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Differentiated need support by teachers: Student-specific provision of autonomy and structure and relations with student motivation

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Background. According to self-determination theory, teachers can support their students' engagement in learning by providing autonomy support and structure. Within classes, however, there appears to be great diversity in the extent to which students experience autonomy and structure.

Aims. This study aimed to investigate the degree to which teachers' perceptions of student-specific autonomy support and structure differ between students in their class and whether differentiated need support predicts students' motivation.

Sample. Twenty-four elementary school teachers and their students ($n = 506$) participated in this study.

Method. Teachers completed a short questionnaire assessing their perceptions of autonomy support and structure for each student. Students completed two questionnaires assessing perceptions of need support and their motivation. Multilevel analyses were conducted.

Results. The results showed that the within-classroom variation in both teacher perceptions and student perceptions of need support was considerably larger than the between-classroom variation. Teacher perceptions of student-specific autonomy support were positively associated with students' autonomous motivation and negatively with students' controlled motivation. However, teacher perceptions of student-specific structure were positively associated with students' controlled motivation.

Conclusions. These findings suggest that teachers differentiate in need support. The positive association between teacher perceptions of structure and students' controlled motivation might suggest that teachers may offer structure in controlling rather than autonomy-supportive ways. Furthermore, the relations between need support and students' motivation differed between the class-level and the within-class (student) level highlighting the need for disentangling the effects of need-supportive teaching at different levels and adopting a multilevel approach.

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According to self-determination theory (SDT), teachers can support their students' engagement in learning by supporting their psychological needs for autonomy, competence, and relatedness (Deci & Ryan, 2000). However, there are indications that teachers do not provide *all* their students with optimal levels of need support. That is, it has often been found that students within the same class experience very different levels of need support from their teacher (Danielsen, Wium, Wilhelmsen, & Wold, 2010; Haerens, Aelterman, Vansteenkiste, Soenens, & Van Petegem, 2015). Yet, thus far, most studies focusing on teacher perceptions of need support rather than student perceptions have assessed need-supportive teaching at the class level (for exceptions, see Skinner & Belmont, 1993; Skinner, Furrer, Marchand, & Kindermann, 2008), thereby assuming that each student in the classroom will receive similar levels of support and thus ignoring that teachers may differentiate their level of need support towards different students. It may therefore not be surprising that such studies focusing on class-general measures of need-supportive teaching mostly found weak or no relations with student motivation (Stroet, Opdenakker, & Minnaert, 2013). The present study aims to provide insight into the extent to which teachers differentiate between students in two main aspects of need support: autonomy support and structure by assessing teacher perceptions of student-specific need support. It is thereby examined to what degree teachers differentiate in need support and how differentiated need support is associated with student perceptions of need support, and student motivation.

Student motivation

Motivation drives and encourages behaviour (Reeve, 2009). In school contexts, motivation is an important prerequisite for learning. Students do not only differ in their degree of motivation for school, but also in the quality of motivation (Vansteenkiste, Lens, & Deci, 2006). According to SDT, the quality of motivation refers to reasons that underlie behaviours of students. When students are intrinsically motivated to learn, they learn because they find the learning activities fun or challenging, rather than learning from an external stimulus, pressure, or reward (Ryan & Deci, 2000). When an activity is performed to achieve an outcome independent of the activity itself, we speak of extrinsic motivation (Ryan & Deci, 2000). According to SDT, three types of extrinsic motivation can be distinguished: identified, introjected, and external regulated motivation (Sierens, Vansteenkiste, Goossens, Soenens, & Dochy, 2009). Students with high levels of identified motivation consider the results of the activity to be valuable or important. Although identified regulation is extrinsic in nature, there is a high degree of autonomy. Because intrinsic and identified regulation are both characterized by a high degree of autonomy and the experience free will and volition, they are considered forms of autonomous motivation (Vansteenkiste *et al.*, 2006). Students with high levels of introjected motivation are motivated by internal pressures, such as a sense of pressure to avoid guilt and fear. Students' motivation is externally regulated when students perform an activity to get an external reward or to avoid punishment. Both introjected and external regulation concern a sense of pressure or control and are therefore both considered forms of controlled motivation (Gagné & Deci, 2005).

Autonomous motivation has consistently been found to be associated with beneficial outcomes, such as deep learning, higher grades, and higher psychological well-being (Levesque, Zuehlke, Stanek, & Ryan, 2004; Soenens & Vansteenkiste, 2005; Vansteenkiste, Simons, Lens, Soenens & Matos, 2005). Controlled motivation, on the other hand, has been found to be associated with less adaptive outcomes, such as procrastination,

reduced concentration, lower school results, and increased fear of taking tests (Guay, Ratelle, & Chanal, 2008; Sierens *et al.*, 2009).

Need-supportive teaching

To enhance the quality of students' motivation, teachers can support students' basic needs for autonomy, competence, and relatedness (Stroet *et al.*, 2013). Prior research has indicated that although supporting students' need for relatedness is important, it plays a more distal role in facilitating students' motivation (Deci & Ryan, 2000). Therefore, this study focuses on supporting students' need for autonomy and competence through the provision of autonomy support and structure. Teaching is considered autonomy-supportive when it fosters the autonomous functioning of students, which means that students can act according to their personal values (Stroet *et al.*, 2013). Several teaching behaviours have been distinguished through which teachers can offer autonomy support. Teaching behaviours are considered autonomy-supportive when teachers provide choice and give students the opportunity to express their feelings, thoughts, and perspectives, or when they adapt learning activities to student personal values (Reeve, Jang, Carrell, Jeon, & Barch, 2004; Stroet *et al.*, 2013). Student perceptions of autonomy support have been found to be positively associated with a variety of adaptive outcomes (Reeve, Deci, & Ryan, 2004), including student engagement in the classroom (Jang, 2008; Reeve, Jang, *et al.*, 2004) and better conceptual learning (Grolnick & Ryan, 1987). A high degree of control, on the other hand, has been found to be negatively related to student motivation (Assor, Kaplan, Kanat-Maymon, & Roth, 2005).

