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## Teacher expectation effects on need-supportive teaching, student motivation, and engagement: a self-determination perspective

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### ABSTRACT

Previous research has shown that teachers differentiate their behaviour based on their expectations of students. Self-determination theory (SDT) makes explicit how teacher behaviour relates to students' motivation and engagement, namely, via need-supportive teaching. In the present study, we combined both research traditions and examined associations of teacher expectations with need-supportive teaching and thereby students' motivation and engagement. Two-hundred-and-seventy-six secondary school students and their teachers ( $N = 11$ ) completed questionnaires. The results indicated that teacher expectations were moderately but positively associated with students' intrinsic motivation and engagement, and negatively with amotivation. These relationships were fully mediated, although with small effect sizes, by need-supportive teaching. These findings highlight the value of combining research on teacher expectations and SDT, to gain further understanding of how teacher expectations may cause teachers to provide more need support to some students than to others, thereby affecting students' motivation and engagement.

### KEYWORDS

Teacher expectations;  
student motivation; need-supportive teaching;  
autonomy support

## Introduction

A core assumption in research on teacher expectations is that teachers – on the basis of their expectations of their students – differentiate their behaviour towards different students (e.g., Babad, 2009; Rubie-Davies, 2018). Such differential behaviour can affect student outcomes, including their motivation and engagement (Urhahne, 2011; Zhu, Urhahne, & Rubie-Davies, 2018). Self-determination theory (SDT) is useful to gain an understanding of such processes, as it makes explicit how specific teacher behaviours relate to students' motivation and engagement. Specifically, in SDT it is argued that teachers can support their students' motivation and engagement by supporting students' needs for autonomy, competence, and relatedness. In the same vein, SDT research could benefit from the insights of research into

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teacher expectations to gain an understanding of why teachers provide more need support to some students than to others (e.g., Jang, Reeve, & Deci, 2010).

Thus far, studies combining insights from the tradition of research on teacher expectations and SDT are very scarce (see Hornstra, Mansfield, Van der Veen, Peetsma, & Volman, 2015, for an exception). In the present study, we aimed to bridge this gap by examining how teacher expectations were associated with need-supportive teaching and thereby different aspects of students' motivation and behavioural engagement.

### **Teacher expectations**

Since the publication of Rosenthal and Jacobson's study, *Pygmalion in the Classroom* (1968), educational scientists have been interested in the topic of teacher expectations and how these affect student outcomes (e.g., Rubie-Davies, 2018). In the original Pygmalion study, teachers were told that some of their students, who were actually randomly selected, would thrive academically, and, indeed, over time these students gained more IQ points than other students. Although there was some controversy about this study, and its results may have been somewhat less dramatic than assumed originally (Jussim & Harber, 2005), this study has been an important starting point for further research on teacher expectations.

Teacher expectations are believed to affect students through the behaviours teachers display towards their students; that is, teacher expectations elicit differential behaviours from teachers towards different students that may subsequently impact student outcomes. Two processes are described in the literature to explain teacher expectation effects: self-fulfilling prophecy effects (Merton, 1957) or "self-maintaining expectations", also referred to as sustaining effects (Babad, Inbar, & Rosenthal, 1982; Brophy, 1983; Cooper & Good, 1983; Good & Brophy, 2003; Jussim & Harber, 2005). Self-fulfilling prophecies occur when a false conception of a situation (e.g., a teacher expectation that is either too low or too high) elicits a new behaviour that makes the original false conception come true (Merton, 1957). Hence, in classrooms, an incorrect teacher expectation may elicit certain teaching behaviours that may cause a student to act in accordance with the incorrect expectation. A review by Jussim and Harber (2005) indicated that such self-fulfilling prophecy effects do occur in education, but these effects are typically small because teacher expectations are often accurate. In case of self-maintaining expectations or sustaining effects, expectations are based upon "real" differences, but could potentially still have an impact on students because the expectations evoke consistency in students' behaviour thereby preventing change (Babad, 1993a; Babad et al., 1982; Cooper & Good, 1983; Salomon, 1981).

Various studies have confirmed the relations between teacher expectations and differential teacher behaviours (Babad, 1993b; Chaikin, Sigler, & Derlega, 1974; Harris & Rosenthal, 1985; Rosenthal, 1994). For example, Brophy and Good (1970) observed dyadic classroom interactions and found that teachers' behaviours towards high-expectation and low-expectation students differed in various ways. For instance, when high-expectation students gave incorrect answers or did not know the answer to a teacher's question, teachers were more likely to rephrase the question and offer another opportunity to respond, whereas low-expectation students were more often given the correct answer rather than teachers rephrasing the question.

Most studies of teacher expectations have focussed on the effects on achievement outcomes, finding positive relations between the expectations of teachers and students'

achievement levels, even after controlling for prior achievement (e.g., Friedrich, Flunger, Nagengast, Jonkmann & Trautwein, 2015; Hinnant, O'Brien, & Ghazarian, 2009; McKown & Weinstein, 2008; Trouilloud, Sarrazin, Martinek, & Guillet, 2002; Zhu et al., 2017), and effects that can be long lasting (Alvidrez & Weinstein, 1999). The well-known meta-analysis by Hattie (2009) indicated that teacher expectations have a medium-sized effect on achievement.

Teacher expectations may have a more direct and stronger impact on student motivation, as this is a precursor to actions affecting student achievement (e.g., studying hard, continuing in the face of difficulties) that are theorised to be influenced by teacher behaviour (e.g., Perry, Turner, & Meyer, 2006). In this vein, Urhahne (2015) suggests that through their behaviours, teachers communicate their expectations to students, which in turn affects students' motivation and thereby their achievement outcomes (see also, Brophy, 1983). Although research on the relations between teacher expectations and student motivation is rather scarce, several studies have found that more positive teacher expectations are associated with higher levels of motivation (Boerma, Mol, & Jolles, 2016; Gilbert et al., 2014; Urhahne, 2015; Wentzel, Battle, Russell, & Looney, 2010; Woolley, Strutchens, Gilbert, & Martin, 2010). Further, a wide array of previous research has indicated that intrinsic motivation can affect students' achievement outcomes (e.g., Baker, 2003; Cerasoli, Nicklin, & Ford, 2014; Guay, Ratelle, Roy, & Litalien, 2010; Taylor et al., 2014).

### **Self-determination theory**

In current education research, SDT is a prominent theoretical framework (e.g., Wentzel & Miele, 2016). As mentioned in the Introduction, SDT posits that there are three fundamental human needs, the need for autonomy, competence, and relatedness. The need for autonomy refers to the inherent desire of people to be causal agents and to experience volition in their actions (Deci & Ryan, 1985; Ryan & Deci, 2000b). The need for competence refers to the need to feel effective and in control and to be able to stretch one's capabilities. Finally, students' need for relatedness refers to the desire to feel connected to others and to experience a sense of belongingness (e.g., Baumeister & Leary, 1995; Ryan, 1995). More specifically, people have a need to form social attachments with others that are characterised by frequent positive interactions and a lack of negative affect or conflict (Baumeister & Leary, 1995). Psychological growth can occur when the social context supports these basic needs (Ryan & Deci, 2000b).

In the present study, we focussed on teaching practices that support these three needs in students according to SDT. These teaching practices are typically referred to as need-supportive teaching. Three dimensions of need-supportive teaching can be distinguished: autonomy support, which supports students' need for autonomy; structure, which supports students' need for competence; and involvement, which supports students' need for relatedness (Stroet, Opdenakker, & Minnaert, 2013). First, *autonomy support* entails the provision of choice, fostering the relevance of learning tasks, acknowledgement of negative feelings, and nurturing of students' inner motivational resources (Reeve & Jang, 2006; Skinner & Belmont, 1993; Stroet et al., 2013; Su & Reeve, 2011). Second, *structure* can be provided to students via provision of clarity, guidance, encouragement, and feedback that is informative rather than evaluative (Skinner & Belmont, 1993; Stroet

et al., 2013). In addition, teachers can also provide structure by being consistent in answering students and adjusting to students' levels (Skinner & Belmont, 1993). These behaviours help students to understand what is expected of them and how they can effectively meet these expectations, thereby fostering their need to feel competent (Jang et al., 2010). Lastly, teachers can support their students' need for relatedness by the provision of *involvement*. Involvement can be expressed in different ways, by showing affection, care, and interest; attuning to their students' needs; and by being available to their students to offer emotional support (Stroet et al., 2013).

