatedness and competence, conditions are most favorable to achieve identified regulation and intrinsic motivation (Koestner & Losier, 2004). In order to support students' need satisfaction,

teachers can adopt different motivating styles, which are linked to the three needs.

Students' experience of autonomy can be promoted by being autonomy supportive (Brooks & Young, 2011; McLachlan & Hagger, 2010; Reeve, Deci, & Ryan, 2004; Reeve & Jang, 2006; Reeve, Jang, et al., 2004). The need for autonomy refers to the need to experience volition. This need can be supported in several ways, such as providing choice, communicating about the value of tasks when facing uninteresting activities, and providing rationales for requested behaviors. In order to support autonomy, it is important that teachers show respect, acknowledge and accept students' expressions of negative affect, and that they do not rely on controlling language (Reeve, Deci, et al., 2004; Stefanou, Perencevich, DiCintio, & Turner, 2004; Stroet et al., 2013).

The need of competence refers to students' experience of effectiveness and can be supported by offering structure (Jang, Reeve, & Deci, 2010). Teachers who provide structure, communicate their expectations clearly, provide explicit guidelines, guidance, informational feedback, support, and encouragement. Structure is expected to support students' motivation by keeping students on task and by avoiding chaos during transitions (Jang et al., 2010; Stroet et al., 2013).

The least mentioned motivating style is involvement (Stroet et al., 2013), which aims to promote students' feelings of relatedness (i.e., the experience of close emotional bonds with significant others). According to Skinner and Belmont (1993) interpersonal involvement is the most important factor of teacher-student relationships. Teachers can promote involvement in order to support students' feelings of relatedness by showing affection, by expressing understanding of the students, by dedicating resources (e.g., time), and by making sure they are dependable and available to offer support (Stroet et al., 2013).

### 1.3. The interplay among need-supportive teaching dimensions

Whereas research first focused on autonomy support, in the last decade more attention has been paid to the interplay between autonomy support and structure (Hospel & Galand, 2016). A recurrent topic in the discussion on need-supportive teaching is the

cohesion among the three dimensions (i.e., autonomy support, structure, and involvement). Although the dimensions are theoretically distinguishable, the three dimensions of need-supportive teaching are not replicated in every study. For example, [Katz, Kaplan, and Gueta \(2010\)](#) studied students' perceptions of need-supportive teaching in primary and secondary school and found only one dimension of need-supportive teaching. Because their factor analysis indicated a one-factor model, they suggest that need-supportive teaching is a more integral perception that cannot be separated into dimensions. Other studies did find distinguishable dimensions (i.e., autonomy support and structure); however, the dimensions were highly correlated (e.g., [Sierens, Vansteenkiste, Goossens, Soenens, & Dochy, 2009](#)).

Moreover, there is no consensus about the mutual relationships among the dimensions. In the literature, the relationships between autonomy support and structure have been conceptualized in three different ways: Antagonistic, curvilinear, and orthogonal relationship ([Jang et al., 2010](#); [Reeve, Deci, et al., 2004](#)).

In an antagonistic relationship, autonomy support and structure are opposite poles of a continuum. In this view, more autonomy support indicates a decrease in structure and vice versa. [Jang et al. \(2010\)](#) argued that aspects of structure (e.g., provision of expectations or guidelines), will interfere with autonomy support (e.g., provision of choice). Another option is a curvilinear relationship ([Jang et al., 2010](#)). In this case, only with moderate structure (as opposed to low or high structure), students experience volition of their actions. However, both an antagonistic and a curvilinear relationship are not very plausible, given that the dimensions have shown to be highly (positively) correlated in previous studies ([Jang et al., 2010](#); [Lam, Cheng, & Ma, 2009](#); [Sierens et al., 2009](#); [Vansteenkiste et al., 2012](#)).

More plausible is an orthogonal relationship. [Reeve, Deci, and Ryan \(2004\)](#) elaborated on the orthogonal character of autonomy support and structure. In this view, autonomy support and structure are independent aspects of teachers' motivating styles. These styles can differ, so that some teachers can score high or low on both dimensions, or high on one dimension, but low on the other (i.e., autonomy support without expressing clear expectations and vice-versa). [Vansteenkiste et al. \(2012\)](#) found support for this assumption in their study with 7th to 12th grade students. Their analyses of students' perceptions of their teacher's motivating style resulted in four clusters: 1) low perceived autonomy support and high clear expectations, 2) high perceived autonomy support and low clear expectations, 3) both low perceived autonomy support and clear expectations, and 4) both high perceived autonomy support and clear expectations. The first two clusters indicate that students can perceive a teacher as supporting their autonomy while he is perceived not to communicate clear expectations and vice versa.

