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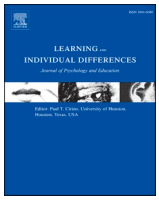

Need satisfied teachers adopt a motivating style: The mediation of teacher enthusiasm

Angelica Moè [a,*], Idit Katz [b]

[a] Department of General Psychology, University of Padua, Italy
[b] Department of Education, Ben-Gurion University of the Negev, Beer-Sheva, Israel

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ABSTRACT

Teachers' basic psychological need satisfaction or frustration are associated with their tendency to adopt a motivating or demotivating teaching style. However, the mechanisms underlying these associations remain unclear. This study examined the role played by teachers' experienced and displayed enthusiasm. Three hundred forty-one high school teachers filled in self-report questionnaires to assess basic psychological need satisfaction and frustration, experienced and displayed enthusiasm, and adoption of (de)motivating teaching styles. The results showed that experienced but not displayed enthusiasm mediated the relationship between teachers' need satisfaction and their tendency to adopt autonomy-supportive and structuring styles, and between teachers' need frustration and their tendency to adopt a chaotic style. The discussion focuses on the theoretical and practical implications.

1. Introduction

Teachers play a central role in motivating students by fostering self-efficacy (Chong et al., 2018), conveying values (e.g., Gaspard et al., 2015), fostering achievement emotions (e.g., Pekrun, 2006), transmitting adaptive beliefs (e.g., Sun, 2018), being enthusiastic (e.g., Keller et al., 2016; Lazarides et al., 2018), and adopting a motivating style (e.g., Cheon et al., 2020).

Grounded in Self-Determination Theory (SDT: Ryan & Deci, 2000; Ryan & Deci, 2017), this study aimed to achieve a better understanding of the factors prompting teachers to adopt a motivating style that satisfies their students' needs, rather than a demotivating style that frustrates them (Vansteenkiste et al., 2020). Specifically, the two motivating autonomy-supportive and structuring styles and the two demotivating controlling and chaotic styles were considered (Aelterman et al., 2019; Bartholomew et al., 2011; Vermote et al., 2020) to shed light on the mechanisms that affect teachers' adoption of a motivating style. The findings can contribute to designing interventions to enable teachers to become more supportive of their students.

Research has shown that teachers' need satisfaction leads to the adoption of a motivating style, whereas need frustration favors the adoption of a demotivating one (e.g., Aelterman et al., 2019), confirming the twofold conceptualization of a bright (motivating) and a dark (demotivating) paths of relations (Bartholomew et al., 2011; Jang et al., 2016). Other studies have examined why satisfied teachers are more supportive, whereas unsatisfied teachers tend to be more controlling or chaotic. The findings pointed to teachers' motivation and beliefs (Katz & Shahar, 2015), self-compassion (Moè & Katz, 2020), and emotion regulation (Moè & Katz, 2021) as possible mechanisms. However, these components do not fully account for the qualities nurtured by need satisfaction that give the teachers the energy to be more supportive. Thus, the current study considered the role played by teacher enthusiasm, which has yet to be investigated in this context.

1.1. The (de)motivating teaching styles

Aelterman et al. (2019) and Vermote et al. (2020) defined four teaching styles characterized by different levels of support vs. control and structure vs. chaos that teachers provide to their students. The 'autonomy-supportive' and 'structuring' styles are considered motivating, whereas the 'controlling' and 'chaotic' styles are considered demotivating.

Autonomy-supportive teachers display patience and accept expressions of affect, identify students' interests, and allow choice (e.g., Aelterman et al., 2019; Assor et al., 2002; Jang et al., 2016; Patall et al., 2010). Structuring teachers display guidance, provide help, and

* Corresponding author at: via Venezia 8, 35131 Padova, Italy.
E-mail address: angelica.moe@unipd.it (A. Moè).

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organize lessons to enable students to feel more competent (e.g., Jang et al., 2010; Vansteenkiste et al., 2012). Controlling teachers are demanding, put pressure on students, show poor understanding of students' perspectives and feelings, and may punish, or make students feel guilty or ashamed (e.g., Bartholomew et al., 2011; Soenens et al., 2012). Chaotic teachers are inconsistent in their behavior and unclear in their expectations. Recent research has pointed to the positive consequences of teacher adoption of autonomy-supportive and structuring styles and the negative consequences of controlling and chaotic styles on students' motivation and engagement (e.g., Collie et al., 2019; Garn et al., 2019).

1.2. Need satisfaction and teacher adoption of a supportive style

According to SDT, people experience wellbeing, motivation, and full functioning when they perceive their basic psychological needs for competence (feeling able to do what is required), autonomy (having the possibility to choose and do meaningful things), and relatedness (feeling supported and respected) are satisfied. A bulk of research has shown that teacher autonomy-support favors a range of student outcomes (e.g., Haerens et al., 2015; Reeve, 2016; Soenens et al., 2012; for a review see Ryan & Deci, 2020).

At the same time, the importance of "supporting the supporters" (Katz, Kaplan, & Buzukashvily, 2011) has been emphasized. To be able to support student needs, teachers also need to feel that their own needs are met (Roth et al., 2007). This experience of need satisfaction acts as an internal resource for motivation and energy (Chen et al., 2015) that enhances teachers' ability to be supportive (Aelterman et al., 2019; Moè & Katz, 2020; Moè & Katz, 2021; Van den Berghe et al., 2014).

While teacher need satisfaction and frustration are related to their motivating style (e.g., Aelterman et al., 2019), little is known about the mechanisms shaping these relations. Previous research has found that a range of factors are related to teacher perceived need satisfaction/frustration. For example, self-compassion/derogation was shown to shape the level of need satisfaction/frustration (Moè & Katz, 2020). Burnout and emotional cognitive reappraisal (Moè & Katz, 2020; Moè & Katz, 2021) were found to mediate, whereas suppression was found to moderate. Hence, this study explored the role played by teacher enthusiasm as a mediating factor.

1.3. Teacher enthusiasm

Teacher enthusiasm has been conceptualized as (a) an enthusiastic behavioral display, characterized by verbal and nonverbal bodily and facial expressions of high energy and involvement (e.g., Collins, 1978: displayed enthusiasm), or (b) self-reported positive affect and felt enthusiasm for teaching or the subject taught (Keller et al., 2016; Kunter et al., 2008; Kunter et al., 2011: experienced enthusiasm). In most cases these two kinds of enthusiasm converge, in that teachers feel enthusiastic and their behavior is considered to express 'authentic enthusiasm' (Keller et al., 2014, 2018; Taxer & Frenzel, 2018). At times however, teachers may produce superficial displays of enthusiasm which they do not actually feel (externalized or pretended enthusiasm). Alternatively, they may feel enthusiastic but not show it (internalized enthusiasm). For instance, in a study of teacher lesson diaries and student evaluations, Keller et al. (2018) found that teachers expressed authentic enthusiasm 64 % of the time, faked enthusiasm 22 % of the time, and felt unexpressed enthusiasm 10 % of the time. Similar percentages were found by Taxer and Frenzel (2018): 69 % of the time teachers were authentically enthusiastic.