### **Motivation and engagement**

By implementing need support in their teaching styles, teachers nurture students' interests and encourage students to be willing to engage in learning out of volition rather than feeling pressured to do so (Jang et al., 2010; Stroet, Opdenakker, & Minnaert, 2015). Thereby, need-supportive teaching triggers high-quality motivation and engagement, as has indeed been indicated by a large amount of research (see Stroet et al., 2013, for a review). High-quality motivation includes high levels of intrinsic motivation, and relatively low levels of extrinsic motivation and amotivation. Students are intrinsically motivated when an activity leads to satisfaction or fulfils a personal interest (Ryan & Deci, 2000a). Intrinsic motivation has been found to have a positive impact on student performance (Baker, 2003; Cerasoli et al., 2014; Guay et al., 2010; Taylor et al., 2014) and various other positive outcomes, including higher levels of well-being (e.g., Burton, Lydon, D'Alessandro, & Koestner, 2006; or see Deci & Ryan, 2008, for an overview). Externally regulated extrinsic motivation (for the sake of readability referred to as extrinsic motivation) occurs when an activity is not undertaken because of the satisfaction of the activity itself, but because of external reasons (i.e., "a means to an end") such as rewards or avoiding shame (Ryan & Deci, 2000a; Vallerand et al., 1992).

Deci and Ryan (1985) argued that not only were intrinsic and extrinsic motivation important to consider, but also amotivation. Amotivation refers to a lack of motivation and occurs when an activity is neither intrinsically nor extrinsically motivating to a student. In case of amotivation, a student has no reason to invest effort in an activity, and this can lead to disengagement in the classroom (Legault, Green-Demers, & Pelletier, 2006). Amotivation has been uniquely associated with maladaptive outcomes such as boredom, superficial learning strategies, unhappiness, low engagement, and low performance (Aelterman et al., 2012; Ntoumanis, 2001; Pelletier, Fortier, Vallerand, & Briere, 2001; Shen, Wingert, Li, Sun, & Rukavina, 2010; Standage, Duda, & Pensgaard, 2005). Abundant research has examined factors that give rise to motivation, yet very few studies have also examined the reasons why students do not want to engage in their schoolwork and show amotivation (Legault et al., 2006).

Whereas the three motivational types described above refer to students' reasons for engaging in their school work (or absence thereof) and could be considered affective components of motivation, behavioural engagement can be considered the behavioural expression of students' motivation (Furrer & Skinner, 2003; Reeve, Jang, Carrell, Jeon, & Barch, 2004; Skinner, Kindermann, & Furrer, 2009). Behavioural engagement refers to students' behavioural involvement in their schoolwork and entails the onset, intensity, and perseverance of effort (e.g., Skinner & Belmont, 1993). To represent the full scope of

motivation, intrinsic motivation, (externally regulated) extrinsic motivation, amotivation, and behavioural engagement were considered as outcome variables in the present study.

### *Differential need-supportive teaching*

As mentioned in the section on teacher expectations, studies of teacher expectations have identified a wide range of teaching behaviours which have been found to differ for students who were ranked as the highest or lowest achieving students by their teachers (Bohlmann & Weinstein, 2013; Brophy & Good, 1970; Harris & Rosenthal, 1985). Below, we will argue how these behaviours can be related to the three dimensions of need-supportive teaching, that is, autonomy support, structure, and involvement. By relating these behaviours to need-supportive teaching, we can make explicit how teacher expectations might affect need-supportive teaching and thereby students' motivation and engagement. As we argued in the Introduction, this is useful to gain understanding of how differentiated teaching might affect students' motivation and engagement, but also for understanding why teachers tend to provide more need support to some students than to others.

Research on teacher expectations shows that teachers provide more choices to high-expectation than to low-expectation students, give more opportunities for students' own input, show more acceptance of students' ideas, and give less direct orders (Babad, 1993b; Brattesani, Weinstein, & Marshall, 1984; Harris & Rosenthal, 1985; Rosenthal, 1994). All these behaviours relate very closely to what are in SDT considered autonomy-supportive behaviours.

Findings from previous research that can be related to the dimension of structure (support for the need for competence) seem more inconsistent. On the one hand, findings suggest that teachers give high-expectation students more positive feedback, make more positive remarks, and encourage those students more, whereas low-expectation students are given less time to think before answering, and their turn to answer is given more quickly to someone else (Brophy & Good, 1970; Rosenthal, 1994). Furthermore, high-expectation students themselves are found to initiate more interactions with their teacher and elicit more encouragement and feedback compared to low-expectation students (Brophy & Good, 1970). On the other hand, research findings also suggest that teachers initiate more procedural and work-related interactions with low-expectation students (Brophy & Good, 1970) and provide low-expectation students with more learning support, explanations, and directions compared to high-expectation students (Babad, 1993b; Harris & Rosenthal, 1985). Hence, these results suggest that teachers provide high-expectation students with more encouragement and feedback, and low-expectation students with more clarity and guidance. As such, the overall level of perceived structure may be similar for high- and low-expectation students.

Regarding the dimension of involvement (support for the need for relatedness), it has been found that teachers initiate more contact, make more eye contact, have a more positive attitude, and express themselves more positively towards high-expectation students compared to low-expectation students (Babad, 1993b; Chaikin et al., 1974; Harris & Rosenthal, 1985; Rubie-Davies, 2018). Teachers also show more non-verbal signs of approval to high-expectation students (Chaikin et al., 1974; Harris & Rosenthal, 1985). This can enhance students' feelings of being understood. Also, teachers seem to dedicate more time and effort to students for whom they have higher expectations than to students

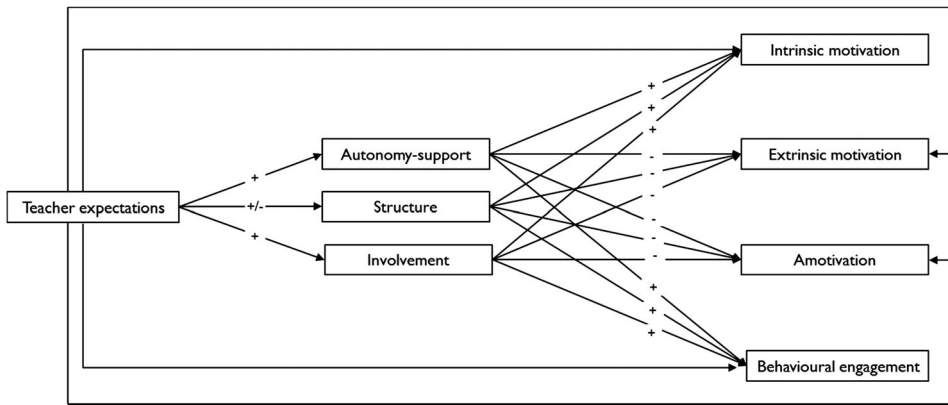
for whom they have lower expectations (Harris & Rosenthal, 1985; Rist, 1970), which may also increase the degree to which teachers are perceived as supportive and involved.

In addition, prior SDT research suggested substantial differences between students in the levels of need-supportive teaching they received (e.g., Domen, Hornstra, Weijers, Van der Veen, & Peetsma, 2018; Reeve, 2009). Specifically, studies that have examined the distribution of variance in student perceptions of need-supportive teaching have indicated that teachers differentiate between students; that is, class-level intraclass correlations (ICCs) of student perceptions of need-supportive teaching have been found to vary from .05 to .31 (Bieg, Backes, & Mittag, 2011; Danielsen, Wiium, Wilhemsen, & Wold, 2010; Hospel & Galand, 2016) and from .24 to .31 for teachers' student-specific perceptions of need-supportive teaching (Domen et al., 2018). These results indicate that most variance in these variables is situated within classes rather than between classes. Hence, students in the same class differ greatly from one another regarding the extent to which they perceive their teacher to provide autonomy support, structure, and involvement. Typically, in SDT studies antecedents of differences *between students* in need-supportive teaching have not been examined. However, in one small-scale interview study, teachers indicated that they differentiated in autonomy support and structure based on their perceptions of their students' ability and background (Hornstra et al., 2015), suggesting that teacher expectations may explain differences in need-supportive teaching.