The above-mentioned relationships among the dimensions of need-supportive teaching are all about the relationships between autonomy support and structure. Less is known about the relationship of involvement with autonomy support and structure. As involvement has shown to be important for diverse student outcomes (i.e., self-esteem, motivation and engagement; [Chan et al., 2013](#); [Murray, 2009](#); [Ryan, Stiller, & Lynch, 1994](#); [Skinner & Belmont, 1993](#)), it is interesting to take this dimension into account as well. According to [Baumeister and Leary \(1995\)](#), the need to belong is fundamental to human motivation. In higher education, good relationships with teachers and peers are assumed to prevent dropout ([Tinto, 1998, 2012](#)). As the dimensions seem to be correlated, it can be presumed that involvement influences (the perception of) autonomy support and structure and vice versa. [Ryan et al. \(1994\)](#) found support for this assumption, as they discovered that relationships with teachers, especially students'

feelings that they can depend on their teachers for cognitive and emotional support, were associated with a greater sense of autonomy and competence.

#### 1.4. *The association between need-supportive teaching and students' motivation*

According to SDT a positive association of need-supportive teaching with students' motivation and subsequent achievement can be expected, as higher levels of need satisfaction are associated with more autonomous motivation ([Deci & Ryan, 2000, 2008](#); [Reeve, 2002](#)). Thus, when a teacher succeeds in supporting the psychological needs of the students, the students become more motivated to study. [Reeve and Jang \(2006\)](#) point out that supporting students' needs is not simple. Based on their observational study, they concluded that teachers can provide autonomy support, but not directly a sense of autonomy ([Reeve & Jang, 2006](#)). There is a mismatch between the actual support provided by teachers and the perceived support by students.

The theoretical assumption that need-supportive teaching is positively associated with autonomous motivation and achievement is studied and supported in several studies (e.g., [Baeten, Dochy, & Struyven, 2013](#); [Stroet et al., 2013](#)). A lot of these studies, however, are executed in primary and secondary education (see [Stroet et al., 2013](#) for an overview of studies on early adolescents). Less research is done in the higher educational context. [Edmunds, Ntoumanis, and Duda \(2008\)](#) studied need-supportive teaching in a university exercise class and compared a supportive teaching style with a typical teaching style. The students in the group with the supportive teaching style perceived in general more need support and need satisfaction. Moreover, their findings supported the assumption that psychological needs satisfaction facilitates autonomous motivation ([Edmunds et al., 2008](#)). The results from the study by [Baeten et al. \(2013\)](#) were in line with the findings of [Edmunds et al. \(2008\)](#). Although it was not the primary focus of the study, [Baeten et al. \(2013\)](#) discovered that perceived need support was a significant positive predictor of autonomous motivation in their sample of first year student teachers. Furthermore, [Black and Deci \(2000\)](#) reported that university students' perceptions of their instructor's autonomy support at the beginning of the semester was a significant predictor of autonomous motivation and course performance.

The research on the association between need-supportive teaching and students' motivation has been dominated by studies using a variable-oriented approach (e.g., confirmatory factor analysis, *t*-tests, regression analysis). Using a variable-oriented approach assumes that the population is homogeneous ([Von Eye & Bogat, 2006](#)). When students' perceptions of the three dimensions of need-supportive teaching have indeed an orthogonal relationship, population homogeneity can be questioned and a person-oriented approach seems more suitable to study the association between need-supportive teaching and students' motivation. Moreover, a person-oriented approach is more suitable to detect non-linear relationships, i.e., orthogonal relationships, than a variable-oriented approach that is used to detect linear relationships ([León & Liew, 2017](#)). [Vansteenkiste et al. \(2012\)](#) have contributed to the discussion about the interplay among the dimensions by using a person-oriented approach (i.e., cluster analysis) in addition to the variable-oriented approach. They studied need-supportive teaching in secondary education and discovered four clusters of students' perceptions of need-supportive teaching with different associations with motivation for each cluster. Students who perceived high autonomy support and clear expectations (Cluster 4) were significantly more autonomously motivated than students in the other clusters. Students who perceived low

autonomy support and vague expectations (Cluster 3) were significantly less autonomously motivated than all other students, and experienced more controlled motivation than students who perceived low autonomy support and clear expectations (Cluster 1).