These authentic expressions of enthusiasm have been shown to lead to increased enjoyment, and decreased boredom in students (Keller et al., 2018) as well as to increased teacher self-efficacy and job satisfaction and decreased teacher anger and anxiety (Taxer & Frenzel, 2018).

By contrast, faking enthusiasm can result in teacher burnout (Taxer & Frenzel, 2018) and negatively affect student achievement (Keller et al., 2018) and teacher wellbeing (Burić, 2019). Studies examining the specific and shared effects of experienced and displayed enthusiasm have found that experienced enthusiasm is much more beneficial than displayed enthusiasm and was associated with students' intrinsic motivation (e.g., Lazarides et al., 2018), positive affect (Frenzel et al., 2009; Frenzel et al., 2018), and learning (Kunter et al., 2013; Moè, Frenzel, Au, & Taxer, 2021).

In this study, we considered both experienced and displayed enthusiasm, by hypothesizing that experienced enthusiasm plays a major role.

1.4. Enthusiasm as a mediator

Previous research has examined a range of factors that make teachers feel enthusiastic. These include beliefs as to what characterizes an effective teacher (Sutton, 2004), teacher self-efficacy and job satisfaction (Burić & Moè, 2020; Kunter et al., 2008, 2011, 2013), positive affect (e.g., Frenzel et al., 2009), emotional labor (e.g., Burić, 2019), and interacting with motivated students (e.g., Frenzel et al., 2018).

However, need satisfaction has been neglected as a factor, nevertheless being considered as an "energizer" that leads to an overall experience of positive affect (e.g., Stanley et al., 2021) and increased vitality (Chen et al., 2015; Vansteenkiste et al., 2020), which are likely to favor teacher experienced enthusiasm (Burić & Moè, 2020). Conversely, perceived frustration of these three needs, which implies mostly negative rather than positive affect, reduces vitality levels and emotional resources (Moller et al., 2006), and can prompt teachers to be less enthusiastic. To the best of our knowledge, only Aldrup et al. (2017) have examined teacher perceived need satisfaction as a factor leading to increased enthusiasm. They conducted a diary study with novice teachers by asking them to record the extent to which they perceived their needs to have been satisfied, and their levels of enthusiasm and emotional exhaustion over a period of 10 working days. The results showed that perceived satisfaction of the needs for competence and relatedness led to increased enthusiasm and decreased emotional exhaustion over time. However, they did not examine need frustration.

Previous research found that enthusiasm for teaching leads to increased instructional quality (e.g., Cui et al., 2017; Frommelt et al., 2021; Gaspard & Lauermann, 2021; Kunter et al., 2008). Kunter et al. (2008) found that both teachers and students perceive an enthusiastic teacher as more cognitively challenging, monitoring and supportive. Cui et al. (2017) found that student-rated teacher enthusiasm was associated with perceived autonomy support and led to decreased student boredom. In a longitudinal study, Frommelt et al. (2021) found that perceived teacher enthusiasm predicted subsequent student perception of autonomy, competence and social relatedness which in turn led to increased student motivation, suggesting that teachers were successful in motivating (e.g., they adopted a motivating style). Gaspard and Lauermann (2021) reported strong and consistent relationships across five lessons between teacher enthusiasm and student engagement, suggesting that a motivational climate had been established. Moreover, teacher enthusiasm has been shown to increase a variety of student factors, which suggests that it associated with a stimulating and supportive style that favor student interest (Keller et al., 2014), vitality (Patrick et al., 2000b), recall, and absorption (Moè, 2016), achievement emotions (Taxer & Frenzel, 2018), student positive affect and intrinsic motivation (Burić, 2019; Lazarides et al., 2018; Zhang, 2014), as well as teacher wellbeing (Keller et al., 2018) and creativity (Huang et al., 2021). Finally, research within the framework of Self-Determination Theory (SDT) has extensively demonstrated that the adoption of a supportive style requires emotional resources (e.g., Reeve, 2009, 2016) and that emotionally exhausted teachers tend to adopt the controlling or chaotic modalities (e.g., Roth et al., 2007). In particular, the adoption of emotional reappraisal modalities instead of suppression has been shown to play a central role. Need satisfaction favors reappraisal leading to adopt a more motivating style. By contrast, need frustration leads to preferring less effective suppressive emotion regulation strategies, thus

favoring the adoption of chaotic or controlling demotivating modalities.

However, none of these studies considered teacher need satisfaction/frustration, teacher enthusiasm, and the adoption of motivating or demotivating styles altogether.

Based on this literature, we predicted that the more teachers perceive their needs to be satisfied; i.e., the more they feel supported, capable and autonomous, the higher their enthusiasm. By contrast, the more they perceive need frustration; i.e., the sense of not to be capable enough, or supported and confronted with a narrow set of possibilities to choose from, the lower their positive affect and vitality and hence enthusiasm.

In turn, enthusiasm, which is an emotional resource (Keller et al., 2016) and which is naturally characterized by expressions of vitality (Collins, 1978; Patrick et al., 2020a) may enable teachers to have the energy to adopt a supportive teaching style.

Further, experienced enthusiasm, more than simply displayed enthusiasm, is likely to play a major role, because it refers to an emotional state that should support the adoption of a motivating style, whereas displayed enthusiasm consists in a set of behaviors that does not reflect genuine enthusiasm.

Overall, we argued that the more teachers feel connected, capable and able to choose, the more they will experience positive affect, including enthusiasm. We reasoned that this positive affect should instill the vitality/energy needed to be supportive with students through the adoption of a motivating style. Conversely, we reasoned that when teachers experience a sense of detachment, hostility or conflict, and sense that they cannot choose, be autonomous and/or perceive lack of competence in facing the challenges of teaching, they will have fewer resources to draw on, express lower levels of positive affect (and enthusiasm) and higher negative affect. As a result, they will not have the energy or the vitality to adopt a motivating style and instead may prefer a controlling or chaotic one.