### **Present study**

The present study aimed to examine how teacher expectations were associated with need-supportive teaching, that is, autonomy support, structure, and involvement, and thereby with students' motivation and behavioural engagement. Whereas most previous studies have used observations to assess differential teaching behaviours (e.g., Brophy & Good, 1970; or see Harris & Rosenthal, 1985, for a meta-analysis), the current study focussed on student perceptions of need-supportive teaching in line with what has typically been done in SDT research (see Stroet et al., 2013). An advantage of using student perceptions is that these are closest to how students respond psychologically to student–teacher interactions and, hence, how these interactions affect their motivation (Deci, 1975). In addition, given that our study focussed on the mediating role of need-supportive teaching in the relations between teacher expectations and student motivation, it made sense to use a measure of need-supportive teaching that incorporated effects of actual teaching behaviour and of students' responses to this behaviour, and a measure of student perceptions of need-supportive teaching is most comprehensive in that respect.

In line with previous studies (Boerma et al., 2016; Gilbert et al., 2014; Urhahne, 2015; Wentzel et al., 2010; Woolley et al., 2010; Zhu et al., 2018), we expected that teacher expectations would be associated with students' motivation and behavioural engagement. We expected that this relation would be partly or fully mediated by need-supportive teaching. More specifically, the following hypotheses were addressed in this study (see also [Figure 1](#) for a graphical display of the hypothesised model): We hypothesised that when a teacher had higher expectations of a student, the student would perceive more autonomy support and more involvement (H1). On the basis of mixed findings regarding structure, no



**Figure 1.** Hypothesised model for the associations between teacher expectations and students' intrinsic motivation, extrinsic motivation, amotivation, and behavioural engagement, mediated by need-supportive teaching.

hypothesis was formulated for structure. Moreover, as previous research has indicated that higher levels of each dimension of need-supportive teaching were associated with higher quality motivation and more behavioural engagement (for a review, see Stroet et al., 2013), we expected positive associations between each dimension of student-perceived need-supportive teaching and intrinsic motivation, negative associations between need-supportive teaching and the less adaptive aspects of motivation, that is, extrinsic motivation and amotivation, and a positive association between need-supportive teaching and behavioural engagement (H2). Although there are indications in SDT research that the strength of the relations between need-supportive teaching and motivation may differ per dimension of need-supportive teaching (e.g., Deci & Ryan, 1985, 2000), this has not been extensively examined thus far, and research has yielded mixed findings (see review by Stroet et al., 2013). Therefore, no specific hypotheses were formulated to address these potential differences in strength of the expected relations. Finally, we expected that the three dimensions of need-supportive teaching would partly or fully mediate the hypothesised relations between teacher expectations and motivation and engagement (H3).

## Method

### Sample

A sample of 276 students from 11 classes in the first 3 years of secondary school participated in this study. In Dutch secondary education, students are taught by different teachers for each subject domain. In the present study, one of their teachers ( $N = 11$  teachers) who taught maths, Dutch, or English also participated. The teachers taught their students 2 to 4 hr per week, which can vary per subject and school. Of the sample, 40.9% of the students were in first grade (cf. Grade 6 in the US), 24.6% were in second grade, and 34.4% were in third grade. Their mean age was 13.5 years ( $SD = 1.11$ ). The sample was not representative of Dutch students in secondary school, as most students (83.0%) were in the highest track of the three main tracks in Dutch secondary education. Half of the students (50.4%) were male, and 3.3% of the participants were



from a non-Western minority background. The mother tongue of most students was Dutch (87%), 8% of the students spoke another language at home, and 5% spoke Dutch and another language at home. The participating teachers (45% male) taught Dutch (2 classes), English (6 classes), or maths (3 classes). Their mean age was 47.7 years old ( $SD = 14.2$ ). On average, they had 21.0 years' teaching experience ( $SD = 14.6$ ).

### **Procedure**

Schools from the network of the researchers were invited to participate in this study. The response rate was 18%. Data collection took place during the second semester of the school year (i.e., April and May). Beforehand, passive consent was obtained from the parents and active consent was obtained from the teachers and students. A total of 28 students did not participate because their parents did not give consent or because they were not present on the day of the administration. The schools were visited by one or two of the researchers. Data collection took place during a class taught by the participating teacher (maths, Dutch, or English). During data collection, students and their teachers first received an introduction explaining the general purpose of the study, how to fill in the questionnaire, and it was explained that their anonymity was guaranteed. They completed the questionnaires during regular class hours during Dutch class, English class, or maths class (21.4%, 50.7%, and 27.9% of the students, respectively). The student questionnaire began with questions on demographic information and continued with other scales on perceived need-supportive teaching and motivation. At the same time, teachers filled in a questionnaire on their expectations of their students.

### **Instruments**

#### **Teacher expectations**

To measure the expectations of the teachers with regard to their students, the teachers completed a short questionnaire (Van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010) for each of their students. More specifically, the teachers were asked to judge various academic characteristics of the relevant students along a Likert-type scale that ranged from 1 (*not applicable*) to 5 (*totally applicable*). The scale consisted of six items (e.g., "This student will have a successful academic career" or "He/she is a smart student"). The scale was found to be highly reliable; Cronbach's alpha for this scale was  $\alpha = .93$ .

#### **Student-perceived need support**

To measure student perceptions of need-supportive teaching by their teacher, students completed a questionnaire during their maths, English, or Dutch class on perceived need-supportive teaching provided by their teacher in that class (Kampshof, 2017). The items could be answered on a Likert-type scale that ranged from 1 (*not applicable*) to 5 (*totally applicable*). A confirmatory factor analysis (CFA) supported the three-factor structure of the questionnaire ( $\chi^2(453) = 953.403$ ,  $p < .001$ ; root mean square error approximation [RMSEA] = .063). The scale "autonomy support" aimed to capture four main dimensions of autonomy support (Belmont, Skinner, Wellborn, & Connell, 1992; Stroet et al., 2013; Su & Reeve, 2011): fostering relevance, providing choices, showing respect

and acknowledging negative feelings, and nurturing inner motivational resources (Belmont et al., 1992; Stroet et al., 2013; Su & Reeve, 2011). The scale consisted of 11 items (e.g., “During the lessons in this subject, my teacher encourages me to think about how this subject can be used in real life”, “During the lessons in this subject, I get to work in my own way”). Cronbach’s alpha for this subscale was  $\alpha = .80$ . The subscale “Structure” included items which assessed three main aspects of structure, for example, guidance, encouragement, and information feedback (Belmont et al., 1992; Stroet et al., 2013). It consisted of 13 items (e.g., “During the lesson, my teacher helps me if I can’t solve a problem”, “During the lesson, my teacher has high expectations of me”). Cronbach’s alpha for this subscale was  $\alpha = .80$ . “Involvement” was measured by an eight-item scale that assessed how involved students perceived their teacher to be (e.g., “My teacher talks to me”, “I cannot count on my teacher when I need him/her” – reverse coded). Cronbach’s alpha for involvement was  $\alpha = .80$ .

### ***Intrinsic motivation, extrinsic motivation, amotivation, and behavioural engagement***

Students’ motivation and behavioural engagement were assessed using student questionnaires. The items could be answered on a Likert-type scale that ranged from 1 (*not applicable*) to 5 (*totally applicable*). Students’ intrinsic motivation and extrinsic motivation were assessed using two scales from the Self-Regulation Questionnaire Academic (SRQ-A; Ryan & Connell, 1989). Participants were presented with eight items representing different reasons for engaging in their school work. All items were preceded by the question, “Why do you try to do your best in this subject?” Four items referred to intrinsic reasons (e.g., “Because I enjoy this subject”) and four items referred to external reasons (e.g., “Because it’s the rule, and I’m supposed to do it”). Cronbach’s alpha for the scale “Intrinsic Motivation” was  $\alpha = .91$ . Cronbach’s alpha for “Extrinsic Motivation” was  $\alpha = .69$ . Lack of motivation was assessed with the scale “Amotivation” from the Academic Motivation Scale by Vallerand et al. (1992), consisting of three items (e.g., “Honestly, I really feel that I am wasting my time in this subject”). Cronbach’s alpha for the Amotivation scale was  $\alpha = .84$ . Lastly, behavioural engagement was assessed with four items (e.g., “In this class, I work as hard as I can”) based on Wellborn (1991). Cronbach’s alpha for the scale behavioural engagement was  $\alpha = .84$ .

