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► To cite this version:

Amael André, Damien Tessier, Benoit Louvet, Edwin Girard. Teachers' perception of classes' engagement, observed motivating teaching practices, and students' motivation: A mediation analysis. *Social Psychology of Education*, 2023, 26 (6), [16 p.]. 10.1007/s11218-023-09805-y . hal-04128821

HAL Id: hal-04128821

<https://hal.science/hal-04128821v1>

Submitted on 16 Jun 2023

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Teachers' Perception of Classes' Engagement, Observed Motivating Teaching Practices, and Students' Motivation: A Mediation Analysis

Abstract

Based on self-determination theory, this study examines the relations between teachers' perception of classes' engagement, their motivating teaching practices, and students' motivation. Fifty-two physical education (PE) teachers and their 1 040 students from 52 classes participated in this study. Teachers' perception of classes' engagement was self-reported one week before their motivating teaching practices were observed. At the end of the observed lesson, students completed a questionnaire assessing their situational motivation toward PE. Results indicated that teachers' perception of class engagement predicted different dimensions of students' self-determined motivation, and that these relations were fully mediated by teachers' behaviors. More specifically, the more teachers reported high scores in class engagement, the more they displayed need-supportive behaviors that were, in turn, related to positive students' motivational outcomes. These results suggest that teachers' perception of class engagement could exacerbate motivational differences between classes.

Keywords: self-determination theory; teacher perception; motivation; motivating teaching practices; mediation analysis

1 Introduction

Motivation is an important prerequisite for learning that has been demonstrated to be predictive of, among other things, school achievement, well-being, and persistence in learning over time (see Howard et al., 2021, for a meta-analysis). In physical education (PE), enhancing students' motivation is also a major goal as it has been linked to higher engagement (Van den Berghe et al., 2016), exercise participation outside of school hours (e.g., Haerens et al., 2010), and future intentions to exercise (e.g., Standage et al., 2003). According to self-determination theory (SDT; Ryan & Deci, 2017), teachers' motivating practices play a key role in student motivation. In PE, many intervention studies grounded in SDT have revealed the effect of teachers' need-supportive practices on students' positive motivational outcomes (e.g., Haerens et al., 2013; Tessier et al., 2008; Van den Berghe et al., 2016). The reverse is also true as studies showed that students' motivation and engagement could predict teachers' behaviors. For example, it was found that teachers were more need supportive when they perceived a better quality of engagement in their students (Escriva-Boulley et al., 2021; Koka, 2013; Pelletier et al., 2002; Reeve, 2013; Skinner & Belmont, 1993). A major limitation of these previous studies was that they relied only on student and teacher reports of teaching behaviors. To prevent from potential bias in student and teacher perceptions and to increase the ecological validity of the results, observational data would be warranted (Ryan & Deci, 2020; Van den Berghe et al., 2016). Therefore, the goal of the present study is to examine the relations between teachers' perception of classes' engagement, their motivating teaching practices, and students' motivation.

1.1 Students' Self-Determined Motivation

SDT has been established as a useful theoretical framework to study motivational dynamics in school settings (Ryan & Deci, 2017) and in PE in particular (see Van den Berghe et al., 2014, for a review). According to SDT, motivation is the central concept that explains students'

experiences in class. SDT-based research supports the idea that individuals have different types of motivation, ranging from autonomous motivation (i.e., fully volitional, freely pursued, and wholly endorsed by the self) to controlled motivation (i.e., pursued and directed by external or internal forces leaving students feeling like they have little to no choice). More specifically, students' autonomous motivation is notably comprised of intrinsic motivation (i.e., when they engage in learning activities for their inherent appeal), and identified regulation (i.e., when students identify the purpose and value of learning activities). In contrast, external regulation (i.e., when engaged in learning activities for external reinforcement such as gaining reward or avoiding punishment) refers to controlled motivation. Finally, amotivation refers to a lack of intention to act or engage in an activity, or doing an activity with no sense of intending to do it (Ryan & Deci, 2017).

1.2 Motivating Teaching Practices

According to SDT, motivating teaching practices, predict students' motivation by nurturing versus thwarting three basic psychological needs (Ryan & Deci, 2020): the need for autonomy (i.e., the sense of initiative and ownership in one's actions), for competence (i.e., the feeling of mastery, a sense that one can succeed and grow), and for relatedness (i.e., the sense of belonging and connection). Teachers' motivating practices include three dimensions which are related to each kind of students' needs.