### 1.5. Aim of this study

The current study investigates the interrelations between autonomy support, structure, and involvement in Dutch higher education. The Dutch higher education system consists of two types of institutes: research universities and universities of applied sciences, which offer higher vocational education. Both institutes have a bachelor's-master's degree structure. The current study is conducted at a university of applied sciences, and includes only bachelor's degree students.

Studies on the association of need-supportive teaching and motivation and achievement have mainly focused on early adolescents (Stroet et al., 2013). It can be questioned whether the results from studies on early adolescents can be transferred directly to higher education as it can be assumed that higher education differs from school settings in many respects, for example in teaching style and classroom settings. Moreover, students at Dutch higher education often are attending university voluntarily, which requires a different conceptualization of motivation. Therefore, to optimally support students' motivation in higher education, it is important to study teachers motivating styles in higher education in more detail.

To obtain full understanding of need-supportive teaching and the association with motivation and achievement, studies are required that include all three dimensions of need-supportive teaching. As previous studies about need-supportive teaching have been dominated by studies about autonomy support, sometimes replenished with (aspects of) structure or involvement, but, to our knowledge never replenished with both, we include all three dimensions in the current study.

The aim of the current study was twofold. Firstly, the interplay among the three dimensions of need-supportive teaching was explored. In order to contribute to the discussion about the orthogonal relationship among the dimensions, both variable-oriented and person-oriented approaches were used. It is expected that the three dimensions can be found in a factor analysis (i.e., variable-oriented approach; Hypothesis 1). The person-oriented approach by Vansteenkiste et al. (2012) was replicated to determine configurations of perceived need-supportive teaching. Because we are not aware of a study in which involvement was included in addition to autonomy support and structure, no specific hypotheses about the type and number of clusters to be found in the person-oriented analysis were formulated.

The second aim of the study was to examine the association of need-supportive teaching with students' motivation and achievement. It is hypothesized that clusters in which students have the highest perceptions of need-supportive teaching (i.e., autonomy support, structure, and involvement) are associated with higher autonomous motivation and lower controlled motivation (Hypothesis 2). It is further hypothesized that clusters in which students have the highest perceptions of need-supportive teaching (i.e., autonomy support, structure, and involvement) are associated with higher achievement (Hypothesis 3).

## 2. Method

### 2.1. Procedure and participants

All first to fourth-year students from 24 different bachelor's degree programs of a university of applied sciences in The

Netherlands, from engineering to teacher education were invited to participate by personalized email. Students participated on a voluntary basis and provided informed consent; 16.07% of the invited students filled out the questionnaire (partially). Participants were 623 students (37.40% male) of whom 55.06% were in their first year. Average age of the participants was 21.17 years ( $SD = 4.63$ ).

### 2.2. Measures

#### 2.2.1. Need-supportive teaching

Students' perceptions of need-supportive teaching of their lecturers were investigated with the teacher as a social context questionnaire (TASC-Q; Belmont, Skinner, Wellborn, & Connell, 1988). In this study, the Dutch and shortened version of the questionnaire was used that has been previously applied in higher education (Vansteenkiste et al., 2009). The TASC-Q consists of 24 items on a scale from 1 (*completely disagree*) to 5 (*completely agree*), divided over three subscales: autonomy support, structure, and involvement. Students were asked to reflect on the need-supportive teaching of their lecturers in general. As Hypothesis 1 relates to the factor structure and other psychometric properties of the scale, this will be reported in the results section.

#### 2.2.2. Motivation

Students' autonomous and controlled motivation to learn were measured with a 16-item Dutch questionnaire (Vansteenkiste et al., 2009) that was based on the Academic Self-Regulation Questionnaire (SRQ-a; Ryan & Connell, 1989). This questionnaire measures students' general motivation instead of subject-specific motivation, on a scale from 1 (*completely disagree*) to 5 (*completely agree*). An example item for autonomous motivation is "I'm motivated to study because I enjoy doing it". An example item for controlled motivation is "I'm motivated to study because I'm supposed to do so". The Cronbach's alphas were good (autonomous motivation: .84; controlled motivation: .86).