Structure refers to teaching behaviours that support students' need to feel competent (Deci & Ryan, 2000). It refers to the amount and clarity of the information that students receive from their teacher that helps students to know what is expected of them and how they can achieve this (Vansteenkiste *et al.*, 2012). Teachers can provide structure by formulating clear and consistent rules and expectations, maintaining them, and structuring the learning process (Vansteenkiste *et al.*, 2012). Structure gives students a sense of control over the learning process and learning outcomes (Jang, Reeve, & Deci, 2010). Structure has also been found to promote autonomous motivation (Guay, Roy, & Valois, 2017).

Rather than two ends of the same continuum, autonomy support and structure are described in SDT as two independent dimensions. Various studies found positive associations between student perceptions of autonomy support and structure (Hospel & Galand, 2016; Sierens *et al.*, 2009; Vansteenkiste *et al.*, 2012), suggesting that teachers tend to combine both dimensions. Providing both autonomy support and structure seems to be most conducive to the motivation of students (Hospel & Galand, 2016; Jang *et al.*, 2010; Vansteenkiste *et al.*, 2012).

Differentiation in autonomy support and structure

Although need-supportive teaching has been associated with positive learning outcomes (Stroet *et al.*, 2013), not all teachers provide their students with optimal levels of need support (Reeve, 2009). In a small-scale interview study, teachers indicated that they differentiate in autonomy support and structure based on their perceptions of their students' ability, background, and motivation (Hornstra, Mansfield, Van der Veen, Peetsma, & Volman, 2015). In addition, several studies on teacher expectancies have shown that teachers differentiate their teaching behaviours towards individual students

based on their expectancies of those students, which in turn affects student motivation (Babad, 2005; Harris & Rosenthal, 1985; Hornstra, Stroet, Van Eijden, Goudsblom, & Roskamp, 2018; Jussim, Eccles, & Madon, 1996; Urhahne, 2015).

Studies which examined the variance in student perceptions of need support within and between classes also suggest that teachers differentiate between students. Intraclass correlations (ICCs) of student perceptions of need support have been found to vary from .05 to .31 (Bieg, Backes, & Mittag, 2011; Danielsen *et al.*, 2010; Haerens *et al.*, 2015; Hospel & Galand, 2016), indicating that most variance in these variables is situated *within* classes and student. It is unclear whether these differences between students in their perceptions of their teachers' behaviour are indicative of actual differences in teaching behaviours towards different students or whether they reflect differences between students in their *perceptions* of similar teachers' behaviours. That is, students may perceive similar behaviours from their teacher but judge those same behaviours differently.

Teacher and student perceptions of need support

To date, a considerable amount of research has been conducted focusing on the relationship between need-supportive teaching and student motivation (see Stroet *et al.*, 2013 for a review). In most of these studies, both need support and outcome measures are assessed from the perception of students. These studies mostly found substantial positive relations between need support and student motivation (Sierens *et al.*, 2009; Stroet *et al.*, 2013; Vansteenkiste *et al.*, 2012), whereas studies that assessed need support from the perspective of the teacher typically show significantly weaker correlations with student motivation (Stroet *et al.*, 2013). In addition, studies typically find a lack of congruence between teacher and student perceptions of need support. Taylor and Ntoumanis (2007), for example, did not find significant relations between teacher perceptions of need support (measured at the class level) and student perceptions of need support. Moreover, teacher perceptions of need support were not associated with student motivation, whereas student perceptions of need support were positively associated with students' motivation. This incongruence between student and teacher perceptions could be caused by the fact that teacher perceptions of need support were assessed at the class level, thereby ignoring possible variation in teaching behaviours towards different students. As discussed above, it might well be that teachers differentiate between students with regard to the provision of autonomy support and structure. Assessing teacher perceptions of need support for each student individually – thereby assuming that teachers differentiate in their behaviours towards different students – may provide a more accurate measure of need support compared to class-level measures.

In a study by Skinner and Belmont (1993), teacher perceptions of need support were assessed for each student individually. They found significant positive correlations between teachers' perceptions of student-specific need support and student-perceived need support. They also found positive correlations between teacher perceptions of student-specific need support and student motivation. However, the study by Skinner and Belmont (1993) had a few limitations. The authors did not examine the degree to which teachers differentiated in need support towards different students. In addition, this study disregarded the hierarchical structure of the data. That is, the authors did not take into account that students are nested in classes and that students within a class may be more similar to one another in terms of their motivation or the need support they receive compared to students in other classes. If this nested structure is not statistically taken into

account, for example, by performing multilevel analyses, this may lead to under- or overestimations of the relations between variables in a study and potentially inaccurate conclusions.

There are yet two other reasons why current research on need-supportive teaching may benefit from the assessment of student-specific need support from the perspective of the teacher. First, many studies on need-supportive teaching focus on student perceptions of need support, but SDT states that students' experiences of need support are explained by actual differences in teaching behaviours (Connell & Wellborn, 1991). It is expected that teacher perceptions of student-specific need support reflect differences in teachers' behaviours towards different students, and are therefore associated with students' perceptions of need-support, and thereby with students' motivation, suggesting a mediational process. Second, teacher perceptions of student-specific need support may also directly be associated with student motivation. Student and teacher perceptions may both reflect different aspects of teachers' need support. Thereby, both measures may explain unique variance in students' motivation. Hence, incorporating both student and teacher perceptions of need support provides a more complete picture than only focusing on need support from the perspective of students.