First, autonomy support is the adoption of a student-focused attitude and an understanding of interpersonal tone that enables the skillful enactment of several autonomy-satisfying instructional behaviors (Reeve & Cheon, 2021) such as offering choices to students, relying on non-controlling language and fostering the relevance of the learning tasks (Jang et al., 2010; Stroet et al., 2013). In contrast, teachers' control pressures students to act and think in ways that are teacher-preferred by means of external sources such as directives or threats of punishment (Reeve & Cheon, 2021). Secondly, structure refers to monitoring learning

processes by providing clear expectations and guidelines, adequate help and timely positive and informative feedback (Jang et al., 2010; Stroet et al., 2013). It is opposed to chaos, which is characterized by the absence of clear expectations, well-organized help, and feedback opportunities. Finally, relatedness-support concerns the desire to form and maintain strong and stable interpersonal relationships which is implemented by showing affection, sympathy, warmth and care, and by offering emotional support (Skinner & Edge, 2002). Its opposite is relatedness-thwarting which gathers cold and distant teachers who display a lack of care and interest. Previous research concerning general educational settings (e.g., Jang et al., 2010) and PE (e.g., Standage et al., 2012) has consistently demonstrated that a need-supportive style is associated with positive motivational outcomes, including students' autonomous motivation (Haerens et al., 2015), and higher engagement (e.g., Van den Berghe et al., 2016). Despite empirical evidences regarding the benefits of need-supportive teaching practices, many teachers still adopt controlling behaviors (Reeve, 2009). Indeed, previous observation studies have indicated that an autonomy supportive style is rarely observed in the current teaching practice in PE (e.g., Haerens et al., 2013).

1.3 Teachers' Perception of Student Engagement

Student engagement, defined by the active involvement of students in a learning activity (Christenson et al., 2012), is a critical construct at school because it provides teachers with an observable manifestation of the quality of students' motivation (Reeve, 2013). It usually comprises four dimensions (Reeve, 2013): behavioral (i.e., effort, attention and persistence), emotional (i.e., presence of positive emotions) cognitive (i.e., use of learning strategies), and agentic (e.g., students' contribution to the flow of instruction).

Previous research indicated that when students are highly engaged, teachers might be more inclined to adopt need-supportive teaching practices in general education (e.g., Pelletier & Vallerand, 1996; Skinner & Belmont, 1993) and in PE ([Escriva-Boulley et al., 2021](#); Koka,

2013; Taylor et al., 2008; Van den Berghe et al., 2015). For example, Skinner and Belmont (1993) revealed that students who were perceived as being behaviorally engaged by their teachers reported receiving more autonomy-support, structure, and relatedness-support, compared to students perceived as less behaviorally engaged. In PE, Koka (2013) showed that teachers who initially perceived their students to be motivated in the lesson reported more need support in their lessons after a period of time. Focusing on dyadic interaction, Hornstra et al. (2018) examined the relation between teachers' perception of individual students' academic characteristics, their motivating teaching practices, and students' motivation and engagement. Results revealed that teachers' perceptions were positively associated with the students' perceptions of a need-supportive teaching practice, and that students' perceptions of teachers' behavior fully mediated the relationships between teachers' perceptions and students' intrinsic motivation and engagement. Using semi-structured interviews, Hornstra et al. (2015) suggest that teachers' motivating practices could also be affected by the whole class characteristics. More specifically, when teachers are faced with at-risk classes (i.e., those with low levels of engagement and/or frequent disruptive behavior), they reported using more controlling strategies because they perceived them as more suitable for these classes.

1.4 The Present Study

The first aim of the present study is to investigate the relations between teacher perceptions of classes' engagement, their observed motivating teaching practices, and students' motivation.

The second aim is to examine the motivating teaching practices' mediating role in the relation between teacher perceptions of classes' engagement and students' motivation.