### ***Data analyses***

To test our hypothesised model (see Figure 1), structural equation modelling was performed with Mplus version 7.4 (Muthén & Muthén, 2017). We estimated a multivariate path model to simultaneously include all four dependent variables (intrinsic motivation, extrinsic motivation, amotivation, behavioural engagement). Maximum likelihood estimation was used as the estimation technique, as multivariate normality was obtained. Collinearity statistics showed that there was no multicollinearity (tolerance  $> .50$ ; variation inflation factor [VIF]  $< 2.0$ ). Students’ sex, grade (Year 1, 2, or 3), subject domain, and track were included in the analyses as control variables for the mediating and dependent variables, as prior research had indicated that these variables were associated with need-supportive teaching as well as student motivation (e.g., Hornstra et al., 2015; Hornstra, Van der Veen, & Peetsma, 2016; Opdenakker, Maulana, & Den Brok, 2012; Roeser, Eccles, &

Sameroff, 1998). As recommended by Zhao, Lynch, and Chen (2010), we tested the different paths of the hypothesised model in one single model, including the hypothesised indirect paths using a bootstrapping re-sampling procedure ( $N = 1,000$ ), and statistical significance was assessed using a 95% confidence interval. To obtain a parsimonious model, non-significant parameters were removed one by one, starting with non-significant associations between the control variables and the mediating or dependent variables, in order of the size of the standardised regression coefficients. Thereafter, the significance of the direct and indirect relations of the variables of interest of the present study were examined and removed one by one if not significant in order of the size of the standardised regression coefficients.

Our hypotheses were evaluated by examining the significance and direction of the direct and indirect effects of the model and by inspection of model fit. Model fit was evaluated using the Chi-square test, the RMSEA, the comparative fit index (CFI), and the standardised 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, an SRMR value less than .08 indicates a good fit (Hu & Bentler, 1999). Furthermore, to assess the strength of the relations in our model, we examined the standardised coefficients of the relations between teacher expectations, need-supportive teaching, and motivation. Standardised estimates of .10, .30, and .50 are indicative of small, medium, and large effects, respectively (Cohen, 1988).

## Results

### *Descriptive statistics and correlations*

Descriptive statistics and correlations are presented in [Table 1](#). A high score corresponds to a high level of the construct. Teachers reported on average 3.93 for their expectations of their students on a 1 to 5 scale. The dimensions of need-supportive teaching were rated around 3.00 to 3.50 on a scale from 1 to 5, and the average scores for the different dimensions of motivation varied from 1.82 for amotivation to 3.49 for behavioural engagement. The correlation table indicates positive correlations between teacher expectations and need-supportive teaching, intrinsic motivation, and behavioural engagement. Teacher expectations were not correlated with extrinsic motivation and were negatively correlated with amotivation. Regarding need support, strong correlations were found between the three dimensions. Furthermore, the pattern of correlations between the different aspects of motivation showed positive correlations between adaptive aspects of motivation (intrinsic motivation and behavioural engagement), negative correlations with amotivation, and negative or non-significant correlations with extrinsic motivation.

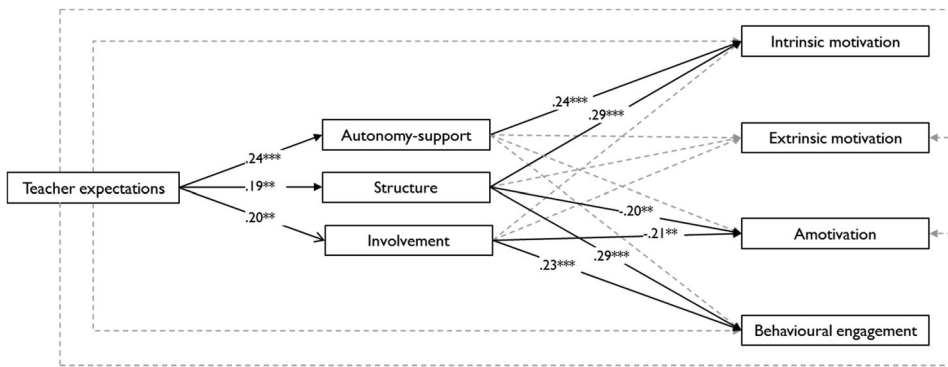
### *Mediation model*

[Figure 2](#) displays the final path model obtained from our analyses. Students' sex, grade (Year 1, 2, or 3), subject domain, and track were entered into the model as control variables. A first model, with all possible relations, including all associations between the control variables and the mediating variables, was just identified (indicating that the

**Table 1.** Descriptive statistics and correlations.

	<i>n</i>	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	5.	6.	7.	8.
1. Teacher expectations	276	3.93	.89	1.00							
2. Autonomy	276	2.99	.66	.25***	1.00						
3. Structure	276	3.45	.56	.19**	.65***	1.00					
4. Involvement	276	3.16	.59	.18**	.62***	.62***	1.00				
5. Intrinsic motivation	275	2.89	1.17	.22***	.45***	.45***	.38***	1.00			
6. Extrinsic motivation	275	3.13	.98	.02	-.14*	-.08	-.14*	-.20**	1.00		
7. Amotivation	275	1.82	.80	-.15*	-.22***	-.32***	-.35***	-.51***	.09	1.00	
8. Behavioural engagement	275	3.49	.85	.17**	.30***	.40***	.40***	.53***	.03	-.46***	1.00

\* $p < .05$  level (2-tailed). \*\* $p < .01$  level (2-tailed). \*\*\* $p < .001$  level (2-tailed).



**Figure 2.** Standardised estimates of the mediation model.

Note: Control variables, error terms, and covariances are not depicted.

number of knowns equalled the unknowns), due to which model fit could not be assessed. After removing non-significant associations with the control variables first, the data fitted the model well ( $\chi^2(19) = 24.092, p = .193$ ; RMSEA = .031; 90% confidence interval [CI] [.000, .052]; CFI = .993; SRMR = .036). Further inspection of the model indicated several other non-significant paths, including the direct effects of teacher expectations on intrinsic motivation ( $\beta = .06; p = .291$ ), extrinsic motivation ( $\beta = .00; p = .997$ ), amotivation ( $\beta = -.10; p = .090$ ), and behavioural engagement ( $\beta = .05; p = .380$ ). Removing these and other non-significant coefficients did not significantly worsen model fit. After removing all non-significant paths one by one in order of the size of the regression coefficient to obtain a parsimonious model, we obtained the final model. The final model fitted the data well ( $\chi^2(31) = 35.378, p = .269$ ; RMSEA = .023; 90% CI [.000, .052]; CFI = .994; SRMR = .041).

In line with the first hypothesis, positive relations were found between teacher expectations and autonomy support ( $\beta = .24; p < .001$ ) and teacher expectations and involvement ( $\beta = .20; p = .001$ ). No clear hypothesis was formulated for structure, yet the results indicated that teacher expectations were also positively associated with structure ( $\beta = .19; p = .001$ ). Hence, students for whom the teacher held higher expectations perceived higher levels of autonomy support, involvement, and structure from their teacher. The standardised coefficients for these relations between teacher expectations and the three dimensions of need-supportive teaching were indicative of small to medium effects. Figure 2 also presents the results for the second hypothesis regarding the expected relations between need-supportive teaching and motivation, and the third hypothesis which posited that need-supportive teaching would mediate relations between teacher expectations and students' motivation and engagement. Below, the results for both hypotheses are described per outcome variable.