The present study

Previous research has found abundant support for the claim that when students experience need support, this facilitates their motivation (Stroet *et al.*, 2013). However, student perceptions of need support typically show low agreement with teacher perceptions (Taylor & Ntoumanis, 2007), and within-class agreement between students is typically quite low (Hospel & Galand, 2016). We therefore posit that teachers provide different levels of need support to different students within their class. The present study therefore focuses on differentiated need support. The following hypotheses are addressed in this study:

Based on exploratory research by Hornstra *et al.* (2015), which suggests that teachers differentiate between students in the degree of provision of autonomy support and structure, and studies that have found differences in student perceptions between students within the same class (Bieg *et al.*, 2011; Hospel & Galand, 2016), we expect to find a substantial proportion of variance in student-specific teacher perceptions of autonomy support and structure to be situated *within* classes (Hypothesis 1).

In line with findings from class-level measures (Taylor & Ntoumanis, 2007) and the study by Skinner and Belmont (1993) in which student-specific teacher perceptions of need support were assessed, we expect to find positive relations between teacher perceptions of need support and students' autonomous motivation, and negative relations between teacher perceptions of need support and students' controlled motivation (Hypothesis 2). In addition, as SDT states that the effects of the actual social context on student motivation are explained by how students experience the social context (Connell & Wellborn, 1991), we expect relations between teacher perceptions of student-specific need support and students' motivation to be partly mediated by student perceptions of need support (Hypothesis 3).

To examine these hypotheses, the present study adopts a multilevel approach. Thereby, we aimed to gain a better understanding of the extent to which teachers differentiate between students in needs support, and how this relates to student-perceived need support and students' motivation. Previous research has indicated that students' motivation can differ for boys and girls (Hornstra, Van der Veen, Peetsma, &

Volman, 2013; Lietaert, Roorda, Laevers, Verschueren, & De Fraine, 2015), for students with and without a minority background (Alonso-Tapia & Simón, 2012; Andriessen, Phaet, & Lens, 2005), and for students in different age groups (Hornstra *et al.*, 2013; Opendakker, Maulana, & Brok, 2012). Therefore, we included gender, minority background, and grade level (school year) as covariates. Thereby, we could examine to what extent teacher and student-perceived need support predicted students' motivation, beyond these background characteristics.

Method

Participants

The study involved 506 upper elementary school students and 24 teachers (grade 3–6) from seven schools from different regions in the Netherlands. The average number of students per class was 20.29 ($SD = 4.75$). Students' mean age was 9.55 years ($SD = 1.31$). 49.2% were girls. The mean age of the teachers (84.8% female) was 32.91 years ($SD = 8.20$). The participating schools had a relatively diverse student population. That is, in the Netherlands, a person is considered to have a non-western minority background when at least one of their parents was born in another non-Western country (CBS, 2016). This was the case for 43.9% of the students in the present sample (primarily Moroccan: 36.5%). In addition, schools in the Netherlands receive additional funding for students whose parents have attained a relatively low educational level. The average share of students for whom schools in the Netherlands receive additional funding is around 14.6% (based on data from a national representative sample of students; Driessen, Mulder, Ledoux, Roeleveld & Van der Veen, 2015). In the present study, this share was substantially higher, namely 27.7%. This indicates that the participating schools had a relatively high share of students with a low SES.

Procedure

The data of this study were pre-test data from a longitudinal intervention study. Schools were recruited through convenience sampling. The teachers provided active consent for participation. Passive consent was obtained from parents. The institutional review board approved this study. Surveys were administered to students and teachers by one of the researchers during regular class hours.

Instruments

All questionnaires used in this study are included in Appendix.

Teacher perceptions of student-specific autonomy support and structure

To assess student-specific autonomy support and structure, the Teachers as Social Context Questionnaire (TASC) of Belmont, Skinner, Wellborn, and Connell (1988) (Dutch translation by Sierens *et al.*, 2009) was used. The formulation of items was adapted to assess student-specific autonomy support and structure ('this student' instead of 'students' or 'this class'). Because teachers rated each student individually, shortened versions of existing scales for autonomy support and structure were used consisting of four and five items, respectively. Based on results from a pilot study in which the complete

scales with all items were filled out, those items with the highest factor loadings were selected. A pilot test with these shortened scales yielded satisfactory results: A factor analysis revealed two distinct factors that both had sufficient reliabilities (Cronbach's $\alpha > .70$). The results from the present study confirmed the two-factor structure with separate subscales for autonomy and structure, $\chi^2(97) = 43.157$, $p < .001$; RMSEA = .055, CFI = .988. The correlation between the latent factors was $r = .52$, $p < .001$. An example item of the *autonomy support* subscale is, 'I let this student make a lot of decisions regarding schoolwork'. An example of the *structure* subscale is, 'I am very clear about my expectations with this student'. All items were answered using a 5-point Likert scale ranging from completely not applicable to this student (1) to completely applicable to this student (5). The autonomy support subscale had a high internal consistency (Cronbach's $\alpha = .93$). One item of the structure subscale ('If a student can't solve a problem, I show different ways to solve the problem') needed to be removed in order to reach sufficient reliability (Cronbach's $\alpha = .60$).