#### 2.2.3. Achievement

Student performance was expressed in their GPA, extracted from school's administration. GPA was the average of grades (0–100) a student was rewarded with, taking into account the EC that were associated with this grade. Each year a student can earn 60 EC. The number of EC awarded to a grade is determined based on the study time that needs to be invested to complete the course. Theoretically, GPA could range between 0 and 100, but in our sample the range of GPA was between 2.36 and 86.09. Average GPA was 70.01 ( $SD = 9.43$ ).

### 2.3. Analyses

To test Hypothesis 1, the factor structure of need-supportive teaching was analyzed with a confirmatory factor analysis, using AMOS (Version 22). Assessment of the model fit was based on multiple fit indices. The comparative fit index (CFI; Bentler, 1990) and Tucker-Lewis index (TLI; Tucker & Lewis, 1973) should have values greater than .95 (Kline, 2005), although values above .90 are acceptable (Bentler, 1990). For the root-mean-square error of approximation (RMSEA; Steiger, 1990) values of .08 or lower can be considered acceptable (Byrne, 2001).

Cluster analysis was performed (using SPSS, version 22) following the cluster analysis procedure described by Vansteenkiste et al. (2012): Scores were standardized prior to the cluster analysis and 14 univariate and multivariate outliers were removed. A two-step procedure was used, starting with determining the number of clusters applying Ward's hierarchical clustering procedure. The two-, three-, and four-cluster solutions were

selected based on the step-size criterion (Milligan & Cooper, 1985). As only in the three-cluster solution the explained variance was at least 50% for each dimension, the three-cluster solution was considered for the second step using a *k*-means procedure. The three-cluster solution was validated replicating the analysis with two random selected halves of the sample. The agreement between these two cluster solutions and the original clusters was good (Cohen's  $\kappa = .96$ ), which indicates a robust cluster solution.

The association between need-supportive teaching and motivation and achievement (Hypotheses 2 and 3) was analyzed using an ANOVA with Bonferroni post-hoc tests to compare the clusters.

### 3. Results

#### 3.1. Preliminary analyses: confirmatory factor analysis

The items and descriptive statistics per item of the TASC-Q are displayed in Table 1. The factor structure was inspected replicating the analytic procedure reported in Johnston and Finney (2010). First, the hypothesized three-factor structure (Step 1, Table 2) and a one-factor structure (Step 2) were tested to determine if the one-factor structure had a better fit to the data than the three-factor structure. In support of Hypothesis 1, the results indicated that the three-factor structure had a better fit to the data than the one-factor structure,  $\chi^2_{\text{difference}}(3) = 216.79, p < .001$ . Because the three-factor structure was not optimal, separate analyses per hypothesized factor (Steps 3–13) were conducted (see Johnston & Finney, 2010). For each factor, items with a non-significant factor loading were removed step-wise, until no non-significant factor loadings remained. A negative-worded method effect was used to compensate for the misfit due to negative-worded items (see Johnston & Finney, 2010). The final factor structure consisted of 18 items, on three dimensions (see Table 2, Step 14:  $\chi^2(125) = 421.73$ ,

RMSEA = .06, CFI = .92, TLI = .91). This means that Hypothesis 1 was supported.

The Cronbach's alphas of the (adjusted) subscales were sufficient (autonomy support: .66; structure: .74) or good (involvement: .87).

#### 3.2. Descriptive statistics

Table 3 presents the descriptive statistics and correlations among the dimensions of need-supportive teaching, motivation and GPA. In general, students were positive about the need support they experienced from their teachers. A within-subjects ANOVA showed significant differences among the mean perceptions on the three dimensions of need-supportive teaching, Wilks' Lambda = .69,  $F(130, 906), p < .01, \eta_p^2 = .30$ . Scores on the need-supportive dimensions were significantly correlated to each other.

Overall, students experienced high autonomous motivation and lower controlled motivation. Nevertheless, students scored quite high on controlled motivation as well. Grade Point Average (GPA) was 70.01 out of 100, and GPA was significantly correlated, albeit weakly, with autonomous and controlled motivation.