First, it was expected that the three dimensions of need-supportive teaching would be positively associated with intrinsic motivation. This was confirmed for autonomy support ( $\beta = .24; p < .001$ ) and structure ( $\beta = .29; p < .001$ ), but not for involvement ( $p > .05$ ). For autonomy support, the effect size of this relation was small to medium, and for structure it was medium. We expected that the dimensions of need-supportive teaching would mediate the relations between teacher expectations and intrinsic motivation. Even

though teacher expectations and intrinsic motivation were significantly correlated ( $r = .22$ ,  $p < .001$ ; see Table 1), the direct effect of teacher expectations on intrinsic motivation was no longer significant ( $p > .05$ ) in the path model which included the three dimensions of need-supportive teaching as mediating variables, thereby excluding the possibility of partial mediation. There were two significant indirect effects, indicating full mediation. The first one was an indirect pathway from teacher expectations to intrinsic motivation via student-perceived autonomy support. The standardised indirect effect was  $.06$ , 95% CI  $[.03, .09]$ . The second significant indirect pathway was a path from teacher expectations to intrinsic motivation via student-perceived structure. The standardised indirect effect was  $.06$ , 95% CI  $[.02, .09]$ . Both indirect effects can be considered small effects.

For extrinsic motivation, it was hypothesised that need-supportive teaching would be negatively associated with extrinsic motivation. However, none of the three aspects of need-supportive teaching were associated with extrinsic motivation ( $p > .05$ ). The direct effect of teacher expectations on extrinsic motivation was not significant ( $p > .05$ ). Because neither aspect of need-supportive teaching was significantly associated with extrinsic motivation, there were no significant indirect relations between teacher expectations and extrinsic motivation.

Regarding amotivation, it was expected that need-supportive teaching would be negatively associated with amotivation. This was confirmed for structure ( $\beta = -.20$ ;  $p = .003$ ) and involvement ( $\beta = -.21$ ;  $p = .001$ ), but not for autonomy support ( $p > .05$ ). The associations of structure and involvement with amotivation had a small to medium effect size. There was a significant and negative correlation between teacher expectations and amotivation ( $r = -.15$ ,  $p = .016$ ; see Table 1), but in the path model, the direct effect of teacher expectations on amotivation was no longer significant ( $p > .05$ ), excluding the possibility of partial mediation. There were two significant indirect effects, indicating full mediation. The first one was an indirect pathway from teacher expectations on amotivation via student-perceived structure. The standardised indirect effect was  $-.04$ , 95% CI  $[-.07, -.01]$ . The second significant indirect pathway was a path from teacher expectations to amotivation via student-perceived involvement. The standardised indirect effect was  $-.04$ , 95% CI  $[-.07, -.01]$ . Both indirect effects can be considered small effects. Hence, teacher expectations were negatively associated with amotivation, and this relation was found to be mediated by structure and involvement.

Lastly, for behavioural engagement, we hypothesised positive relations between need-supportive teaching and behavioural engagement. This was confirmed for structure ( $\beta = .29$ ;  $p < .001$ ) and involvement ( $\beta = .23$ ;  $p < .001$ ), but not for autonomy support ( $p > .05$ ). The associations of structure and involvement with behavioural engagement had a medium and a small to medium effect size, respectively. There was a significant and positive correlation between teacher expectations and amotivation ( $r = .17$ ,  $p = .004$ ; see Table 1), but the direct effect of teacher expectations on behavioural engagement was no longer significant in the path model ( $p > .05$ ), excluding the possibility of partial mediation. There were two significant indirect effects, indicating full mediation. The first one was an indirect pathway from teacher expectations on behavioural engagement via student-perceived structure. The standardised indirect effect was  $.06$ , 95% CI  $[.02, .09]$ . The second significant indirect pathway was a path from teacher expectations on behavioural engagement via student-perceived involvement. The standardised indirect effect was  $.05$ , 95% CI  $[.02, .08]$ . Both indirect effects can be considered small effects. Hence,

teacher expectations were positively associated with behavioural engagement, and this relation was found to be mediated by structure and involvement.

In all, the findings suggested that teacher expectations were related to students' intrinsic motivation, amotivation, and their behavioural engagement, and these relations were fully mediated by how students perceived their teachers' behaviours in terms of autonomy, structure, and involvement. The effect sizes for the indirect relations suggested small effect sizes. The estimated model explained 28% of the variance in intrinsic motivation, 13% of the variance in extrinsic motivation, 14% in amotivation, and 25% in behavioural engagement.

## Discussion

The present study was designed to bridge the gap between teacher expectation research and SDT, thereby contributing to a more complete understanding of motivational processes at work in the classroom. Research on SDT has yielded indications that teachers offer different levels of need-supportive teaching towards different students (e.g., Bieg et al., 2011; Danielsen et al., 2010; Hornstra et al., 2015; Hospel & Galand, 2016), but the role of teacher expectations as a factor underlying these differences in need-supportive teaching has been underexplored thus far. In line with our expectations, we found that teacher expectations were associated with different aspects of students' motivation, and these relations were fully mediated – albeit with relatively small effect sizes – by need-supportive teaching. These results indicated that when their teacher had higher expectations of them, students experienced more need-supportive teaching. In turn, these positive relations were related to higher levels of intrinsic motivation, less amotivation, and more behavioural engagement.

More specifically, we found, as expected and in line with previous research, that higher teacher expectations were associated with higher levels of perceived autonomy support; that is, students for whom the teacher reported higher expectations experienced their teacher to be more autonomy supportive, for example, by providing them with more choices compared to students for whom the teacher reported lower expectations. Further, as expected, these students also experienced more involvement from their teacher, such as more affection, interest, or emotional support. Regarding the relationship between teacher expectations and structure, previous research has been inconsistent. Our results suggested that students for whom teachers held higher expectations perceived more structure. This contradicts the notion that teachers may perceive low-expectation students to have a higher need for structure and, accordingly, provide them with more structure to support their need for competence (e.g., Hornstra et al., 2015). Instead, our result regarding structure aligned with that of previous studies that suggested that high-expectation students elicited more interactions, encouragement, and positive feedback from their teacher (e.g., Brophy & Good, 1970), thereby increasing their perception of structure. Of relevance in this regard is that we focussed on student-perceived structure, whereas Hornstra et al. (2015) researched teacher perceptions of structure. Possibly, teachers' provision of structure is not always experienced as such by students; that is, teachers may try to provide more or equal levels of structure to low-expectation students, but students may perceive this differently.

In addition, we expected that the dimensions of need-supportive teaching would be associated with intrinsic motivation, extrinsic motivation, amotivation, and behavioural

engagement. Our expectations were mostly confirmed as most of the expected relations were significant and in the expected direction. However, some of the expected relations were not found to be significant. As expected, intrinsic motivation was predicted by autonomy support and structure, but not by involvement. Furthermore, it appeared that structure predicted a broader spectrum of motivational outcomes (i.e., intrinsic motivation, amotivation, behavioural engagement), whereas autonomy support and involvement only predicted certain aspects of students' motivation (only intrinsic motivation or only amotivation and behavioural engagement, respectively). These findings align with SDT notions suggesting that structure would be a stronger predictor of different aspects of motivation compared to autonomy support and involvement, because feeling competent (which is supported through structure) is conditional for almost all aspects of motivation (Deci & Ryan, 1985). In addition, it has also been suggested that involvement plays a more distal role in predicting motivational outcomes compared to autonomy support and structure (Deci & Ryan, 2000). However, as suggested by Stroet and colleagues in their review (2013), these notions of differential effectiveness of these different dimensions of need-supportive teaching warrant more research.

Notably, need-supportive teaching was not found to be related to extrinsic motivation. Prior research (Haerens, Aelterman, Vansteenkiste, Soenens, Van Petegem, 2015; Vansteenkiste & Ryan, 2013) has suggested that need-supportive teaching is mostly associated with positive motivational outcomes such as intrinsic motivation and behavioural engagement (referred to as the "bright pathway"), whereas less adaptive motivational outcomes such as extrinsic motivation and amotivation, are more strongly predicted by need-thwarting teaching behaviours, such as control and neglect ("dark pathway"). Future research on the relations between teacher expectations, teaching behaviour, and student motivation may therefore benefit from also incorporating need-thwarting behaviours to examine whether low teacher expectations may elicit need-thwarting teaching and thereby promote extrinsic motivation.