Student perceptions of autonomy support and structure

Because this study was part of a larger research project, the questionnaire in this study included various other scales. To limit the time needed to fill out the questionnaires, we also used a shortened student version of the TASC (Belmont *et al.*, 1988, 1992; translation by Sierens *et al.*, 2009) to assess student perceptions of *autonomy support* (four items) and *structure* (five items). The items were answered using a 5-point Likert scale ranging from completely not applicable to me (1) to completely applicable to me (5). Note that the items of the teacher and student version of the original TASC are not parallel, so neither were the items of the teacher and student subscales in the present study. Based on results of the aforementioned pilot study in which all items were filled out, those items with the highest factor loadings were selected. The results of this pilot test with these shortened scales yielded satisfactory results: A factor analysis indicated two factors that both had sufficient reliabilities (Cronbach's $\alpha > .60$). Contrary to the results on teacher reports, a CFA revealed that student subscales of *autonomy support* and *structure* could not be well distinguished. That is, a one-factor model fitted the data better, $\chi^2(21) = 57.808$, $p < .001$; RMSEA = .059, CFI = .931, than a two-factor model, $\chi^2(26) = 225.209$, $p < .001$; RMSEA = .123, CFI = .628. For further analyses, these subscales were combined into one subscale 'need support'. An example item is 'This teacher gives me a lot of choices about how to do my schoolwork'. One item from the subscale structure ('Everytime I do something wrong, my teacher acts differently') was removed because a factor analysis revealed it had a low factor loading (.18). Removing this item raised the reliability from $\alpha = .62$ to $\alpha = .64$. The final scale consisted of eight items. Previous studies also used combined measures of need support rather than separating the dimensions (Katz, Kaplan, & Gueta, 2009; Lam, Cheng, & Ma, 2009; Skinner *et al.*, 2008; Zimmer-Gembeck, Lees, Bradley, & Skinner, 2009) or found strong correlations between different aspects of student-perceived need support (Hospel & Galand, 2016; Sierens *et al.*, 2009; Skinner & Belmont, 1993).

Motivation

Motivation has been assessed with the Academic Self-Regulation Questionnaire (SRQ-A) (Ryan & Connell, 1989; Dutch translation by Sierens *et al.*, 2009). This scale contains four subscales (internal, identified, introjected, and external regulation). The items were answered using a 5-point Likert scale ranging from totally not applicable to me (1) to

totally applicable to me (5). The items of the questionnaires were preceded by the question: ‘Why do you do your schoolwork?’ after which the different items were presented. A confirmatory factor analysis indicated that two factors, autonomous and controlled motivation, could be distinguished, $\chi^2(97) = 259.373$, $p < .001$; RMSEA = .063, CFI = .902. The correlation between the latent factors was $r = .38$, $p < .001$. Based on these results and in line with Vansteenkiste, Sierens, Soenens, Luyckx, and Lens (2009), composite scores for autonomous motivation and controlled motivation were calculated. The subscale autonomous motivation consisted of eight items (e.g., ‘I enjoy doing my schoolwork’) and had a high reliability (Cronbach’s $\alpha = .85$). The subscale controlled motivation also consisted of eight items (e.g., ‘I want others to think I am smart’) and had satisfactory reliability (Cronbach’s $\alpha = .72$).

Data analysis

To examine the hypothesized model and account for the hierarchical structure of the data (students nested in classes), we estimated multilevel path models in Mplus version 7.4 (Muthén & Muthén, 2017). There was a limited degree of missing data (no more than 3.6% per variable), which were handled by the full information maximum-likelihood method.

Regarding the first hypothesis on the degree to which teachers differentiate in need support, the variance distributions of autonomy support and structure were examined by calculating the intraclass correlations (ICCs). The ICC(1) represents the proportion of the total variance in autonomy support and structure situated at the class level. To examine whether differentiated autonomy support and structure predicted student motivation (Hypothesis 2) and whether this relationship was mediated by need support as perceived by students (Hypothesis 3), a two-level mediation model was estimated for both dependent variables (i.e., autonomous and controlled motivation) (Preacher, Zyphur, & Zhang, 2010). School year, ethnic background and gender were included in the models as covariates. The models included two levels, a between and a within level. At the between level, the aggregated class means of autonomy support and structure were included as predictors, and the aggregated class mean of perceived need support was included as a mediating variable. At the within level, student-specific autonomy support and structure were included as predictors and students’ perceived need support was included as a mediating variable. The independent and mediating variables were grand-mean-centred at the between level and group-mean-centred at the within level to assess differences within classes (Lüdtke, Robitzsch, Trautwein, & Kunter, 2009). Categorical variables were entered as dummy variables. We corrected for measurement error using the approach suggested by Cole and Preacher (2014) to account for the relatively weak reliabilities of the teacher and student need support scales. According to this method, the variables were modelled as single-item latent variables and their variance was adjusted for measurement error. Furthermore, because previous research has shown interactions effects of autonomy and structure on motivation (Hospel & Galand, 2016), we also included the interaction between teacher-perceived autonomy and structure in the models as predictors of student-perceived need support and motivation at both the within and the between level.

Model fit was evaluated based on the comparative fit index (CFI), the root-mean-square error of approximation (RMSEA), and the standardized root-mean-square residual (SRMR). An RMSEA below .05 indicates good fit of a model, and scores between .05 and .08 indicate reasonable fit. Scores above .10 indicate poor fit. A CFI above .90 indicates acceptable fit, and a CFI above .95 indicates good fit of a model. Lastly, SRMR values smaller than .08 are considered acceptable (Hu & Bentler, 1999; Kline, 2011).

Results

Descriptive statistics and correlations

Table 1 shows the descriptive statistics and intraclass correlations (ICCs). The ICC(1) represents the proportion of variance situated at the class level. The ICC(1) for teacher perceptions of student-specific structure was .37, and for student-specific autonomy support was .23, indicating that for both aspects of need support, there is a substantial proportion of the variance distributed at the class level, suggesting that teachers differ from one another in their perceptions of structure and autonomy support. Yet in line with the first hypothesis, a much larger share of the variance was situated at the student level, indicating that teachers vary substantially in their perceptions of the degree of structure and autonomy support that they provide towards each student. The ICC(1) for student-perceived need support is .12 indicating that students' perceptions of need support vary greatly within classes with only limited agreement between students within the same class. Table 1 also reports the ICC(2) of the variables of the present study. The ICC(2) represents the reliability of the group means (Bliese, 2000), which are sufficient to good for all variables. Only for controlled motivation the ICC(2) is a bit low, ICC(2) = .68 (Bliese, 2000).

Table 2 shows the correlations between the measures at the class and student level. As is apparent from Table 2, correlations at the between and within level differ from one another. This is further examined in the subsequent multilevel mediation models.