1.5. Aims and hypotheses

This study assessed the mediating role of teacher displayed and experienced enthusiasm in the association between need satisfaction/frustration and the adoption of (de)motivating styles. We posited that the more teachers report their needs to be satisfied, the more they will experience and display enthusiasm and in turn, adopt a motivating style. By contrast, the more teachers perceive their needs to be frustrated, the less they will experience and display enthusiasm, and may thus adopt more a controlling or a chaotic style. In assessing these relationships, we controlled for social desirability, which has been shown to be associated with teachers' tendency to report the adoption of a (de)motivating style (e.g., Aelterman et al., 2019).

The following hypotheses were formulated:

H1. Need satisfaction will be positively associated with the adoption of autonomy-supportive and structuring styles, whereas need frustration will be associated with controlling and chaotic styles.

H2. Teacher enthusiasm will be positively associated with need satisfaction, and autonomy-supportive and structuring styles, and negatively with need frustration, and controlling and chaotic styles.

H3. Experienced enthusiasm, to a greater extent than displayed enthusiasm, will mediate the association between teachers' need satisfaction and their tendency to use autonomy-supportive and structuring styles and between teachers' need frustration and their tendency to use controlling and chaotic styles.

2. Method

2.1. Participants

A convenience sample of 341 Italian high school teachers took part in this study (aged $M = 49.60$, $SD = 10.14$, 108–32 % males). They taught Italian, history or geography (33 %), mathematics or sciences (18 %), second language (13 %), technical subjects (14 %), music (8 %), physical education (4 %), and religion (2 %). Eight percent were assistant teachers.

2.2. Procedure

The local Ethics Committee approved this study (Protocol number 3711). A large number of high school teachers were contacted by e-mail and social networks and asked to take part in a study on teacher motivation and wellbeing. After signing the informed consent, the participants filled in an online survey containing the measures listed below, followed by a few demographic questions. Teachers interested in receiving tips on ways for motivating and the study's main results were asked to provide their e-mail addresses (72 % percent did so).

2.3. Measures

2.3.1. Basic need satisfaction and frustration

The Italian validation by Costa et al. (2018) of the Basic Psychological Need Satisfaction and Frustration Scale (BPNSNF: Chen et al., 2015) was used. This scale consists of 24 items. Participants are asked to rate their experiences of need satisfaction (example item: 'I feel that my decisions reflect what I want') and need frustration (example item: 'I feel pressured to do too many things') at school on a 5-point Likert scale (1 = completely disagree, 5 = completely agree). In line with most studies in the SDT perspective (e.g., Benita et al., 2020; Holding et al., 2020; Warburton et al., 2020) and after having controlled for the equivalence of the two-factor and the six-factor solutions (both models had the same CFIs and RMSEAs, $\Delta \chi^2$ ns), we preferred the model with more degrees of freedom; that is, the 2-factor solution and computed two scores by averaging the 12 items related to each subscale.

2.3.2. Experienced enthusiasm

This was assessed on the Kunter et al. (2008) scale, which consists of 4 items examining teachers' experience of enthusiasm to teach ('I teach my subject with great enthusiasm' and 'I really enjoy teaching the subject I teach') and for the subject they teach ('I am still enthusiastic about the subject I teach' and 'I find the subject I teach exciting and try to convey my enthusiasm to the students') to be rated on a 4-point scale ranging from 1 = strongly disagree to 4 = strongly agree. As done by Burić (2019), a single score was computed by averaging the four items.

2.3.3. Displayed enthusiasm

This was conceptualized as enthusiastic teaching behavior (Collins, 1978), and assessed with five items taken from Murray (1983). The exact wording was: 'When I teach (a) I gesticulate; (b) I move around the classroom; (c) I change my tone of voice; (d) I change my facial expressions; (e) I'm overall alive, to be rated on a 7-point Likert scale (anchoring points 1 = never to 7 = always)'. A single score was computed by averaging the five items.

2.3.4. (De)motivating teaching styles

These were assessed using the Situations In School (SIS) questionnaire (Aelterman et al., 2019) in the Italian validation (Moè, Consiglio, & Katz, 2022). This questionnaire presents 15 school situations (e.g., "You would like to motivate students during class. You decide to …".) followed by the description of potential behaviors corresponding to the four (de)motivating styles: autonomy-supportive (e.g., 'Identify what the personal benefits of the learning material are for students' everyday life'), structure (e.g., 'Offer help and guidance'), control (e.g., 'Pound the desk and say loudly: "Now it is time to pay attention"'), and chaos (e.g., 'Minimize the lesson plan; let what happens happen in the lesson'). Participants are asked to rate each item on a 7-point Likert scale ranging from 1 = does not describe me at all to 7 = describes me extremely well. Four scores were calculated by averaging the 15 items referring to each

style.

2.3.5. Social desirability

This was assessed using the Self-Deceptive Enhancement subscale (SDE) of the Balanced Inventory of Desirable Responding (BIDR: Paulhus, 1991) in the Italian validation by Bobbio and Manganelli (2011). It presents eight items (e.g., 'Once I've made up my mind, other people can seldom change my opinion') to be rated on a 6-point Likert scale anchored at 1 = strongly disagree to 6 = strongly agree.

See Table 1 for the Cronbach alphas of all measures.

2.3.6. Data analysis

First, descriptive statistics were run. Then, to test H1 and H2, the inter-correlations among the study variables were calculated. Finally, to test H3, we conducted multivariate mediation analyses using PROCESS model 4 (Hayes, 2009, 2012).

3. Analyses and results

3.1. Descriptive statistics and correlations

Table 1 reports the mean values, standard deviations, and intercorrelations among variables. We conducted a confirmatory factor analysis (CFA) to test the convergence of the items assessing experienced and displayed enthusiasm into different factors. The measurement model was composed of 5 manifested items pertaining to displayed teacher enthusiasm and 4 manifested items pertaining to experienced teacher enthusiasm. The results indicated an adequate fit to the data, $\chi^2(26) = 110.86$, $p < .001$, *NFI* = 0.92, *CFI* = 0.94, *RMSEA* = 0.08. Loadings onto their respective factors were strong and statistically significant. They ranged from 0.49 to 0.89 (see Table 2), which validated the measurement model, suggesting that experienced and displayed enthusiasm are two distinct constructs.

Supporting H1, teacher need satisfaction was positively associated with adoption of the autonomy-supportive and structuring styles. In contrast, need frustration was positively associated with the controlling and chaotic styles. As a confirmation of H2, experienced and displayed teacher enthusiasm were positively associated with need satisfaction, autonomy-supportive, and structuring styles, and negatively associated with need frustration, and controlling and chaotic styles. Teacher displayed enthusiasm showed a low positive association with the autonomy-supportive style, a negative association with the chaotic style, and no association with the structuring and controlling styles. Years of teaching correlated at $p < .05$ with need frustration and the adoption of a structuring style. These correlations were small in magnitude and related to 2 out of the 8 variables. Hence, years of teaching was not controlled for when testing the model.