### ***Implications for research and practice***

Our findings generated several relevant implications for research as well as practice. First, the results suggested that SDT, and more specifically the construct of need-supportive teaching, could offer teacher expectation research a useful framework to classify differential teaching behaviours towards low- and high-expectation students. By integrating these two research traditions, our findings also indicated that teacher expectations (among other factors) may help to explain why teachers vary in their level of need-supportive teaching towards different students. Future research may benefit from incorporating teacher expectations in research on differential need-supportive teaching.

Second, given the finding that teachers varied between students in the level of need-supportive teaching (see also Bieg et al., 2011; Danielsen et al., 2010; Hospel & Galand, 2016) and on the basis of studies suggesting that teacher expectations are affected by various student characteristics (e.g., Ready & Wright, 2011) as well as teacher characteristics (e.g., Gershenson, Holt, & Papageorge, 2016), we posit that need-supportive teaching should not only be considered as a general teaching style of a teacher, but rather as a feature of dyadic teacher–student relationships. In other words, variability in need-supportive teaching may be explained by characteristics of the teacher and the student, and



potentially also by characteristics of their specific pairing. Future research on teacher expectations could therefore benefit from a cross-classified approach to disentangle these factors and to increase our understanding of factors contributing to motivating and demotivating teacher–student relationships (see, for an example of such an approach, Mainhard, Oudman, Hornstra, Bosker, & Goetz, 2018).

Third, this study has shown that teacher expectations are associated with students' motivation. These findings, as well as findings from previous studies on the effects of teacher expectations (Rubie-Davies, 2018), stress the importance of paying attention to teacher expectations in teacher training programmes and educational interventions. This could, for example, be done by increasing teachers' awareness regarding the potential effects of their expectations on their students' motivation and by focussing on how high expectations can be communicated to all students.

Fourth, although SDT suggests that students' motivation can best be supported by high levels of support in all three dimensions (e.g., Ryan & Deci, 2000b), our findings as well as findings from previous studies (e.g., Hornstra et al., 2015; Reeve, 2009) have indicated that, in practice, not all students are offered such an optimal teaching style. In particular, students for whom teachers held lower expectations were found to perceive less autonomy support, structure, and involvement. Prior research has indicated that teacher expectation interventions can positively affect students' achievement (Rubie-Davies & Rosenthal, 2016). In addition, teacher interventions on need-supportive teaching have been found to be effective in terms of enhancing students' motivation (e.g., Su & Reeve, 2011). For future research, it may be interesting to examine if interventions that integrate these two research traditions, by focussing on enhancing teacher expectations as well as increasing teachers' need-supportive teaching, may be even more effective. Also, it may be worthwhile to examine whether such interventions would be especially beneficial for low-expectation students, because these students are more likely to receive lower levels of need-supportive teaching according to the results of this study, and because these students are relatively often from stigmatised groups and have been found to be particularly vulnerable to teacher expectation effects (e.g., Jussim, Eccles, & Madon, 1996; Jussim & Harber, 2005).

### ***Limitations and directions for future research***

Several limitations of the present study are worth noting. First, given the cross-sectional nature of the data, the direction of causality could not be established. We acknowledge that relationships between teacher expectations, teacher behaviour, and student motivation are not unidirectional and that students' motivation may also affect teacher expectations and teacher behaviours (Reeve, 2009). In the present study, however, we aligned with prior teacher expectation research focussing on the effects of teacher expectations on student outcomes (e.g., Jussim & Harber, 2005; Rubie-Davies, 2018) and SDT research focussing on effects of need-supportive teaching on student motivation (e.g., Stroet et al., 2013). By doing so, the present study focussed on the potential effects that teachers may have had on their students' motivation, because teachers have a central role as professionals in the classroom. Because of this role, they are in a position to bring about change. For that reason, insight into what teachers can do to enhance student motivation is critical. Future research could benefit from investigating causality and reciprocity

regarding teacher expectations, teacher behaviour, and student motivation. In particular, longitudinal research could help to unravel the direction of causality.

Second, our sample mostly consisted of classes in the higher tracks of secondary school. This may have limited the generalisability of our findings. Specifically, the rather homogeneous sample may have limited the degree of variation in teacher expectations and differential teacher behaviours in the present study and, thereby, the strength of the relations found between these constructs. In more heterogeneous samples, there may be more variation in these constructs and effect sizes may thus be stronger than those obtained in the present study. Therefore, in future research, it would be interesting to include different tracks, or extend the research to other educational contexts which are not tracked and thereby present more heterogeneity within classes (e.g., primary education or samples from countries without a tracked educational system).

Third, the sample size at the class level was limited to 11 classes. Larger sample sizes of at least 30 or 50 units at the group level have been recommended and would allow for multilevel analyses to disentangle effects at the classroom level and individual level (e.g., Kreft & De Leeuw, 1998; Maas & Hox, 2005).

## Conclusions

The present study is among the first to integrate SDT research with research on teacher expectations. By integrating these two perspectives, we were able to show that teacher expectations affected need-supportive teaching and thereby students' motivation and behavioural engagement. The findings of the present study highlighted the value of taking teacher expectations into account to gain an understanding of how motivation of all students can be fostered through need-supportive teaching.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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## References

- Aelterman, N., Vansteenkiste, M., Van Keer, H., Van den Berghe, L., De Meyer, J., & Haerens, L. (2012). Students' objectively measured physical activity levels and engagement as a function of between-class and between-student differences in motivation toward physical education. *Journal of Sport and Exercise Psychology, 34*, 457–480. doi:10.1123/jsep.34.4.457
- Alvidrez, J., & Weinstein, R. S. (1999). Early teacher perceptions and later student academic achievement. *Journal of Educational Psychology, 91*, 731–746. doi:10.1037/0022-0663.91.4.731
- Babad, E. (1993a). Pygmalion – 25 years after interpersonal expectations in the classroom. In P. D. Blanck (Ed.), *Interpersonal expectations: Theory, research, and applications* (pp. 125–153). Cambridge, UK: Cambridge University Press.
- Babad, E. (1993b). Teachers' differential behavior. *Educational Psychology Review, 5*, 347–376. doi:10.1007/bf01320223
- Babad, E. (2009). Teaching and nonverbal behavior in the classroom. In L. J. Saha & A. G. Dworkin (Eds.), *International handbook of research on teachers and teaching* (pp. 817–827). Boston, MA: Springer. doi:10.1007/978-0-387-73317-3\_52
- Babad, E. Y., Inbar, J., & Rosenthal, R. (1982). Pygmalion, Galatea, and the Golem: Investigations of biased and unbiased teachers. *Journal of Educational Psychology, 74*, 459–474. doi:10.1037/0022-0663.74.4.459
- Baker, S. R. (2003). A prospective longitudinal investigation of social problem-solving appraisals on adjustment to university, stress, health, and academic motivation and performance. *Personality and Individual Differences, 35*, 569–591. doi:10.1016/s0191-8869(02)00220-9
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117*, 497–529. doi:10.1037/0033-2909.117.3.497
- Belmont, M., Skinner, E., Wellborn, J., & Connell, J. (1992). *Two measures of teacher provision of involvement, structure, and autonomy support* (Technical report). Rochester, NY: University of Rochester.
- Bieg, S., Backes, S., & Mittag, W. (2011). The role of intrinsic motivation for teaching, teachers' care and autonomy support in students' self-determined. *Journal for Educational Research Online, 3*, 122–140.
- Boerma, I. E., Mol, S. E., & Jolles, J. (2016). Teacher perceptions affect boys' and girls' reading motivation differently. *Reading Psychology, 37*, 547–569. doi:10.1080/02702711.2015.1072608
- Bohlmann, N. L., & Weinstein, R. S. (2013). Classroom context, teacher expectations, and cognitive level: Predicting children's maths ability judgments. *Journal of Applied Developmental Psychology, 34*, 288–298. doi:10.1016/j.appdev.2013.06.003
- Brattesani, K. A., Weinstein, R. S., & Marshall, H. H. (1984). Student perceptions of differential teacher treatment as moderators of teacher expectation effects. *Journal of Educational Psychology, 76*, 236–247. doi:10.1037/0022-0663.76.2.236
- Brophy, J. E. (1983). Research on the self-fulfilling prophecy and teacher expectations. *Journal of Educational Psychology, 75*, 631–661. doi:10.1037/0022-0663.75.5.631