#### 3.3. Clustering

The three-cluster solution accounted for 51.14% of the variance in perceived autonomy support, 63.56% in structure, and 62.94% in involvement. Table 4 presents the cluster solution and cluster means. The first cluster ( $n = 133, 21.84\%$ ) is characterized by relative low need-supportive teaching. Students with average or slightly above average scores on all three dimensions of need-supportive teaching were clustered in the moderate need-supportive teaching-cluster ( $n = 283, 46.47\%$ ). In contrast to the first cluster, students in the third cluster ( $n = 193, 31.69\%$ ) scored

**Table 1**  
Items and descriptive statistics for the teacher as a social context questionnaire (TASC-Q).

Item	<i>M</i>	<i>SD</i>	Skewness	Kurtosis	Factor loadings final model
<i>Autonomy support</i>					
1 My teachers give me a lot of freedom in how I organize my study	3.89	0.77	−1.02	1.70	.46 ***
2 My teachers listen to my ideas	3.68	0.75	−0.61	0.43	.73 ***
3 It seems like my teachers are always telling me what to do <sup>a,b</sup>	3.30	0.84	−0.30	−0.39	
4 My teachers don't give me much choice in how I organize my study <sup>a,b</sup>	3.74	0.81	−0.86	0.91	
5 My teachers don't listen to my opinion <sup>a</sup>	3.84	0.81	−0.63	0.33	.67 ***
6 My teachers explain how I can use the things we learn in school <sup>b</sup>	3.56	0.87	−0.84	0.49	
7 My teachers are always getting on my case about how I organize my study <sup>a,b</sup>	3.64	0.89	−0.45	−0.12	
8 My teachers don't explain why what I do in school is important to me <sup>a</sup>	3.54	0.96	−0.43	−0.38	.44 ***
<i>Structure</i>					
9 My teachers don't make clear what they expect of me in class <sup>a</sup>	3.49	0.90	−0.56	−0.38	.38 ***
10 If I can't solve a problem, my teachers show me different ways to try to	3.55	0.82	−0.98	0.65	.64 ***
11 Every time I do something wrong, my teachers respond differently <sup>a</sup>	3.22	0.83	−0.18	−0.33	.25 ***
12 My teachers don't tell me what they expect of me <sup>a,b</sup>	3.50	0.89	−0.53	−0.27	
13 My teachers check whether I'm ready before they start a new topic	2.52	0.93	0.34	−0.58	.50 ***
14 My teachers keep changing how they respond towards me <sup>a,b</sup>	3.79	0.88	−0.53	−0.17	
15 My teachers show me how to solve problems	3.52	0.81	−0.66	0.17	.67 ***
16 My teachers make sure I understand before they move on	2.72	1.00	0.13	−0.68	.61 ***
<i>Involvement</i>					
17 My teachers know me well	3.22	0.95	−0.28	−0.47	.75 ***
18 My teachers just don't understand me <sup>a</sup>	3.74	0.76	−0.45	0.18	.67 ***
19 My teachers talk with me	3.84	0.80	−1.09	1.82	.71 ***
20 I can't count on my teachers when I need them <sup>a</sup>	3.62	0.96	−0.64	0.05	.56 ***
21 My teachers like me	3.61	0.65	−0.19	0.35	.59 ***
22 My teachers spend time with me	3.05	0.81	0.01	−0.09	.69 ***
23 My teachers really care about me	3.33	0.85	−0.29	−0.18	.79 ***
24 I can't depend on my teachers for important things <sup>a</sup>	3.69	0.94	−0.73	0.27	.56 ***

Note.  $N = 609$ . Response scale ranged from 1 to 5.

\*\*\* $p < .001$ .

<sup>a</sup> Negatively worded items were recoded before analysis.

<sup>b</sup> Item was not included in the final model.