In line with previous studies, we first hypothesized that the more positive is the teachers' perceptions of their classes, the more they will be observed to significantly enact (a) more autonomy-supportive than controlling behaviors during instruction, (b) more relatedness-supportive than relatedness-thwarting behaviors, and (c) more structured than chaotic

behaviors. Secondly, we expected positive associations between each dimension of need-supportive teaching and autonomous motivation, and inversely negative associations between need-supportive teaching and external regulation and amotivation. Finally, we expected that the three dimensions of need-supportive teaching would mediate the potential relations between teacher perception of class engagement and students' motivation.

2 Method

2.1 Participants

A power analysis carried out with the G*Power (Faul et al., 2007) software indicated that to achieve 80% statistical power with a Type I error rate of 5%, and anticipating a low effect size ($f^2 = 0.15$), at least 43 participants would be required for a linear multiple regression. To account for potential dropout, the sample size was inflated by 20% to 52. Therefore, 52 volunteered teachers (41% females, $M_{\text{age}} = 36.3$ years, $M_{\text{experience}} = 12$ years) and their 1 040 students (48% females, from 6th to 8th grade, $M_{\text{age}} = 12.71$ years) from 16 public middle schools located in the north of France participated in this study.

2.2 Procedure

After gaining the school principals' permission, PE teachers were contacted and informed about the study. Because of the nature of the investigation, the teachers were not told the exact purpose of the study. Rather, they were told that the researchers were interested in different types of student motivations and behaviors in PE. The protocol took place during one sport unit. In France, the physical education curriculum comprises of 8-week sport units. Students attend physical education lessons once a week for 2 h. To control for the influence of the sport taught, data collection was carried out during a teaching unit of collective sport (i.e., basketball and handball). First, at the end of the second lesson of the teaching unit, teachers were asked to complete a questionnaire assessing their perceptions of their class usual engagement (i.e., based on these two first lessons). Second, teachers were filmed during the

fifth or sixth lesson of the teaching unit to assess their motivating teaching practices. Finally, students' motivation for PE was measured at the end of this lesson. Teachers were informed about the purpose of the study during a post-observation debrief. Ethical approval was obtained from the university ethics committee and the local education authority. Further consent to participate in the study was obtained from the students' parents.

2.3 Measures

2.3.1 Teacher Perception of Class Engagement

Behavioral and emotional engagement were measured using the behavioral engagement and emotional engagement scales (Skinner et al., 2009). The behavioral engagement scale includes three items (e.g., "In this class, students work as hard as they can during PE sessions; $\alpha = .87$). The emotional engagement scale comprises three items (e.g., "In this class, students enjoy learning new things during PE sessions"; $\alpha = .81$). Cognitive engagement was assessed using Wolters' (2004) metacognitive strategies questionnaire, which includes three items (e.g., "Before starting an assignment for this class, students try to figure out the best way to do it during this PE session; $\alpha = .78$). Agentic engagement was measured with the agentic engagement scale (Reeve, 2013) which includes three items (e.g., "Students ask questions to help them learn during PE sessions"; $\alpha = .80$). A 7-point Likert scale, ranging from 'strongly disagree' (1) to 'strongly agree' (7), was used for all answers. CFA showed an adequate goodness-of-fit ($\chi^2/df = 1.54$, TLI = .95, CFI = .97, SRMR = .04). As scores from these four engagement scales were highly positively intercorrelated ($.70 < r < .92$), they were averaged to create a single engagement index (Cheon & Reeve, 2015; Reeve et al., 2014).

2.3.2 Students' Motivation

The 14-item Situational Motivation Scale (SIMS; Standage et al., 2003) was used to assess the students' motivation. The SIMS measures four subscales: intrinsic motivation, identified regulation, external regulation and amotivation. Participants were asked, "Why are you

currently engaged in this activity?” A 7-point Likert scale, ranging from ‘strongly disagree’ (1) to ‘strongly agree’ (7), was used for all answers. CFA showed an adequate goodness-of-fit ($\chi^2/df = 1.94$, TLI = .95, CFI = .96, SRMR = .04). Cronbach’s alphas in the present study were satisfying ($\alpha = .82$, .71, .77, and .75 for, respectively, intrinsic motivation, identified regulation, external regulation and amotivation)