- Brophy, J. E., & Good, T. L. (1970). Teachers' communication of differential expectations for children's classroom performance: Some behavioral data. *Journal of Educational Psychology, 61*, 365–374. doi:10.1037/h0029908
- Burton, K. D., Lydon, J. E., D'Alessandro, D. U., & Koestner, R. (2006). The differential effects of intrinsic and identified motivation on well-being and performance: Prospective, experimental, and implicit approaches to self-determination theory. *Journal of Personality and Social Psychology, 91*, 750–762. doi:10.1037/0022-3514.91.4.750
- Cerasoli, C. P., Nicklin, J. M., & Ford, M. T. (2014). Intrinsic motivation and extrinsic incentives jointly predict performance: A 40-year meta-analysis. *Psychological Bulletin, 140*, 980–1008. doi:10.1037/a0035661
- Chaikin, A. L., Sigler, E., & Derlega, V. J. (1974). Nonverbal mediators of teacher expectancy effects. *Journal of Personality and Social Psychology, 30*, 144–149. doi:10.1037/h0036738
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.
- Cooper, H., & Good, T. (1983). *Pygmalion grows up: Studies in the expectation communication process*. New York, NY: Longman.
- Danielsen, A. G., Wium, N., Wilhelmsen, B. U., & Wold, B. (2010). Perceived support provided by teachers and classmates and students' self-reported academic initiative. *Journal of School Psychology, 48*, 247–267. doi:10.1016/j.jsp.2010.02.002
- Deci, E. L. (1975). *Intrinsic motivation*. New York, NY: Plenum.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York, NY: Plenum Press.
- Deci, E. L., & Ryan, R. M. (2000). The "What" and "Why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*, 227–268. doi:10.1207/s15327965pli1104\_01
- Deci, E. L., & Ryan, R. M. (2008). Facilitating optimal motivation and psychological well-being across life's domains. *Canadian Psychology, 49*, 14–23. doi:10.1037/0708-5591.49.1.14
- Domen, J., Hornstra, L., Weijers, D., Van der Veen, I., & Peetsma, T. (2018). *Differentiated need support by teachers: Student-specific provision of autonomy and structure and the relation with student motivation*. Manuscript resubmitted for publication.
- Friedrich, A., Flunger, B., Nagengast, B., Jonkmann, K., & Trautwein, U. (2015). Pygmalion effects in the classroom: Teacher expectancy effects on students' maths achievement. *Contemporary Educational Psychology, 41*, 1–12. doi:10.1016/j.cedpsych.2014.10.006
- Furrer, C., & Skinner, E. (2003). Sense of relatedness as a factor in children's academic engagement and performance. *Journal of Educational Psychology, 95*, 148–162. doi:10.1037/0022-0663.95.1.148
- Gershenson, S., Holt, S. B., & Papageorge, N. W. (2016). Who believes in me? The effect of student-teacher demographic match on teacher expectations. *Economics of Education Review, 52*, 209–224. doi:10.1016/j.econedurev.2016.03.002
- Gilbert, M. C., Musu-Gillette, L. E., Woolley, M. E., Karabenick, S. A., Strutchens, M. E., & Martin, W. G. (2014). Student perceptions of the classroom environment: Relations to motivation and achievement in mathematics. *Learning Environments Research, 17*, 287–304. doi:10.1007/s10984-013-9151-9
- Good, T. L., & Brophy, J. E. (2003). *Looking in classrooms* (9th ed.). New York, NY: Longman.
- Guay, F., Ratelle, C. F., Roy, A., & Litalien, D. (2010). Academic self-concept, autonomous academic motivation, and academic achievement: Mediating and additive effects. *Learning and Individual Differences, 20*, 644–653. doi:10.1016/j.lindif.2010.08.001
- Haerens, L., Aelterman, N., Vansteenkiste, M., Soenens, B., & Van Petegem, S. (2015). Do perceived autonomy-supportive and controlling teaching relate to physical education students' motivational experiences through unique pathways? Distinguishing between the bright and dark side of motivation. *Psychology of Sport and Exercise, 16*(Part 3), 26–36. doi:10.1016/j.psychsport.2014.08.013
- Harris, M. J., & Rosenthal, R. (1985). Mediation of interpersonal expectancy effects: 31 meta-analyses. *Psychological Bulletin, 97*, 363–386. doi:10.1037/0033-2909.97.3.363
- Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Abingdon: Routledge.

- Hinnant, J. B., O'Brien, M., & Ghazarian, S. R. (2009). The longitudinal relations of teacher expectations to achievement in the early school years. *Journal of Educational Psychology, 101*, 662–670. doi:10.1037/a0014306
- Hornstra, L., Mansfield, C., Van der Veen, I., Peetsma, T., & Volman, M. (2015). Motivational teacher strategies: The role of beliefs and contextual factors. *Learning Environments Research, 18*, 363–392. doi:10.1007/s10984-015-9189-y
- Hornstra, L., Van der Veen, I., & Peetsma, T. (2016). Domain-specificity of motivation: A longitudinal study in upper primary school. *Learning and Individual Differences, 51*, 167–178. doi:10.1016/j.lindif.2016.08.012
- Hospel, V., & Galand, B. (2016). Are both classroom autonomy support and structure equally important for students' engagement? A multilevel analysis. *Learning and Instruction, 41*, 1–10. doi:10.1016/j.learninstruc.2015.09.001
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*, 1–55. doi:10.1080/10705519909540118
- Jang, H., Reeve, J., & Deci, E. L. (2010). Engaging students in learning activities: It is not autonomy support or structure but autonomy support and structure. *Journal of Educational Psychology, 102*, 588–600. doi:10.1037/a0019682
- Jussim, L., Eccles, J., & Madon, S. (1996). Social perception, social stereotypes, and teacher expectations: Accuracy and the quest for the powerful self-fulfilling prophecy. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 28, pp. 281–388). San Diego, CA: Academic Press. doi:10.1016/s0065-2601(08)60240-3
- Jussim, L., & Harber, K. D. (2005). Teacher expectations and self-fulfilling prophecies: Knowns and unknowns, resolved and unresolved controversies. *Personality and Social Psychology Review, 9*, 131–155. doi:10.1207/s15327957pspr0902\_3
- Kampshof, M. (2017). *Ervaren differentiatie in autonomie-ondersteuning in associatie met leerling motivatie* [Perceived differentiation in autonomy-support in association with student motivation] (Unpublished Master thesis). Utrecht University, Utrecht.
- Kreft, I. G. G., & De Leeuw, J. (1998). *Introducing multilevel modeling*. Newbury Park, CA: Sage.
- Legault, L., Green-Demers, I., & Pelletier, L. (2006). Why do high school students lack motivation in the classroom? Toward an understanding of academic amotivation and the role of social support. *Journal of Educational Psychology, 98*, 567–582. doi:10.1037/0022-0663.98.3.567
- Maas, C. J. M., & Hox, J. J. (2005). Sufficient sample sizes for multilevel modeling. *Methodology, 1*, 85–91. doi:10.1027/1614-2241.1.3.85
- Mainhard, T., Oudman, S., Hornstra, L., Bosker, R. J., & Goetz, T. (2018). Student emotions in class: The relative importance of teachers and their interpersonal relations with students. *Learning and Instruction, 53*, 109–119. doi:10.1016/j.learninstruc.2017.07.011
- McKown, C., & Weinstein, R. S. (2008). Teacher expectations, classroom context, and the achievement gap. *Journal of School Psychology, 46*, 235–261. doi:10.1016/j.jsp.2007.05.001
- Merton, R. K. (1957). *Social theory and social structure*. New York, NY: Free Press.
- Muthén, B., & Muthén, L. (2017). *Mplus version 7: User's guide*. Los Angeles, CA: Authors.
- Ntoumanis, N. (2001). A self-determination approach to the understanding of motivation in physical education. *British Journal of Educational Psychology, 71*, 225–242. doi:10.1348/000709901158497
- Opdenakker, M.-C., Maulana, R., & Den Brok, P. (2012). Teacher–student interpersonal relationships and academic motivation within one school year: Developmental changes and linkage. *School Effectiveness and School Improvement, 23*, 95–119. doi:10.1080/09243453.2011.619198
- Pelletier, L. G., Fortier, M. S., Vallerand, R. J., & Brière, N. M. (2001). Associations among perceived autonomy support, forms of self-regulation, and persistence: A prospective study. *Motivation and Emotion, 25*, 279–306. doi:10.1023/a:1014805132406
- Perry, N. E., Turner, J. C., & Meyer, D. K. (2006). Classrooms as contexts for motivating learning. In P. H. Alexander & P. A. Winne (Eds.), *Handbook of educational psychology* (2nd ed., pp. 327–348). Mahwah, NJ: Lawrence Erlbaum.