Need support and students' autonomous motivation

Figure 1 summarizes the results of the multilevel analyses for students' autonomous motivation. The full results are also described in Table 3. The interaction effects of teacher-perceived autonomy and structure on student-perceived need support and autonomous motivation were also tested, but not included in the final model, because these interactions were not significant and worsened model fit. Furthermore, the covariate at the between level (school year) was not significantly related to autonomous motivation,

Table 1. Descriptive statistics and intraclass correlations

	N	M	SD	Min	Max	ICC(1)	ICC(2)
Autonomous motivation	503	4.06	0.71	1.00	5.00	.24	.87
Controlled motivation	502	3.33	0.78	1.00	5.00	.09	.68
Teacher perception autonomy support	498	3.34	0.99	1.00	5.00	.23	.86
Teacher perception structure	496	3.95	0.55	2.00	5.00	.37	.93
Student-perceived need support	504	3.74	0.58	1.78	5.00	.12	.74

Table 2. Correlations at the between level (above the diagonal) and within level (under the diagonal)

	1.	2.	3.	4.	5.
1. Teacher perception autonomy	–	.08	–.04	–.12**	–.04
2. Teacher perception structure	–.26***	–	–.04	–.03	.01
3. Student-perceived need support	.04	–.02	–	.04**	.00
4. Autonomous motivation	.09***	–.03*	.13***	–	.03
5. Controlled motivation	–.10**	.06*	.01	.08*	–

Note. * $p < .050$; ** $p < .010$; *** $p < .001$.

worsened model fit and was therefore excluded from the model. The fit indices for the final model indicated that the model fit the data well (RMSEA = .034; CFI = .991; SRMR_{within} = .037; SRMR_{between} = .000).

The results of this model show that Hypothesis 2, which assumed positive relations between teacher perceptions of need support and students' autonomous motivation, could only partly be confirmed. At the student (within) level, we could confirm the hypothesized positive relation between teacher perceptions of student-specific autonomy support and students' autonomous motivation ($b = .08, p = .004$). However, the hypothesized relation between teacher perceptions of student-specific structure and students' autonomous motivation could not be confirmed ($b = .07, p = .564$). Hypothesis 3, which assumed mediation, could not be confirmed for the student level, because student perceptions of need support were not predicted by teacher perceptions of autonomy support ($b = .05, p = .081$) nor structure ($b = -.03, p = .794$). The expected positive relation between student-perceived need support and students' autonomous motivation ($b = .83, p < .001$) was confirmed. Notably, the results furthermore indicated a negative association between teacher perceptions of student-specific autonomy and teacher perceptions of student-specific structure at the student (within) level ($b = -.25, p < .001$).

To summarize, the results at the student (within) level indicated that teacher perceptions of student-specific autonomy support and student-perceived need support were not associated with one another, but both were independently associated with students' autonomous motivation. The hypothesized positive relation between teacher

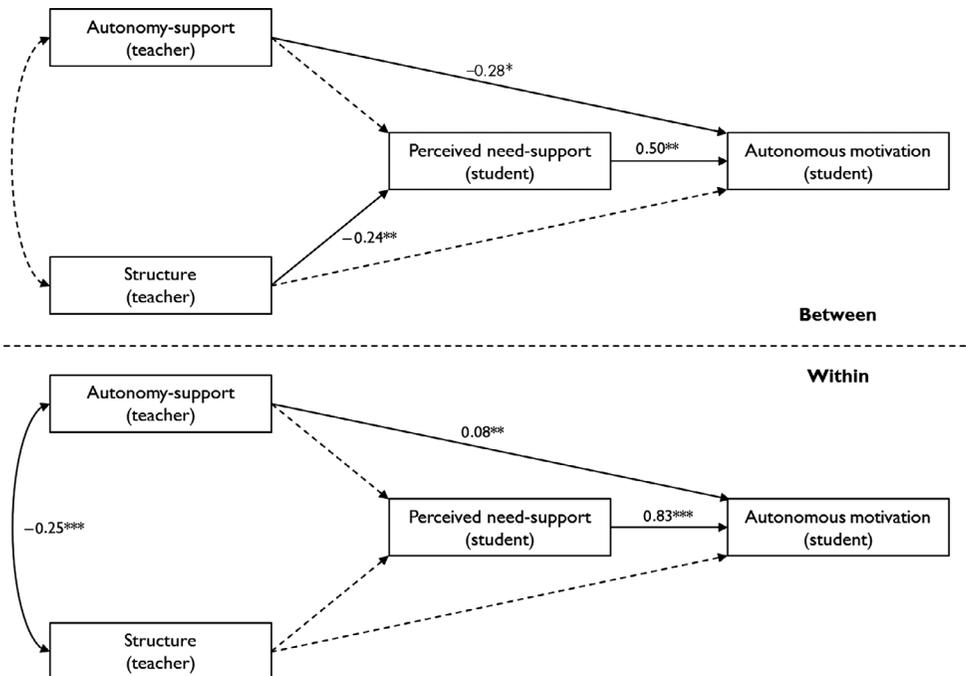


Figure 1. Unstandardized regression coefficients for relationships between autonomy support and structure, and autonomous motivation mediated by perceived need support. Covariates: gender and ethnic background (not depicted in the model). * $p < .050$; ** $p < .010$; *** $p < .001$.