2.3.3. Teachers’ Motivating Teaching Practices

To assess the three dimensions of teacher’s motivating teaching practices, an observational instrument grounded in SDT and previous educational studies (Reeve, Jang & Deci, 2010; Tessier et al., 2010) was used. Each dimension was coded using a 1-7 Likert scale in a bipolar format (i.e., need-thwarting was coded as 1, and need-support as 7). Both the frequency and the intensity of teachers’ behaviors were considered to graduate the rating from 1 to 7. The rating scale takes into account (simultaneously) the frequency of observed teacher behaviors, but importantly also considers the intensity or quality of the teacher’s delivery and how pervasive the environment was in terms of its motivational meaning (Smith et al., 2015; Tessier et al., 2010). Raters were told to use number 4 as an anchor or starting point. Then, they gradually moved to the left when behavior from the left column was more present, and they moved to the right when behavior from the right column was more present. The bipolar descriptors used for each dimension are described in Table 1. In addition, the coding protocol is detailed in the supplementary material.

2.4 Data Analysis

To test the relations between teachers’ perception of classes’ engagement and their motivating teaching practices, controlling for sex and years of experience, series of simple regressions was performed using Jamovi, version 1.1.9.0. To examine the effect of teachers’ perception of classes’ engagement on students’ motivation, a series of multilevel regressions was performed using Jamovi, due to the nested nature of the data. Data was treated as a two-level hierarchical

model (i.e., the students at level 1 and teachers at level 2). In a preliminary step, an unconditional model (Model 1) was tested—with only an intercept and no explanatory variables—to partition the variance of each dependent variable into within individual and between-individual components. In step 2, the predictor “perception of class engagement” was included in the model (Model 2) as a fixed parameter. The variables of sex and teaching experience were also included in the model as a control variable. The effect sizes were calculated using R^2 marginal (i.e., the variance explained by the fixed effects) and conditional (i.e., the proportion of total variance explained through both fixed *and* random effects) (Nakagawa, & Schielzeth, 2013).

To ascertain the mediation effects between the study variables, further multilevel regressions were performed, in which perception of class engagement was included as the input variable. Autonomy support, structure, and relatedness support were simultaneously modeled as multiple mediators, and student motivations were entered as outcome variables. These multilevel mediations tests are based on 2-2-1 models, as the input and the mediators are situated at level 2, and the outcome variables are situated at level 1 (Zhang et al., 2009). Given that the “a paths” (i.e., from the input variable to the mediators) and the “c paths” (i.e., from the input variable to the outcome) of the mediation were tested in the analyses related to hypothesis 1, these further multilevel analyses examined “b paths” (i.e., from the mediators to the outcome, controlling for the input). Thus, the students’ motivation variables were regressed on teachers motivating styles, controlling for the perception of class engagement. Monte Carlo approach was used to resampling the distribution of each indirect effect (20,000 values) that allowed us to construct the appropriate confidence intervals. If the 95% CI from this simulation excludes zero, then the indirect effect test is significant ($p < .05$).

3 Results

3.1 Preliminary Analysis

The statistical assumptions associated with multilevel models were examined by exploring the residuals in the full conditional models. Results indicated relative normality in the distribution of the residuals and no extreme outliers, and no major signs of heteroscedasticity. Intraclass correlation coefficients from the unconditional models were all above 5% indicating that there was a hierarchical structure in the data and that multilevel analysis was appropriate (Raudenbush & Bryk 2002). Means and standard deviations are presented in Table 2.

3.2 Teachers' Perception of Classes' Engagement, Motivating Teaching Practices, and Students' Motivation

Table 3 presents the results for the linear regression analyses testing the effect of teachers' perception of classes' engagement on their motivating teaching practices. Results indicated that teachers' perception of classes' engagement positively predicted autonomy support ($b = 1.06, p < .001$), structure ($b = 0.61, p < .001$), and relatedness support ($b = 0.42, p < .001$), and that effect sizes were moderate to high ($R^2 = 0.69, 0.33, \text{ and } 0.31$, respectively for autonomy -support, structure and relatedness support).

Table 4 displays the results of the multilevel regression analyses examining the effect of teachers' perception of classes' engagement on students' situational motivation. Results reveal that autonomous motivation is positively predicted by teachers' perception ($b = 0.29, p < .001$ and $b = 0.28, p < .001$, respectively), while external regulation and amotivation are negatively related to teachers' perception ($b = -0.16, p < .01$ and $b = -0.28, p < .01$, respectively). Effect sizes were low ($R^2 \text{ marginal} < 0.08$).