**Table 2**  
Fit indices for the hypothesized and modified models.

Model		$\chi^2$	df	RMSEA	CFI	TLI
<i>General models</i>						
(1)	Hypothesized 24-item, three-factor	1267.19	249	.08	.80	.78
(2)	24-item, one-factor	1483.98	252	.09	.76	.74
(3)	24-item, three-factor with method effect	920.79	237	.07	.87	.84
<i>Autonomy support models</i>						
(4)	8-item, one-factor	258.14	20	.14	.72	.61
(5)	8-item, one-factor with method effect	214.85	15	.15	.76	.56
(6)	5-item, one-factor with method effect <sup>a</sup>	59.231	5	.13	.90	.81
(7)	4-item, one-factor <sup>b</sup>	10.230	2	.08	.98	.94
<i>Structure models</i>						
(8)	8-item, one-factor	283.35	20	.15	.75	.65
(9)	8-item, one-factor with method effect	142.09	16	.11	.88	.79
(10)	7-item, one-factor with method effect <sup>c</sup>	50.341	10	.08	.95	.90
(11)	6-item, one-factor with method effect <sup>d</sup>	14.468	6	.05	.99	.97
<i>Involvement models</i>						
(12)	8-item, one-factor	178.78	20	.11	.92	.89
(13)	8-item, one-factor with method effect	80.863	17	.08	.97	.95
<i>Rejoined modified models</i>						
(14)	18-item, three-factor with method effect <sup>e</sup>	421.73	125	.06	.92	.91

<sup>a</sup> Items 3, 4, and 7 were removed.<sup>b</sup> Items 3, 4, 6, and 7 were removed.<sup>c</sup> Item 14 was removed.<sup>d</sup> Items 12 and 14 were removed.<sup>e</sup> Items 3, 4, 6, 7, 12, and 14 were removed.**Table 3**  
Descriptive statistics and correlations of need-supportive teaching, motivation, and achievement.

	Possible range	M	SD	1	2	3	4	5
1. Autonomy support (N = 609)	1–5	3.74	0.56	–				
2. Structure (N = 609)	1–5	3.43	0.56	.64**	–			
3. Involvement (N = 609)	1–5	3.51	0.60	.62**	.65**	–		
4. Autonomous motivation (N = 606)	1–5	3.83	0.58	.37**	.37**	.43**	–	
5. Controlled motivation (N = 606)	1–5	2.52	0.79	-.11**	-.19**	-.10**	-.08**	–
6. Grade Point Average (N = 607)	0–100	70.01	9.43	.14**	.16**	.19**	.16**	-.10**

\* $p < .05$ , \*\* $p < .01$ .**Table 4**  
Univariate ANOVA's and post-hoc cluster comparisons.

	Cluster			Total (n = 609)	F (2, 606)	$\eta^2$
	Low NST (n = 133)	Moderate NST (n = 283)	High NST (n = 193)			
Autonomy support	3.04 <sup>a</sup>	3.70 <sup>b</sup>	4.27 <sup>c</sup>	3.74	489.98**	.61
Structure	2.70 <sup>a</sup>	3.41 <sup>b</sup>	3.96 <sup>c</sup>	3.43	544.14**	.64
Involvement	2.82 <sup>a</sup>	3.45 <sup>b</sup>	4.08 <sup>c</sup>	3.52	440.05**	.59
Autonomous motivation	3.47 <sup>a</sup>	3.79 <sup>b</sup>	4.11 <sup>c</sup>	3.83	58.88**	.16
Controlled motivation	2.68 <sup>b</sup>	2.58 <sup>b</sup>	2.33 <sup>a</sup>	2.52	9.66**	.03
GPA	67.07 <sup>a</sup>	70.01 <sup>b</sup>	72.00 <sup>c</sup>	70.01	11.09**	.04

Note. NST = need-supportive teaching.

Mean-scores with different superscripts were significantly different from each other.

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

high on all three dimensions of need-supportive teaching (the high need-supportive teaching-cluster).

### 3.4. Association with motivation and achievement

In support of Hypothesis 2, for autonomous motivation,  $F(2, 603) = 58.88$ ,  $p < .001$ ,  $\eta_p^2 = .16$ , the same pattern among the clusters was found as for the perceived need-supportive teaching (see Table 4). Students in the high need-supportive teaching cluster scored significantly higher on autonomous motivation than students in the other clusters. Students in the moderate need-supportive teaching cluster scored significantly higher than the

students in the low need-supportive teaching cluster as well. For controlled motivation a slightly different pattern was found, as only the high need-supportive teaching cluster scored significantly lower on controlled motivation than the other clusters,  $F(2, 603) = 9.66$ ,  $p < .001$ ,  $\eta_p^2 = .03$ . No significant difference was found between the moderate and low need-supportive teaching cluster (see Table 4).