Table 3. Unstandardized path coefficients for the multilevel model examining the relations between teacher and student-perceived need support and autonomous motivation

		B	SE	p
Within				
Gender (girl)	→ Autonomous motivation	.06	.04	.141
Minority background	→ Autonomous motivation	.32**	.10	.001
Teacher autonomy support	→ Student need support	.05	.03	.081
Teacher structure	→ Student need support	-.03	.11	.794
Teacher autonomy support	→ Autonomous motivation	.08**	.03	.004
Teacher structure	→ Autonomous motivation	.07	.12	.564
Student need support	→ Autonomous motivation	.83***	.13	.000
Teacher autonomy support	↔ Teacher structure	-.25***	.04	.000
Between				
Teacher autonomy support	→ Student need support	-.08	.07	.287
Teacher structure	→ Student need support	-.24**	.08	.005
Teacher autonomy support	→ Autonomous motivation	-.28*	.10	.008
Teacher structure	→ Autonomous motivation	.06	.10	.576
Student need support	→ Autonomous motivation	.50**	.17	.004
Teacher autonomy support	↔ Teacher structure	.07	.05	.174
Indirect effect (between)				
Teacher structure	→ Student need support → Autonomous motivation	-.12*	.09	.032

Note. Non-significant indirect effects are not displayed.

* $p < .050$; ** $p < .010$; *** $p < .001$.

perceptions of student-specific structure and students' perceived need-support and students' autonomous motivation could not be confirmed at the student (within) level. The hypothesized negative relation between teacher perceptions of student-specific structure and students' controlled motivation also could not be confirmed at the student (within) level. That is, teacher perceptions of student-specific structure were not found to be related to either students' perceived need support nor students' autonomous motivation. These findings suggest that students who, according to their teacher, received more structure than other students in the same classroom, did not experience higher levels of need support or more autonomous motivation. In all, 32.7% of the within-level variance in autonomous motivation was explained by the predictors in this model.

At the class (between) level, a positive relation between students' perceived need support and students' autonomous motivation was found ($b = .50$, $p = .004$). Other relations at the class level deviated from our hypotheses. The results indicated a negative relation between teacher perceptions of autonomy support and students' autonomous motivation ($b = -.28$, $p = .008$), indicating that in classes where teachers – on average – report higher levels of autonomy support, students' autonomous motivation is actually lower. Furthermore, teachers' reported use of structure at the class level was negatively associated with student-perceived need support ($b = -.24$, $p = .005$), which indicates that students, on average, experience less need support when their teacher reports higher average levels of structure. The indirect path from teacher perceptions of structure via student-perceived need support to students' autonomous motivation was significant ($b = -.12$, $p = .032$).¹ Because the direct relation between structure and autonomous

¹ A Monte Carlo simulation was performed to assess the distribution of the indirect effect. The distribution was slightly skewed to the left but approached a normal distribution.

motivation was not significant ($b = .06$, $p = .576$), this indirect path suggests full mediation. Hence, when teachers reported higher average levels of structure, their students reported lower average levels of autonomous motivation, which could be explained by lower average levels of student-perceived need support. The predictors of this model explained 64.0% of the between-level variance in students' autonomous motivation.

Need support and students' controlled motivation

Figure 2 and Table 4 display the results of the multilevel analyses for students' controlled motivation. Like in the model for students' autonomous motivation, the interaction effects of teacher perceptions of autonomy and structure on student-perceived need support and students' controlled motivation were not significant and worsened model fit. These interactions were therefore not included in the final model. Furthermore, similar to the model for students' autonomous motivation, the covariate at the between level (school year) was not significantly related to students' controlled motivation, worsened model fit, and was therefore excluded from the model. The overall model fit the data well (RMSEA = .033; CFI = .989; SRMR_{within} = .036; SRMR_{between} = .000).

The results of this model show that our hypotheses could only partly be confirmed. In line with our expectations, we found that teacher perceptions of student-specific autonomy support were negatively related to students' controlled motivation ($b = -.13$, $p = .005$) at the student (within) level. However, contrary to our expectations, we found that teacher perceptions of student-specific structure were a positive predictor of students' controlled motivation ($b = .32$, $p = .028$). Neither teacher perceptions of student-specific autonomy support, nor teacher perceptions of student-specific structure were associated with student-perceived need support ($b = .05$, $p = .079$; $b = -.03$, $p = .796$, respectively), thereby excluding the possibility of mediation. In all, 4.2% of the within-level variance in students' controlled motivation was explained by the predictors in this model.

At the class (between) level, we could not confirm the hypothesized negative relation between teacher perceptions of autonomy support, and students' controlled motivation ($b = -.17$, $p = .076$), or between teacher perceptions of structure and students' controlled motivation ($b = .06$, $p = .700$). In addition, and contrary to our expectations, we found that teacher perceptions of structure were negatively related to student-perceived need support at the class level ($b = -.24$, $p = .005$). The predictors in this model explained 11.2% of the between-level variance in students' controlled motivation.

Discussion

The aim of this study was to examine the extent to which teachers in primary schools differentiate between students in the degree of autonomy support and structure, and how this is associated with student-perceived need support and students' motivation. Both teacher and student perceptions of need support varied substantially within classes, suggesting that teachers indeed differentiate in need support. Furthermore, the results of this study indicated that relations between need support and motivation at the student level differed from relations found at the class level. Thereby, these results highlight the need for disentangling effects at the different levels and adopting a multilevel approach. Below, the results are discussed in more detail.