3.3 Mediational Effect

The results from the mediational models are displayed in Table 5. As seen above, "paths a"—from teachers' perception to their motivating teaching practices—were all significant. With regard to "paths b"—from a teacher's motivating teaching practices to students' motivation

— results from the multilevel regressions analysis disclosed that autonomy support is positively associated with autonomous motivation ($\hat{b}_1 = 0.17, p < .05$), with a low effect size (R^2 marginal = 0.09), and not significantly related to external regulation and amotivation ($\hat{b}_1 = -0.11$, and $\hat{b}_3 = -0.15, ns, respectively$). Further, the Monte Carlo resampling approach showed that the confidence interval for the indirect effect of teachers' perception of engagement on students' autonomous motivation (0.003, 0.32) via autonomy support did not include zero, thereby confirming autonomy support as a mediator. Results concerning paths \hat{b}_2 revealed that the structure was positively related to autonomous motivation ($\hat{b}_2 = 0.10, p < .05$), with a low effect size (R^2 marginal = 0.08), and it was not significantly associated with the other types of motivation ($\hat{b}_2 = -0.13$, and $-0.13, ns, respectively$ for external regulation and amotivation). Further, the Monte Carlo resampling approach showed that the confidence interval for the indirect effect of teachers' perception of engagement on students' autonomous motivation via structure did not include zero (0.01, 0.13), thereby confirming structure as a mediator. Results pertaining to path b_3 revealed that teachers' relatedness support was not significantly related to students' motivations ($\hat{b}_3 = -0.03, 0.07$, and $0.13, ns, respectively$ for autonomous motivation, external regulation and amotivation), when teachers' perception of students' engagement is controlled.

With respect to “paths c’”, results indicated that the relations between teachers' perception of engagement and students' motivation were not significant when the motivating teaching practices are entered into the models ($\hat{c}' = 0.06, 0.01$, and $-0.10, ns, respectively$ for autonomous motivation, external regulation and amotivation). Given that “paths c”—the effect of teachers' perception on students' motivation—were significant ($\hat{c} = 0.30, -0.16$, and $0.29, p < 0.01$, respectively for autonomous motivation, external regulation and amotivation), this suggests that autonomy support and, to a lesser extent, structure fully mediated the relationships between teachers' perception and students' autonomous motivation.

4 Discussion

This study was designed to investigate the relations between teacher perceptions of classes' engagement and both their motivating teaching practices and students' motivational outcomes. In line with our expectations, we found that teachers' perceptions of class engagement were associated with students' motivation, and these relations were fully mediated by two need-supportive dimensions (i.e., autonomy support and structure). These results related to the differences between classes expand the findings highlighted by Hornstra et al. (2018) which focused on dyadic interaction and within-classroom differences.

4.1 Teacher Perception of Class Engagement and Their Motivating Teaching Practices

As expected, our results indicated that higher teacher perception of class engagement is associated with a higher level of need-supportive teaching practice. These observation-based findings reinforce those of previous studies relying on students' and teachers' self-report measures (Hornstra et al. 2018; Koka, 2013; Skinner & Belmont, 2013). First, teachers were more autonomy-supportive with classes that they perceived as more engaged. As suggested by Hornstra et al. (2015), several teachers believe that autonomy-supportive strategies are suitable for motivating engaged classes because they think students from these classes can benefit from autonomy-supportive teaching. In contrast, when teachers considered their classes to be less engaged, they relied much more on controlling strategies because they believe that control is more appropriate and efficient with these classes.

Further, as expected, higher teacher perceptions of class engagement were associated with more structured behaviors. As illustrated in previous studies, teachers gave the greatest and clearest amount of guidance to classes that they perceived as more engaged (Skinner & Belmont, 1993) and may experience a stronger desire to advance the classes that seem to understand the value and importance of PE (Jussim & Harber, 2005). Finally, teachers used more relatedness-support behaviors, such as affection, interest, or emotional support, with

classes that they perceived as being more engaged (Skinner & Belmont, 1993). It may be considered that their perceptions of class engagement could be associated with positive emotions that, in turn, positively predict the relatedness-supportive dimension of the motivating teaching practices (Burel et al., 2021).