Table 2
CFA results.

	Item	*β*	*B*	*S.E.*	*C.R.*	*p*
Displayed enthusiasm	1	0.49	0.72	0.13	6.37	<.001
	2	0.60	1.29	0.17	7.40	<.001
	3	0.77	1.35	0.16	8.21	<.001
	4	0.80	1.30	0.16	8.29	<.001
	5	0.58	0.86	0.12	7.22	<.001
Experienced enthusiasm	1	0.77	1.37	0.13	8.32	<.001
	2	0.86	0.91	0.05	16.78	<.001
	3	0.89	1.07	0.06	17.45	<.001
	4	0.81	0.89	0.06	15.80	<.001

3.2. Testing the mediation model

Two multivariate mediation analyses were conducted to investigate the hypothesis that experienced and displayed enthusiasm would mediate the effect of teacher need satisfaction on the autonomy-supportive and structuring styles. Two other multivariate mediation analyses investigated the hypothesis that experienced and displayed enthusiasm would mediate the effects of teacher need frustration on the controlling and chaotic styles. All four models were controlled for social desirability to test the variables' unique contribution over and above the contribution of social desirability. We used PROCESS model 4 (Hayes, 2009, 2012) to test the proposed mediations. To test the indirect effects, we used bootstrapping methods with 5000 bootstrap samples and 95 % confidence intervals.

The results revealed that teacher need satisfaction was positively associated with experienced [$\beta = 0.41$, $B = 0.42$, $SE = 0.05$, $t(340) = 8.12$, $p < .001$] and displayed enthusiasm [$\beta = 0.25$, $B = 0.45$, $SE = 0.09$, $t(340) = 4.75$, $p < .001$]. However, only experienced enthusiasm was significantly related to the autonomy-supportive [$\beta = 0.17$, $B = 0.27$, $SE = 0.09$, $t(340) = 4.46$, $p < .001$] and structuring [$\beta = 0.24$, $B = 0.35$, $SE = 0.07$, $t(340) = 4.48$, $p < .001$] styles. Teacher need satisfaction was positively associated with the autonomy-supportive [$\beta = 0.25$, $B = 0.42$, $SE = 0.09$, $t(340) = 4.48$, $p < .001$] and structuring styles [$\beta = 0.27$, B = 0.41, $SE = 0.08$, $t(340) = 5.05$, $p < .001$]. The higher the teacher need satisfaction, the higher the experienced enthusiasm, which, in turn, related to the adoption of the autonomy-supportive and structuring styles. The models explained 11.1 % of the autonomy-supportive variance ($R^2 = 0.11$) and 16.6 % of the structural variance ($R^2 = 0.16$). Thus, the analyses confirmed our mediation hypotheses, that teacher experienced enthusiasm partly mediated the association between their needs satisfaction and adoption of the autonomy-supportive styles, indirect effect = 0.11, 95 % CI [0.03, 0.20] and structuring, indirect effect = 0.14, 95 % CI [0.07, 0.22] (see Fig. 1, panels a and b). However, the mediation of displayed enthusiasm on the association between teacher need satisfaction and autonomy-supportive and structuring styles was

Table 1
Partial correlations among the study variables and descriptive statistics.

Variable	rSDE	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Need satisfaction	0.31**	–								
2. Need frustration	−0.20**	−0.49**	–							
3. Experienced enthusiasm	0.18*	0.38**	−0.15*	–						
4. Displayed enthusiasm	0.10	0.22**	−0.24**	0.21**	–					
5. Autonomy supportive	0.18*	0.30**	0.02	0.26**	0.13*	–				
6. Structuring	0.27**	0.33**	−0.02	0.33**	0.09	0.75**	–			
7. Controlling	0.03	−0.10	0.25**	−0.13*	−0.10	−0.11*	−0.01	–		
8. Chaotic	−0.02	−0.16*	0.27**	−0.25**	−0.19**	−0.17*	−0.33**	0.40**	–	
9. Years of teaching	0.05	0.03	0.11*	−0.01	−0.04	0.09	0.13*	−0.01	0.08	–
M	3.83	3.75	2.20	3.60	5.94	5.11	5.60	3.38	2.18	20.33
SD	0.79	0.52	0.63	0.54	0.94	0.86	0.77	0.97	0.71	11.52
Cronbach α	0.73	0.83	0.84	0.90	0.78	0.85	0.86	0.86	0.79	–

$n = 341$, *SDE* = Self-Deceptive Enhancement (social desirability).
** $p < .001$.
* $p < .05$.

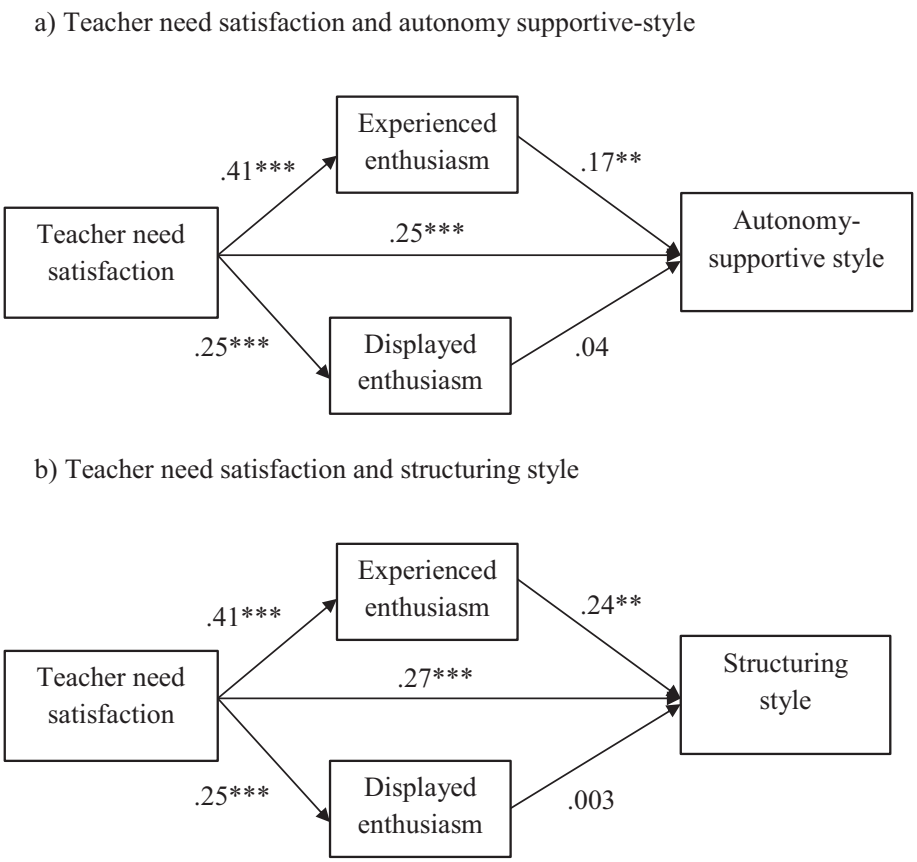

Fig. 1. Results of the multivariate analyses investigating the mediation of experienced and displayed enthusiasm while controlling for SDE.
Panel a. Teacher need satisfaction and autonomy supportive-style.
Panel b. Teacher need satisfaction and structuring style.
Panel c. Teacher need frustration and chaotic style.
*$p < .05$, **$p < .01$, ***$p < .001$

not significant.