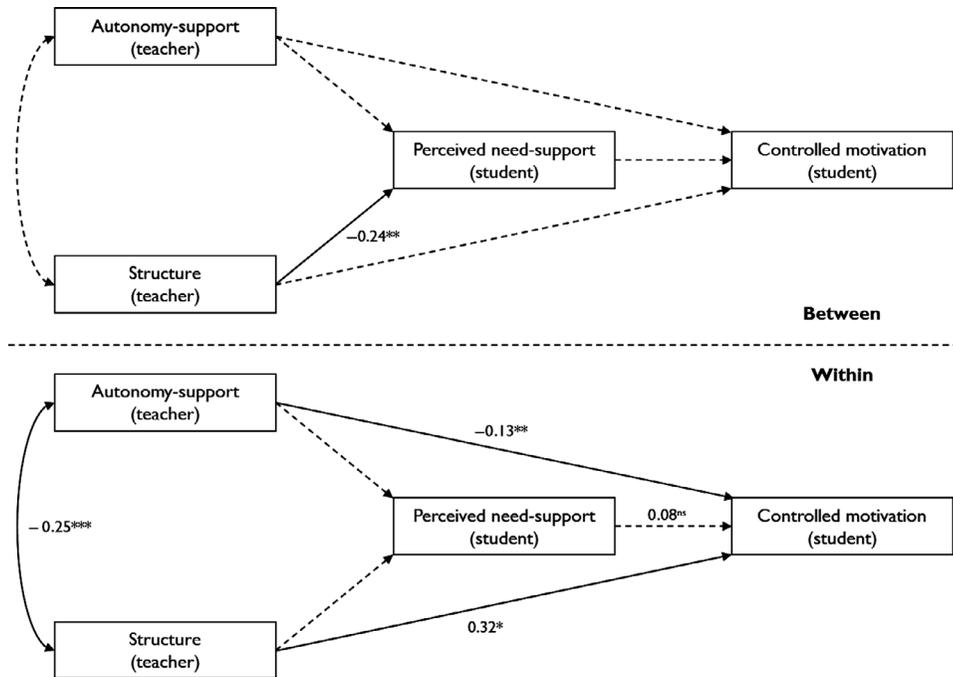


Figure 2. Unstandardized regression coefficients for relationships between autonomy support and structure, and controlled motivation mediated by perceived need support. Covariates: gender and ethnic background (not depicted in the model). * $p < .050$; ** $p < .010$; *** $p < .001$.

Table 4. Unstandardized path coefficients for the multilevel model examining the relations between teacher and student-perceived need support and controlled motivation

		B	SE	p
Within				
Gender (girl)	→ Controlled motivation	-.08	.07	.203
Minority background	→ Controlled motivation	.08	.11	.504
Teacher autonomy support	→ Student need support	.05	.03	.079
Teacher structure	→ Student need support	-.03	.11	.796
Teacher autonomy support	→ Controlled motivation	-.13**	.04	.005
Teacher structure	→ Controlled motivation	.32*	.15	.028
Student need support	→ Controlled motivation	.08	.14	.578
Teacher autonomy support	↔ Teacher structure	-.25***	.04	.000
Between				
Teacher autonomy support	→ Student need support	-.08	.07	.287
Teacher structure	→ Student need support	-.24**	.08	.005
Teacher autonomy support	→ Controlled motivation	-.17	.09	.076
Teacher structure	→ Controlled motivation	.06	.14	.700
Student need support	→ Controlled motivation	-.09	.30	.774
Teacher autonomy support	↔ Teacher structure	.07	.05	.174

Note. Non-significant indirect effects are not displayed.
 * $p < .050$; ** $p < .010$; *** $p < .001$.

Prior research has shown large within-class variation in student perceptions of need support (Bieg *et al.*, 2011; Danielsen *et al.*, 2010; Haerens *et al.*, 2015; Hospel & Galand, 2016). The results of this study show that not only do students' perceptions of their teachers' behaviours differ, but also teacher perceptions of the behaviours they express to their students differ in terms of need support. From the perspective of SDT, this is a worrisome finding because SDT (Deci & Ryan, 1985; Ryan & Deci, 2000) posits that the basic psychological needs for autonomy and competence are universal. All students are assumed to benefit from (equally) high levels of need support. These within-classroom differences in teacher and student-perceived need support may come about as teacher differ in their perceptions of students' abilities. Studies from the tradition of teacher expectancy research suggest that teachers differentiate their teaching behaviours based on their perceptions of their students' abilities, motivation, and background characteristics (Jussim & Harber, 2005; Urhahne, 2015). This may also apply to differentiation in need support (Hornstra *et al.*, 2018).

As expected and in line with SDT, the results of this study show that teacher perceptions of student-specific autonomy support were positively related to students' autonomous motivation in addition to the positive association with student-perceived need support. These findings were obtained at the student level, which is the level at which most variance in motivation was situated and which could therefore be considered the most impactful. At the class level, however, a negative relation between teacher perceptions of autonomy support and students' autonomous motivation was found. Teachers who on average reported more autonomy support taught classes in which students reported lower levels of autonomous motivation. A possible explanation for this counterintuitive finding could be that teachers may apply their motivational strategies more explicitly if they teach a class of students with lower levels of autonomous motivation. In that case, teachers may provide more autonomy support in order for their students to enjoy and value learning more. More research is needed to examine whether this potential explanation may account for the findings of the present study.

Contrary to findings of previous studies in which structure was positively related to students' autonomous motivation and negatively to students' controlled motivation (Guay *et al.*, 2017; Jang *et al.*, 2010), the results of the present study indicated that structure was associated with negative outcomes at both the class level and student level. At the class level, structure was associated with lower levels of student-perceived need support, and within classes, structure was associated with more controlled motivation. These results suggest that teachers may provide structure in a need-thwarting, controlling manner. This is supported by the negative correlation between teacher perceptions of student-specific autonomy support and structure at the student level. Prior research has also suggested that many teachers find it difficult to provide structure in an autonomy-supportive way, while both are needed to optimally foster students' motivation and learning (Jang *et al.*, 2010). That is, to optimally foster students' motivation, it is important that teachers provide *all* students with autonomy support as well as structure (Hospel & Galand, 2016; Jang *et al.*, 2010). It is interesting to note, however, that students perceive this relation between autonomy support and structure differently than their teachers. Teachers seemed to consider autonomy support and structure as opposite dimensions. That is, according to their perceptions, students who received high levels of autonomy support received lower levels of structure, and vice versa. For students, however, autonomy support and structure could not be distinguished as two different factors, suggesting that students consider these aspects of need support to be undistinguishable. Previous studies found high correlations between student perceptions of autonomy support and structure

(Sierens *et al.*, 2009; Vansteenkiste *et al.*, 2012) or also found a single need support dimension (Katz *et al.*, 2009; Lam *et al.*, 2009; Skinner *et al.*, 2008; Zimmer-Gembeck *et al.*, 2009). These results could suggest that students are not able to distinguish these different dimensions and potentially a general 'liking' factor may account for this. It could also be that students need to experience a certain amount of autonomy support to experience structure, and the other way around.