The students in the high need-supportive teaching cluster scored significantly higher on GPA than the moderate and low need-supportive teaching cluster, and the moderate need-supportive teaching cluster scored significantly higher than the low need-supportive teaching cluster,  $F(2, 604) = 11.09$ ,  $p < .001$ ,

$\eta_p^2 = .04$  (see Table 4). Therefore, Hypothesis 3 was supported.

#### 4. Discussion

This study aimed to explore the configurations in which the three dimensions of need-supportive teaching occur in higher education. Furthermore, we examined whether students' perceptions of need-supportive teaching were associated with their motivation and achievement. Results of this study are important as they provide insight in how teachers in higher education can promote students' motivation and achievement. As studies in which all three teachers' motivating styles (i.e., autonomy support, structure, and involvement) were included are scarce, it remains unclear whether these teachers' styles are equally important in motivating students.

The current study is, to our knowledge, the first attempt to find configurations of students' perceptions of need-supportive teaching that includes all three dimensions. Previous studies focussed on the relationship between autonomy support and structure, while involvement was ignored. As involvement is important in motivating students as well (e.g., Ryan et al., 1994; Skinner & Belmont, 1993), it is interesting to explore the relationships among all three dimensions.

##### 4.1. The interplay among the three dimensions of need-supportive teaching

The first aim of this study was to contribute to the discussion about the orthogonal relationship among the three dimensions of need-supportive teaching (i.e. autonomy support, structure, and involvement). Firstly, we used a variable-oriented approach and conducted a confirmatory factor analysis to test whether the dimensions could be distinguished as independent factors. Our results showed that an orthogonal relationship was supported, confirming Hypothesis 1. However, correlations among the dimensions were quite high ( $r = .62-.65$ ), so there seems to be some interdependence. These high correlations are in line with previous research (e.g., Sierens et al., 2009).

Secondly, we used a person-oriented approach to find configurations of teachers' motivating styles. Cluster analysis resulted in three clusters: high, moderate, and low need-supportive teaching. This cluster solution did not confirm an orthogonal relationship among the dimensions, as we did not find clusters with opposite scores on the dimensions. This is probably due to the fact that we asked students to reflect on need support of their teachers in general. This means that they had to reflect on their average perception of several situations and teachers at the same time. This might make it hard to differentiate among the dimensions.

The cluster solution we found was not in line with the cluster solution reported by Vansteenkiste et al. (2012). They reported two clusters with opposite scores for autonomy support and clear expectations. However, differences between autonomy support and clear expectations in these two clusters with opposite amounts of need support (high on autonomy support versus low on clear expectations and vice versa) were quite small: mean scores of the low perceptions were only less than a half standard deviation lower than average. Therefore, these two clusters are probably more similar to our moderate cluster than the labelling of the clusters would suggest. It is plausible that including all aspects of structure (instead of only clear expectations) and involvement, as we did in the current study, resulted in one merged moderate cluster.

In summary, an orthogonal relationship was not confirmed by our results. In the current study, the dimensions were positively related to each other, at least regarding students' perceptions. This indicates that autonomy-supportive teachers are also perceived as being involved and providing high structure. Instead of an

orthogonal relationship, the dimensions seem to be gradually related (e.g., more autonomy support resulting in more structure); the dimensions seem to overlap.

##### 4.2. Association with students' motivation and achievement

The second aim of this study was to examine the association of students' perceptions of need-supportive teaching with students' motivation and achievement. Both hypotheses were confirmed, as we found the same patterns for autonomous motivation and GPA and the perception of need-supportive teaching among the clusters. The cluster that showed high scores on need-supportive teaching also showed significantly higher scores on autonomous motivation and GPA than the other clusters. The moderate need-supportive teaching cluster showed significantly higher scores on autonomous motivation and GPA than the low need-supportive teaching cluster. This result is in line with previous research in secondary education (e.g., Vansteenkiste et al., 2012).