In addition, teacher need frustration was negatively associated with experienced [$\beta = -0.18$, $B = -0.15$, $SE = 0.05$, $t(340) = -3.30$, $p = .001$] and displayed enthusiasm [$\beta = -0.27$, $B = -0.40$, $SE = 0.08$, $t(340) = -5.06$, $p < .001$]. Only experienced enthusiasm was negatively associated with the chaotic style [$\beta = -0.19$, $B = -0.25$, $t(340) = -3.59$, $p < .001$]. Teacher need frustration was positively associated with the chaotic style [$\beta = 0.18$, $B = 0.21$, $SE = 0.06$, $t(340) = 3.43$, $p < .001$]. The higher the need frustration, the lower the experienced enthusiasm, which, in turn, was related to the adoption of a chaotic style. The models explained 6 % of the controlled style variance ($R^2 = 0.06$) and 8 % of the chaotic style variance ($R^2 = 0.08$). Teacher experienced enthusiasm partially mediated the association between need frustration and adoption of a chaotic style, indirect effect = 0.04, 95 % CI [0.006, 0.08] (see Fig. 1, panel c). However, the mediation of displayed enthusiasm on the association between teacher need frustration and controlling and chaotic styles, and the mediation of experienced enthusiasm on the association between teacher need frustration and a controlling style were not significant.

4. Discussion

This study explored the role played by teacher need satisfaction and enthusiasm in favoring the adoption of a motivating style characterized

by autonomy support and the provision of a structure, and teacher need frustration in reducing enthusiasm and favoring the adoption of a demotivating style. The results confirmed that (a) need satisfaction related to the adoption of the autonomy-supportive and structuring styles, whereas need frustration was associated with both the chaotic and the controlling styles, and (b) teacher experienced but not displayed enthusiasm mediated this set of relationships.

This pattern of relationships confirms the twofold conceptualization of enthusiasm as an inner emotional experience or as a set of displayed behaviors (Keller et al., 2016). The results also showed that experienced, but not displayed enthusiasm mediated the relationship between need satisfaction and the adoption of the autonomy-supportive and structuring styles and between need frustration and adoption of a chaotic style. These results reinforce previous findings differentiating between the potential positive effects of teacher experienced enthusiasm as a source of energy, vitality and positive affect (Vansteenkiste et al., 2020). Displaying enthusiasm without experiencing it might be the result of suppressing or "faking" emotions (i.e. showing an emotion different from that really felt), and can result in more emotional labor (Grandey, 2000), which can impact the teachers' ability to provide students with a coherent, stable, and organized learning environment (Burić, 2019). Need satisfaction may thus provide the energy and the positive affect needed to truly experiencing enthusiasm, hence favoring adoption of motivating styles.

These results also support the differentiation within SDT between a bright and a dark path of motivation (Bartholomew et al., 2011; Jang et al., 2016). Within the "bright path", the results fully confirmed our hypotheses and previous studies (e.g., Aelterman et al., 2019; Vansteenkiste et al., 2020), that teacher need satisfaction is a source of positive affect. In this study, this energy fueled their experienced enthusiasm as well as their tendency to use the autonomy-supportive and structuring styles.

As about the "dark path", the results confirmed that teacher need frustration negatively related to both experienced and displayed enthusiasm. This is consistent with previous studies suggesting that frustration of basic psychological needs is an "ego depleting" experience which is associated with negative emotions, ill-being and lack of energy (Vansteenkiste & Ryan, 2013). However, teachers who experienced need frustration did not adopt more controlling styles toward their students, unlike in previous studies (e.g. Pelletier et al., 2002). This was surprising and made it impossible to assess the mediation hypothesis between need frustration and the controlling style. One explanation is that in addition to internal pressures (e.g., teacher need frustration, traits, beliefs), the adoption of controlling modalities may also depend on a range of contextual factors we could not assess, such as pressure from above (e.g., organizational duties, deadlines, the principal's demands) and below (e.g., disruptive or disengaged students) that could have led to adopt controlling modalities irrespective of the need frustration level (Reeve, 2009).

The two significant mediation effects of experienced enthusiam for the autonomy-supportive and structuring style imply that in order to help teachers adopt a supportive style, efforts *should not* be directed toward advising them to *display* enthusiasm but rather to favor *truly experienced* enthusiasm. This leads to the issue of what should be done to favor teacher experienced enthusiasm. The positive relationship between teacher need satisfaction and experienced enthusiasm and the negative association between teacher need frustration and enthusiasm suggests that supporting teachers' needs may be a potential way to achieve this goal. Specifically, while a teacher cannot be taught or instructed to feel more enthusiastic, favoring perceived need satisfaction is a way to help teachers feel enthusiastic and thus adopt a motivating style characterized by more support and less chaos. Supporting teacher needs will help them to be more enthusiastic about the subjects they teach and teaching in general.

The significant mediation of experienced enthusiasm for the chaotic style suggests that to curb the tendency to adopt this style, it would be useful to reduce teacher need frustration which in turn would free up more resources to experience enthusiasm. This goal could be achieved by favoring teacher competence, autonomy and the experience of connections in the workplace.