The findings of the present study indicated that teacher perceptions of need support were not congruent with student perceptions of need support. The formulation of the teacher and student items, especially with regard to autonomy support, appears to be somewhat different. Whereas the teacher items mostly focus on providing students with choices and letting them work in their own way, the student items focus more on the teacher listening to students' ideas. This lack of parallelism in the items may have contributed to the lack of congruence between teacher and student perceptions of need support. Nevertheless, the findings of the present study indicated that teacher and student perceptions of need support were both predictive of students' autonomous and controlled motivation even though they were not congruent with one another. Hence, both teacher and student perceptions appear to tap into different aspects of need support that are both related to students' motivation.

By adding a student-specific measure of teacher perceptions of need-supportive teaching, this study extends current research that has mainly assessed need support by means of student perceptions (Stroet *et al.*, 2013). Because outcome measures (e.g., motivational outcomes) are typically also measured with students' self-reports, there is a risk of common method bias in these studies (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Hence, the relationship between experienced need support and students' motivation may have been overestimated in prior research. The few studies that focused on teacher perceptions of need support found weaker or no relation with students' motivation (Stroet *et al.*, 2013). By assessing teachers' perceptions of student-specific need support, the present study shows that combining different measures can provide more insight on need-supportive teaching and add to the prediction of students' motivation. Furthermore, through its multilevel approach, this study has shown that the relation between need support and students' motivation is more complex than assumed to date.

Limitations

This study has some limitations. First, our sample mostly consisted of classes with a very diverse student population in ethnic background. This may have contributed to the substantial degree of differentiation that was found in the present study. Variation may be smaller in more homogenous classes. Second, the measures of the present study were self-report scales. Self-reports tend to evoke socially desirable responses and overestimation. Yet, by including different informants (teachers and students) we were able to extend current research that typically only includes student self-reports to assess need support as well as student motivation. Observational data could have provided additional insights. Third, the sample size at the class level was limited to 24 classes. Larger sample sizes of at least 30 or 50 units at the group level have been recommended for multilevel analyses (Kreft & De Leeuw, 1998; Maas & Hox, 2005). However, the bias in standard errors caused by smaller sample sizes at the group level appears to be limited when dependent variables are continuous (Maas & Hox, 2005; McNeish & Stapleton, 2016) and other scholars have recommended a minimum sample size of 20 units at the group level (Snijder & Bosker, 2012). Nonetheless, a larger sample at the

group level is recommended for future research. Fourth, the present study had a cross-sectional design that does not allow for causal inferences. Finally, we used shortened scales of existing measures, which may not cover the full range of the constructs as well as the complete scales. In addition, the reliabilities of some scales were not optimal, which could also be due to the limited number of items of these scales. Yet, it is important to note that the use of these shortened scales also had advantages. It allowed teachers to fill out the scales for every student in their class.

Implications for classroom practice

This research has shown that teachers' perceptions of autonomy support and structure as well as students' perceptions of need support differ between students in the same class. This suggests that teachers differentiate in need support. More research is needed to understand why teachers may offer some students more or less need support than others. The findings of this study, especially the negative relation between teacher-perceived autonomy support and structure, also suggest that in practice, teachers find it hard to combine autonomy support and structure for individual students and struggle to provide *all* students with optimal levels of autonomy support and structure. Several studies have shown that teacher training programmes aimed at autonomy support can have a positive effect on teaching and student motivation (see Su & Reeve, 2011 for a meta-analysis). Interventions as well as teacher training programmes may be even more effective by focusing especially on how teachers can combine autonomy support with structure for different students.

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Appendix :

Questionnaire items

Teacher scales

Autonomy support

1. I have to lead this student through his/her schoolwork step by step. (*reverse coded*)
2. I let this student make a lot of his/her own decisions regarding schoolwork.
3. I can let this student do things his/her own way.
4. My general approach with this student is to give him/her as few choices as possible. (*reverse coded*)

Structure

5. I regularly check if this student needs help.
6. When this student doesn't understand something, I explain it in a different way.
7. I am very clear with this student about what I expect of him/her in class.
8. I am very consistent with this student.

Student scales

Need support (*autonomy support and structure combined*)

1. My teacher gives me a lot of choices about how I do my schoolwork.
2. My teacher listens to my ideas.
3. My teacher doesn't give me many choices when it comes to doing assignments. (*reverse coded*)
4. My teacher doesn't listen to my opinion. (*reverse coded*)
5. If I can't solve a problem, my teacher shows me different way to try to.
6. My teacher makes it clear what he/she expects of me in school.
7. My teacher keeps changing how he/she acts towards me. (*reverse coded*)
8. My teacher makes sure I understand before he/she goes on.

Autonomous motivation

Why do you do your schoolwork?

1. I like to work in class.
2. Because it's fun to do my schoolwork.
3. Because I enjoy doing my school work well.
4. I enjoy doing my schoolwork.
5. It's important to me to do my schoolwork.
6. I want to learn new things.
7. Because I want to understand the subject.
8. Because it's important to me to try to do well in school.

Controlled motivation

Why do you do your schoolwork?

9. Because I will feel really proud of myself if I do well.
10. Because I will feel bad about myself if I don't do it.
11. Because I'll be ashamed of myself if it didn't get done.
12. I want others to think I'm smart.
13. Because that's what I'm supposed to do.
14. I do my schoolwork mostly because I have to.
15. Because I want my teacher to say nice things about me.
16. I do my schoolwork so my teacher won't be angry with me.