##### 4.3. Limitations and directions for future research

Some critical remarks can be made about the results of the current study. First, we concluded that a gradually relationship exists among the three dimensions of need-supportive teaching, although it remains unclear whether the positive association among the dimensions means that those teachers indeed provide autonomy support, structure, and involvement in comparable amounts, or if students' perceptions are influenced by mainly one of the dimensions. For example, a student that perceives his or her teacher as being involved, is probably more mild about lacking autonomy support and structure. In this case, the scores of students' perceptions on the three dimensions turn out to be comparable (e.g., all around 3 out of 5), but this does not reflect the actual support that the student experiences. It can be valuable to look into more detail, which teacher behaviors affect students' perceptions of need-supportive teaching and whether perceptions of one dimension of need support affect students' perceptions of another dimension as well. This insight can be particularly interesting for the educational practice, as it tells us whether teachers can focus on one of the dimensions or if they better parcel out their attention to all three dimensions.

The found association between need-supportive teaching and motivation and achievement does not tell us anything about the direction of this association (Stroet et al., 2013). As students' perceptions of need-supportive teaching and their motivation were measured at the same time and both need-supportive teaching and motivation and GPA are general measures, it is not clear whether they reflect same practices and whether teachers' motivating style influenced students' motivation or vice versa. For example, students who are autonomously motivated and perform well, might have more positive perceptions of their teachers' need support than students who are less autonomously motivated and perform less well.

Although the direction of the association remains unclear, based on the fact that the different clusters of need-supportive teaching were associated with motivation and achievement, it can be concluded that need-supportive teaching is of importance in higher education as well. More research to investigate need-supportive teaching in higher education is recommended. In the current study students' general perceptions of need-supportive teaching were studied. However, it can be expected that students' perceptions vary among teachers and situations (Vansteenkiste et al., 2012). For that reason, we assume that studying students' situation-specific perceptions provides additional insight into the relationship among the three dimensions of teachers' motivating

styles.

We strongly recommend including involvement in future research on the relationship among the three dimensions of need-supportive teaching. Studies to the relationship between autonomy support and structure have provided many interesting insights, but – as this study shows – this is just a simplification of reality. Including involvement gives a more complete, but complicated view on the interplay among the dimensions.

In the current study we studied motivating teaching styles from an SDT-perspective. Different conceptualizations of teaching styles are found in, for example, literature about instructional communications (e.g., Kerssen-Griep, 2001) or interpersonal perspectives on classroom management (e.g., Wubbels, Brekelmans, den Brok, & van Tartwijk, 2006). Comparisons of these different conceptualizations were beyond the scope of the current study, but could be interesting to study into detail in future research.

In addition to these critical remarks about the results, the current study has some limitations which should be addressed in future research. First, the response rate was quite low (16.07%). This might have distorted the results, as more motivated students are more willing to participate. Second, the questionnaire used to measure students' perceptions of need-supportive teaching showed to have some items that did not fit within the assumed factor. Although an acceptable fit was attained after removing several items, we suggest to develop an alternative measurement scale in future research.

## 5. Conclusion

This exploratory study highlights the importance of need-supportive teaching in higher education and the potential of including involvement into research on need-supportive teaching. Although confirmatory factor analysis supported the three dimensions of need-supportive teaching (i.e. autonomy support, structure, and involvement) to be independent factors, cluster analysis did not support an orthogonal relationship among the dimensions. Students' perceptions of need-supportive teaching were clustered into three groups: high, moderate, and low need-supportive teaching. Therefore, instead of an orthogonal relationship, a gradually relationship in which dimensions overlap seems to be more plausible. The positive association that was found in this study between need-supportive teaching and students' motivation and achievement underscores the importance of research to unravel the interplay among the dimensions of need-supportive teaching.

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## Update

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## Corrigendum to “Need-supportive teaching in higher education: Configurations of autonomy support, structure, and involvement” [Teaching and Teacher Education 68, (2017) 134–142]



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**Keywords:**

Need-supportive teaching  
Self-determination theory  
Autonomous motivation  
Achievement

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The authors regret that the abstract of the manuscript was missing in the published article and hereby provide the absent abstract:  
*Need-supportive teaching is believed to increase students' motivation and achievement. This assumption was tested in a higher education sample from a Dutch university of applied sciences (N = 623). Configurations of students' perceptions of autonomy support, structure, and involvement were explored using cluster analysis to establish the relationship among these three dimensions of need-supportive teaching. Three clusters of need-supportive teaching were found: high, average, and low perceived need support. Associations with students' motivation and performance were explored using ANOVAs. The clusters were respectively associated with relatively high, average, and low student autonomous motivation and achievement.*

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