4.1. Limitations and future avenues

First, this study was based solely on self-reports. While it has been demonstrated that self-reported displayed enthusiasm relates to students' perceptions (Taxer & Frenzel, 2018), self-serving perspective bias can affect the scores: student or external observer ratings could complement this assessment in future research. Second, our design was correlational, which prevents drawing causal inferences. We speculated that need satisfaction might act as an energizer favoring teacher enthusiasm. However, the other direction is also possible: experienced enthusiasm could lead teachers to perceive their needs as more satisfied and less frustrated. A longitudinal design could disentangle the causality question. Third, only a single time point was considered, although it is well-known that the level of enthusiasm may vary from lesson to lesson (Keller et al., 2018) and perceived need satisfaction and need frustration may also change over time (Aldrup et al., 2017). Future studies could include assessments at more time points to confirm and extend the results obtained here. Fourth, individual differences due to years of teaching or gender were not assessed. Years of teaching related with small r values, to only 2 out of the 8 variables and in this sample only 32 % of the teachers were male, thus making it difficult to assess gender differences. However, these factors may moderate these relationships and should be included in future studies with samples of male/female teachers who could perhaps be differentiated into novice and experienced teachers to reduce the span of years. Fifth, in this study we only considered the overall experience of need satisfaction/frustration. Future studies should assess the unique contribution of each of the three needs satisfaction/frustration to achieve a deeper understanding of which needs play a major role, as done in previous research (e.g., Abós et al., 2018). Finally, we decided to focus on high school teachers. Future research could also consider primary and middle school teachers.

4.2. Educational implications

There is a general consensus that being enthusiastic is an effective instructional tool (e.g., Sutton, 2004). The results both here and in previous research on authentic enthusiasm (e.g., Keller et al., 2018; Taxer & Frenzel, 2018) seem to suggest that experienced rather than displayed enthusiasm is the key variable, which ultimately favors the adoption of a motivating style. Thus, interventions for teachers should favor the experience of enthusiasm, which could lead to naturally displaying enthusiasm, rather than teaching and modeling the adoption of a set of instructional behaviors. One way to reach this goal would be to favor need satisfaction and reduce need frustration. This could be fostered in a supportive rather than pressuring school climate (e.g., Pelletier & Sharp, 2009; Reeve, 2009) and by the adoption of autonomy supportive trainings (for a review, see Reeve & Cheon, 2021). At the same time, teachers could be advised of the negative consequences of not expressing or faking emotions on their personal wellbeing and student outcomes.

Declaration of competing interest

The authors declare that they have no conflict of interest.

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References

Abós, Á., Haerens, L., Sevil, J., Aelterman, N., & García-González, L. (2018). Teachers' motivation in relation to their psychological functioning and interpersonal style: A variable-and person-centered approach. *Teaching and Teacher Education, 74*, 21–34. https://doi.org/10.1016/j.tate.2018.04.010

Aelterman, N., Vansteenkiste, M., Haerens, L., Soenens, B., Fontaine, J. R., & Reeve, J. (2019). Toward an integrative and fine-grained insight in motivating and de-motivating teaching styles: The merits of a circumplex approach. *Journal of Educational Psychology, 111*, 497–521. https://doi.org/10.1037/edu0000293

Aldrup, K., Klusmann, U., & Lüdtke, O. (2017). Does basic need satisfaction mediate the link between stress exposure and wellbeing? A diary study among beginning teachers. *Learning and Instruction, 50*, 21–30. https://doi.org/10.1016/j.learninstruc.2016.11.005

Assor, A., Kaplan, H., & Roth, G. (2002). Choice is good, but relevance is excellent: Autonomy-enhancing and suppressing teacher behaviors predicting students' engagement in schoolwork. *British Journal of Educational Psychology, 72*, 261–278. https://doi.org/10.1348/000709902158883

Bartholomew, K. J., Ntoumanis, N., Ryan, R. M., Bosch, J. A., & Thøgersen-Ntoumani, C. (2011). Self-determination theory and diminished functioning: The role of interpersonal control and psychological need thwarting. *Personality and Social Psychology Bulletin, 37*, 1459–1473. https://doi.org/10.1177/0146167211413125

Benita, M., Benish-Weisman, M., Matos, L., & Torres, C. (2020). Integrative and suppressive emotion regulation differentially predict well-being through basic need satisfaction and frustration: A test of three countries. *Motivation and Emotion, 44*, 67–81. https://doi.org/10.1007/s11031-019-09781-x

Bobbio, A., & Manganelli, A. M. (2011). Measuring social desirability responding. A short version of Paulhus' BIDR 6. *Testing, Psychometrics Methodology in Applied Psychology, 18*, 117–135.

Burić, I. (2019). The role of emotional labor in explaining teachers' enthusiasm and students' outcomes: A multilevel mediational analysis. *Learning and Individual Differences, 70*, 12–20. https://doi.org/10.1016/j.lindiff.2019.01.002

Burić, I., & Moè, A. (2020). What makes teachers enthusiastic: The interplay of positive affect, self-efficacy and job satisfaction. *Teaching and Teacher Education, 89*, Article 103008. https://doi.org/10.1016/j.tate.2019.103008

Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Van der Kaap-Deeder, J., & Verstuyf, J. (2015). Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motivation and Emotion, 39*, 216–236. https://doi.org/10.1007/s11031-014-9450-1

Cheon, S. H., Reeve, J., & Vansteenkiste, M. (2020). When teachers learn how to provide classroom structure in an autonomy-supportive way: Benefits to teachers and their students. *Teaching and Teacher Education, 90*, Article 103004. https://doi.org/10.1016/j.tate.2019.103004

Chong, W. H., Liem, G. A. D., Huan, V. S., Kit, P. L., & Ang, R. P. (2018). Student perceptions of self-efficacy and teacher support for learning in fostering youth competencies: Roles of affective and cognitive engagement. *Journal of Adolescence, 68*, 1–11. https://doi.org/10.1016/j.adolescence.2018.07.002

Collie, R. J., Granziera, H., & Martin, A. J. (2019). Teachers' motivational approach: Links with students' basic psychological need frustration, maladaptive engagement, and academic outcomes. *Teaching and Teacher Education, 86*, Article 102872. https://doi.org/10.1016/j.tate.2019.07.002

Collins, M. L. (1978). Effects of enthusiasm training on preservice elementary teachers. *Research in Teacher Education, 29*, 53–57.

Costa, S., Ingoglia, S., Inguglia, C., Liga, F., Lo Coco, A., & Larcan, R. (2018). Psychometric evaluation of the basic psychological need satisfaction and frustration scale (BPNSFS) in Italy. *Measurement and Evaluation in Counselling and Development, 51*, 193–206. https://doi.org/10.1080/07481756.2017.1347021

Cui, G., Yao, M., & Zhang, X. (2017). The dampening effects of perceived teacher enthusiasm on class-related boredom: The mediating role of perceived autonomy support and task value. *Frontiers in Psychology, 8*, 400. https://doi.org/10.3389/fpsyg.2017.00400

Frenzel, A. C., Becker-Kurz, B., Pekrun, R., Goetz, T., & Lüdtke, O. (2018). Emotion transmission in the classroom revisited: A reciprocal effects model of teacher and student enjoyment. *Journal of Educational Psychology, 110*, 628–639. https://doi.org/10.1037/edu0000228

Frenzel, A. C., Goetz, T., Lüdtke, O., Pekrun, R., & Sutton, R. E. (2009). Emotional transmission in the classroom: Exploring the relationship between teacher and student enjoyment. *Journal of Educational Psychology, 101*, 705–716. https://doi.org/10.1037/a0014695

Frommelt, M., Schiefele, U., & Lazarides, R. (2021). Teacher enthusiasm, supportive instructional practices, and student motivation in mathematics classrooms. *Interdisciplinary Education and Psychology, 2*, 1–5.