Even if these relations between class engagement and motivating teaching practices are significant, effect sizes are moderate. This finding echoes Hornstra et al. (2018) showing the importance of individual students' characteristics on teachers' behaviors. *Indeed, teachers could differ their need-supportive practices between the students in their class (e.g., they may be very autonomy-supportive to some, but not other students)*. Thus, in the future, it would be warranted to examine both the impact of individual students' characteristics and perceived class engagement on motivating teaching practices.

4.2 Teacher Motivating Teaching Practices and Student Motivation

This hypothesis was partially confirmed as autonomy-support predicted autonomous motivation, but they did not predict external regulation and amotivation. These findings are in line with evidence in PE regarding the existence of a bright pathway and a dark pathway in the motivational process (Haerens et al., 2015; Vansteenkiste & Ryan, 2013). As expected, structure predicted intrinsic motivation. Structure nurtures the need for competence, which is a strong predictor of intrinsic motivation (Ryan & Deci, 2017). Finally, relatedness-support did not predict student motivation. This unexpected result could be due to a ceiling effect given that scores of teachers' relatedness-support were high in most classes. It can also be supposed that the teachers who agreed to be filmed were those who felt self-efficient in their relations with students and displayed a high level of interpersonal involvement.

Finally, the weak effect of level 2 (e.g., teacher) variables on students' motivation (R^2 marginal < 0.10 for engagement and teaching practices) might be explained by the low ICC's

of motivation variables (ICC's $< .10$). Indeed, it seems that the major influence of students' motivation is situated at level 1 (e.g., students' characteristics), and not at level 2.

4.3 Limitations

Even if the strength of this study is to associate teachers' perceptions, external coders' ratings of teachers' behaviors and students' motivation, it is not without limitations. First, the teachers' psychological need satisfaction is lacking. Indeed, a recent mediation analysis study revealed the crucial role of teachers' need satisfaction between contextual pressures and their motivating teaching practices (Moè, Consiglio, & Katz, 2022; Moe & Katz, 2020). Future research on this mediation effect is warranted. The second limitation is related to the bipolar format of the measurement tool's scales. Some studies have suggested that these dimensions of need support and need thwarting are likely to be inversely related, but are not necessarily bipolar (Bartholomew et al., 2010). The Multidimensional Motivational Climate Observation System separately assessed need-thwarting and need-supportive behaviors in the sport context (Smith et al., 2015). This observational tool could be used in future research to investigate the relations between teachers' perceptions and both the need-thwarting and the need-supportive dimensions of motivating teaching practices. Another limitation of our study is the relatively homogeneous sample. Caution is warranted in generalizing the current findings, and future research would do well to examine how the relationships between teachers' perception and their actual motivating teaching practices in academic classes might differ from the PE context and whether the relationships between need-supportive behavior and students' motivation observed in the PE context also apply in academic classes. Finally, student engagement could have been affected by teachers' motivating teaching practices in previous units. A cross-lagged design could have shed more light on this type of reciprocity and may be an interesting design for future research.

4.4 Conclusion and practical implications

Our results generated several relevant implications. First, our results suggest that teacher perceptions of class engagement could exacerbate motivational differences between classes, with more (versus less) autonomous motivation in classes perceived as being more (versus less) engaged. In turn, these motivational differences could cause differences in class learning and achievement (Howard et al., 2021). One recommendation following from these results is that it is important to raise awareness among teachers about these motivational inequalities, which is the starting point to begin using more need-supportive behaviors with classes perceived as less engaged (De Meyer et al., 2014). [Indeed, this process is circular as teacher perception of class engagement depends on real student engagement which can be raised by teaching practices such as providing opportunities for active learning \(e.g., Cole et al., 2021\), stimulating critical thinking \(e.g., Franklin & Harrington, 2019\), and displaying enthusiasm \(e.g., Moè et al., 2021\).](#) Second, in conducting future intervention studies, research should not only consider the positive effects of need-supportive training programs on student motivation (Cheon & Reeve, 2015; [Tessier et al., 2010](#)), but also the necessity to address the potential role of teachers' perceptions of students' engagement. Indeed, these perceptions could limit the efficacy of the intervention program if the teachers involved in these programs perceived their classes as disengaged.

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