- Ready, D. D., & Wright, D. L. (2011). Accuracy and inaccuracy in teachers' perceptions of young children's cognitive abilities: The role of child background and classroom context. *American Educational Research Journal*, 48, 335–360. doi:10.3102/0002831210374874
- Reeve, J. (2009). Why teachers adopt a controlling motivating style toward students and how they can become more autonomy supportive. *Educational Psychologist*, 44, 159–175. doi:10.1080/00461520903028990
- Reeve, J., & Jang, H. (2006). What teachers say and do to support students' autonomy during a learning activity. *Journal of Educational Psychology*, 98, 209–218. doi:10.1037/0022-0663.98.1.209
- Reeve, J., Jang, H., Carrell, D., Jeon, S., & Barch, J. (2004). Enhancing students' engagement by increasing teachers' autonomy support. *Motivation and Emotion*, 28, 147–169. doi:10.1023/b:moem.0000032312.95499.6f
- Rist, R. (1970). Student social class and teacher expectations: The self-fulfilling prophecy in ghetto education. *Harvard Educational Review*, 40, 411–451. doi:10.17763/haer.40.3.h0m026p670k618q3
- Roeser, R. W., Eccles, J. S., & Sameroff, A. J. (1998). Academic and emotional functioning in early adolescence: Longitudinal relations, patterns, and prediction by experience in middle school. *Development and Psychopathology*, 10, 321–352. doi:10.1017/s0954579498001631
- Rosenthal, R. (1994). Interpersonal expectancy effects: A 30-year perspective. *Current Directions in Psychological Science*, 3, 176–179. doi:10.1111/1467-8721.ep10770698
- Rosenthal, R., & Jacobson, L. (1968). *Pygmalion in the classroom: Teacher expectation and pupils' intellectual development*. New York, NY: Holt, Rinehart and Winston.
- Rubie-Davies, C. M. (2018). *Teacher expectations in education*. New York, NY: Routledge.
- Rubie-Davies, C. M., & Rosenthal, R. (2016). Intervening in teachers' expectations: A random effects meta-analytic approach to examining the effectiveness of an intervention. *Learning and Individual Differences*, 50, 83–92. doi:10.1016/j.lindif.2016.07.014
- Ryan, R. M. (1995). Psychological needs and the facilitation of integrative processes. *Journal of Personality*, 63, 397–427. doi:10.1111/j.1467-6494.1995.tb00501.x
- Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization: Examining reasons for acting in two domains. *Journal of Personality and Social Psychology*, 57, 749–761. doi:10.1037/0022-3514.57.5.749
- Ryan, R. M., & Deci, E. L. (2000a). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, 25, 54–67. doi:10.1006/ceps.1999.1020
- Ryan, R. M., & Deci, E. L. (2000b). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55, 68–78. doi:10.1037/0003-066x.55.1.68
- Salomon, G. (1981). Self-fulfilling and self-sustaining prophecies and the behaviors that realize them. *American Psychologist*, 36, 1452–1453. doi:10.1037/0003-066x.36.11.1452
- Shen, B., Wingert, R. K., Li, W., Sun, H., & Rukavina, P. B. (2010). An amotivation model in physical education. *Journal of Teaching in Physical Education*, 29, 72–84. doi:10.1123/jtpe.29.1.72
- Skinner, E. A., & Belmont, M. J. (1993). Motivation in the classroom: Reciprocal effects of teacher behavior and student engagement across the school year. *Journal of Educational Psychology*, 85, 571–581. doi:10.1037//0022-0663.85.4.571
- Skinner, E. A., Kindermann, T. A., & Furrer, C. J. (2009). A motivational perspective on engagement and disaffection: Conceptualization and assessment of children's behavioral and emotional participation in academic activities in the classroom. *Educational and Psychological Measurement*, 69, 493–525. doi:10.1177/0013164408323233
- Standage, M., Duda, J. L., & Pensgaard, A. M. (2005). The effect of competitive outcome and task-involving, ego-involving, and cooperative structures on the psychological well-being of individuals engaged in a co-ordination task: A self-determination approach. *Motivation and Emotion*, 29, 41–68. doi:10.1007/s11031-005-4415-z
- Stroet, K., Opdenakker, M.-C., & Minnaert, A. (2013). Effects of need supportive teaching on early adolescents' motivation: A review of the literature. *Educational Research Review*, 9, 65–87. doi:10.1016/j.edurev.2012.11.003
- Stroet, K., Opdenakker, M.-C., & Minnaert, A. (2015). What motivates early adolescents for school? A longitudinal analysis of associations between observed teaching and motivation. *Contemporary Educational Psychology*, 42, 129–140. doi:10.1016/j.cedpsych.2015.06.002

- Su, Y.-L., & Reeve, J. (2011). A meta-analysis of the effectiveness of intervention programs designed to support autonomy. *Educational Psychology Review*, 23, 159–188. doi:10.1007/s10648-010-9142-7
- Taylor, G., Jungert, T., Mageau, G. A., Schattke, K., Dedic, H., Rosenfield, S., & Koestner, R. (2014). A self-determination theory approach to predicting school achievement over time: The unique role of intrinsic motivation. *Contemporary Educational Psychology*, 39, 342–358. doi:10.1016/j.cedpsych.2014.08.002
- Trouilloud, D. O., Sarrazin, P. G., Martinek, T. J., & Guillet, E. (2002). The influence of teacher expectations on student achievement in physical education classes: Pygmalion revisited. *European Journal of Social Psychology*, 32, 591–607. doi:10.1002/ejsp.109
- Urhahne, D. (2011). Teachers' judgments of elementary students' ability, creativity and task commitment. *Talent Development and Excellence*, 3, 229–237.
- Urhahne, D. (2015). Teacher behavior as a mediator of the relationship between teacher judgment and students' motivation and emotion. *Teaching and Teacher Education*, 45, 73–82. doi:10.1016/j.tate.2014.09.006
- Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The academic motivation scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement*, 52, 1003–1017. doi:10.1177/0013164492052004025
- Van den Bergh, L., Denessen, E., Hornstra, L., Voeten, M., & Holland, R. W. (2010). The implicit prejudiced attitudes of teachers: Relations to teacher expectations and the ethnic achievement gap. *American Educational Research Journal*, 47, 497–527. doi:10.3102/0002831209353594
- Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration*, 23, 263–280. doi:10.1037/a0032359
- Wellborn, J. G. (1991). *Engaged and disaffected action: The conceptualisation and measurement of motivation in the academic domain* (Unpublished doctoral dissertation). University of Rochester, New York, NY.
- Wentzel, K. R., Battle, A., Russell, S. L., & Looney, L. B. (2010). Social supports from teachers and peers as predictors of academic and social motivation. *Contemporary Educational Psychology*, 35, 193–202. doi:10.1016/j.cedpsych.2010.03.002
- Wentzel, K. R., & Miele, D. B. (Eds.). (2016). *Handbook of motivation at school* (2nd ed.). New York, NY: Routledge.
- Woolley, M. E., Strutchens, M., Gilbert, M. C., & Martin, W. G. (2010). Mathematics success of black middle school students: Direct and indirect effects of teacher expectations and reform practices. *Negro Educational Review*, 61, 41–59.
- Zhao, X., Lynch, J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research*, 37, 197–206. doi:10.1086/651257
- Zhu, M., Urhahne, D., & Rubie-Davies, C. M. (2018). The longitudinal effects of teacher judgement and different teacher treatment on students' academic outcomes. *Educational Psychology*, 38, 648–668. doi:10.1080/01443410.2017.1412399