Garn, A. C., Morin, A. J., & Lonsdale, C. (2019). Basic psychological need satisfaction toward learning: A longitudinal test of mediation using bifactor exploratory structural equation modeling. *Journal of Educational Psychology, 111*, 354–372. https://doi.org/10.1037/edu0000283

Gaspard, H., Dicke, A. L., Flunger, B., Brisson, B. M., Häfner, I., Nagengast, B., & Trautwein, U. (2015). Fostering adolescents' value beliefs for mathematics with a relevance intervention in the classroom. *Developmental Psychology, 51*, 1226–1240. https://doi.org/10.1037/dev0000028

Gaspard, H., & Lauermann, F. (2021). Emotionally and motivationally supportive classrooms: A state-trait analysis of lesson-and classroom-specific variation in teacher-and student-reported teacher enthusiasm and student engagement. *Learning and Instruction, 75*, Article 101494. https://doi.org/10.1016/j.learninstruc.2021.101494

Grandey, A. A. (2000). Emotional regulation in the workplace: A new way to conceptualize emotional labor. *Journal of Occupational Health Psychology, 5*, 95–110. https://doi.org/10.1037/1076-8998.5.1.95

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*, 26–36. https://doi.org/10.1016/j.psychsport.2014.08.013

Hayes, A. F. (2009). Beyond baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs, 76*, 408–420. https://doi.org/10.1080/03637750903310360

Hayes, A. F. (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling. [White paper]. Retrieved from http://www.afhayes.com/public/process2012.pdf.

Holding, A. C., St-Jacques, A., Verner-Filion, J., Kachanoff, F., & Koestner, R. (2020). Sacrifice—but at what price? A longitudinal study of young adults' sacrifice of basic psychological needs in pursuit of career goals. *Motivation and Emotion, 44*, 99–115. https://doi.org/10.1007/s11031-019-09777-7

Huang, X., Chin-Hsi, L., Mingyao, S., & Peng, X. (2021). What drives teaching for creativity? Dynamic componential modelling of the school environment, teacher enthusiasm, and metacognition. *Teaching and Teacher Education, 107*, Article 103491. https://doi.org/10.1016/j.tate.2021.103491

Jang, H., Kim, E. J., & Reeve, J. (2016). Why students become more engaged or more disengaged during the semester: A self-determination theory dual-process model. *Learning and Instruction, 43*, 27–38. https://doi.org/10.1016/j.learninstruc.2016.01.002

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. https://doi.org/10.1037/a0019682

Keller, M. M., Goetz, T., Becker, E. S., Morger, V., & Hensley, L. (2014). Feeling and showing: A new conceptualization of dispositional teacher enthusiasm and its relation to students' interest. *Learning and Instruction, 33*, 29–38. https://doi.org/10.1016/j.learninstruc.2014.03.001

Katz, I., Kaplan, A., & Buzukashvily, T. (2011). The role of parents' motivation in students' autonomous motivation for doing homework. *Learning and Individual Differences, 21*, 376–386. https://doi.org/10.1016/j.lindif.2011.04.001

Katz, I., & Shahar, B. H. (2015). What makes a motivating teacher? Teachers' motivation and beliefs as predictors of their autonomy-supportive style. *School Psychology International, 36*, 575–588. https://doi.org/10.1177/0143034315609969

Keller, M. M., Becker, E. S., Frenzel, A. C., & Taxer, J. L. (2018). When teacher enthusiasm is authentic or inauthentic: Lesson profiles of teacher enthusiasm and relations to students' emotions. *AERA Open, 4*. https://doi.org/10.1177/2332858418782967, 2332858418782967.

Keller, M. M., Hoy, A. W., Goetz, T., & Frenzel, A. C. (2016). Teacher enthusiasm: Reviewing and redefining a complex construct. *Educational Psychology Review, 28*, 743–769. https://doi.org/10.1007/s10648-015-9354-y

Kunter, M., Frenzel, A., Nagy, G., Baumert, J., & Pekrun, R. (2011). Teacher enthusiasm: Dimensionality and context specificity. *Contemporary Educational Psychology, 36*, 289–301. https://doi.org/10.1016/j.cedpsych.2011.07.001

Kunter, M., Klusmann, U., Baumert, J., Richter, D., Voss, T., & Hachfeld, A. (2013). Professional competence of teachers: Effects on instructional quality and student development. *Journal of Educational Psychology, 105*, 805–820. https://doi.org/10.1037/a0032583

Kunter, M., Tsai, Y. M., Klusmann, U., Brunner, M., Krauss, S., & Baumert, J. (2008). Students' and mathematics teachers' perceptions of teacher enthusiasm and instruction. *Learning and Instruction, 18*, 468–482. https://doi.org/10.1016/j.learninstruc.2008.06.008

Lazarides, R., Buchholz, J., & Rubach, C. (2018). Teacher enthusiasm and self-efficacy, student-perceived mastery goal orientation, and student motivation in mathematics classrooms. *Teaching and Teacher Education, 69*, 1–10. https://doi.org/10.1016/j.tate.2017.08.017

Moè, A. (2016). Does displayed enthusiasm favour recall, intrinsic motivation and time estimation? *Cognition and Emotion, 30*, 1361–1369. https://doi.org/10.1080/02699931.2015.106148

Moè, A., Consiglio, P., & Katz, I. (2022). Exploring the circumplex model of motivating and demotivating teaching styles: The role of teacher need satisfaction and need frustration. *Teaching and Teacher Education, 118*, Article 103823. https://doi.org/10.1016/j.tate.2022.103823

Moè, A., Frenzel, A. C., Au, L., & Taxer, J. L. (2021). Displayed enthusiasm attracts attention and improves recall. *British Journal of Educational Psychology, 91*, 911–927. https://doi.org/10.1111/bjep.12399

Moè, A., & Katz, I. (2020). Self-compassionate teachers are more autonomy supportive and structuring whereas self-derogating teachers are more controlling and chaotic: The mediating role of need satisfaction and burnout. *Teaching and Teacher Education, 96*, Article 103173. https://doi.org/10.1016/j.tate.2020.103173

Moè, A., & Katz, I. (2021). Emotion regulation and need satisfaction shape a motivating teaching style. *Teachers and Teaching: Theory and Practice, 27*, 370–387. https://doi.org/10.1080/13540602.2020.1777960

Moller, A. C., Deci, E. L., & Ryan, R. M. (2006). Choice and ego-depletion: The moderating role of autonomy. *Personality and Social Psychology Bulletin, 32*, 1024–1036. https://doi.org/10.1177/0146167206288008

Murray, H. G. (1983). Low-inference classroom teaching behaviors and student ratings of college teaching effectiveness. *Journal of Educational Psychology, 75*, 138–149. https://doi.org/10.1037/0022-0663.75.1.138

Patall, E. A., Cooper, H., & Wynn, S. R. (2010). The effectiveness and relative importance of choice in the classroom. *Journal of Educational Psychology, 102*, 896–915. https://doi.org/10.1037/a0019545

Patrick, B. C., et al. (2000a). The effects of teacher enthusiasm on student intrinsic motivation and vitality. *The Journal of Experimental Education, 68*, 217–236. https://doi.org/10.1080/00220970009600093

Patrick, B. C., Hisley, J., & Kempler, T. (2000b). "What's everybody so excited about?": The effects of teacher enthusiasm on student intrinsic motivation and vitality. *The Journal of Experimental Education, 68*, 217–236. https://doi.org/10.1080/00220970009600093

Paulhus, D. L. (1991). Measurement and control of response bias. In J. P. Robinson, P. R. Shaver, & L. S. Wrightsman (Eds.), *Measures of personality and social psychological attitudes* (vol. 1, pp. 17–59). New York: Academic Press.

Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review, 18*, 315–341. https://doi.org/10.1007/s10648-006-9029-9

Pelletier, L. G., & Sharp, E. C. (2009). Administrative pressures and teachers' interpersonal behaviour in the classroom. *Theory and Research in Education, 7*, 174–183. https://doi.org/10.1177/1477878509104322

Pelletier, L. G., et al. (2002). Pressure from above and pressure from below as determinants of teachers' motivation and teaching behaviors. *Journal of Educational Psychology, 94*, 186–196. https://doi.org/10.1037/0022- 0663.94.1.186

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. https://doi.org/10.1080/00461520903028990

Reeve, J. (2016). Autonomy-supportive teaching: What it is, how to do it. In W. Liu, J. Wang, & R. Ryan (Eds.), *Building autonomous learners* (pp. 129–152). Singapore: Springer.

Reeve, J., & Cheon, S. H. (2021). Autonomy-supportive teaching: Its malleability, benefits, and potential to improve educational practice. *Educational Psychologist, 56*, 54–77. https://doi.org/10.1080/00461520.2020.1862657

Roth, G., Assor, A., Kanat-Maymon, Y., & Kaplan, H. (2007). Autonomous motivation for teaching: How self-determined teaching may lead to self-determined learning. *Journal of Educational Psychology, 99*, 761–774. https://doi.org/10.1037/0022-0663.99.4.761

Ryan, R. M., & Deci, E. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*, 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. New York: Guilford Press.

Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology, 101860*. https://doi.org/10.1016/j.cedpsych.2020.101860

Soenens, B., Sierens, E., Vansteenkiste, M., Dochy, F., & Goossens, L. (2012). Psychologically controlling teaching: Examining outcomes, antecedents, and mediators. *Journal of Educational Psychology, 104*, 108–120. https://doi.org/10.1037/a0025742

Stanley, P. J., Schutte, N. S., & Phillips, W. J. (2021). A meta-analytic investigation of the relationship between basic psychological need satisfaction and affect. *Journal of Positive School Psychology, 5*, 1–16. https://doi.org/10.47602/jpsp.v5i1.210

Sun, K. L. (2018). Brief report: The role of mathematics teaching in fostering student growth mindset. *Journal for Research in Mathematics Education, 49*, 330–335. https://doi.org/10.5951/jresematheduc.49.3.0330

Sutton, R. E. (2004). Emotional regulation goals and strategies of teachers. *Social Psychology of Education, 7*, 379–398. https://doi.org/10.1007/s11218-004-4229-y

Taxer, J. L., & Frenzel, A. C. (2018). Inauthentic expressions of enthusiasm: Exploring the cost of emotional dissonance in teachers. *Learning and Instruction, 53*, 74–88. https://doi.org/10.1016/j.learninstruc.2017.07.008

Van den Berghe, L., Soenens, B., Aelterman, N., Cardon, G., Tallir, I. B., & Haerens, L. (2014). Within-person profiles of teachers' motivation to teach: Associations with need satisfaction at work, need supportive teaching, and burnout. *Psychology of Sport and Exercise, 15*, 407–417. https://doi.org/10.1016/j.psychsport.2014.04.001

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. https://doi.org/10.1037/a0032359

Vansteenkiste, M., Ryan, R. M., & Soenens, B. (2020). Basic psychological need theory: Advancements, critical themes, and future directions. *Motivation and Emotion, 44*, 1–31. https://doi.org/10.1007/s11031-019-09818-1

Vansteenkiste, M., Sierens, E., Goossens, L., Soenens, B., Dochy, F., Mouratidis, A. A., & Beyers, W. (2012). Identifying configurations of perceived teacher autonomy support and structure: Associations with self-regulated learning, motivation and problem behavior. *Learning and Instruction, 22*, 431–439. https://doi.org/10.1016/j.learninstruc.2012.04.002

Vermote, B., Aelterman, N., Beyers, W., Aper, L., Buysschaert, F., & Vansteenkiste, M. (2020). The role of teachers' motivation and mindsets in predicting a (de) motivating teaching style in higher education: A circumplex approach. *Motivation and Emotion, 44*, 270–294. https://doi.org/10.1007/s11031-020-09827-5

Warburton, V. E., Wang, J. C., Bartholomew, K. J., Tuff, R. L., & Bishop, K. (2020). Need satisfaction and need frustration as distinct and potentially co-occurring constructs: Need profiles examined in physical education and sport. *Motivation and Emotion, 44*, 54–66. https://doi.org/10.1007/s11031-019-09798-2

Zhang, Q. (2014). Assessing the effects of instructor enthusiasm on classroom engagement, learning goal orientation, and academic self-efficacy. *Communication Teacher, 28*, 44–56. https://doi.org/10.1080/17404622.2013.839047