



Classroom Social Environment as Student Emotions' Antecedent: Mediating Role of Achievement Goals

Xiaojing Sun, Marloes M. H. G. Hendrickx, Thomas Goetz, Theo Wubbels & Tim Mainhard

To cite this article: Xiaojing Sun, Marloes M. H. G. Hendrickx, Thomas Goetz, Theo Wubbels & Tim Mainhard (2022) Classroom Social Environment as Student Emotions' Antecedent: Mediating Role of Achievement Goals, The Journal of Experimental Education, 90:1, 146-157, DOI: 10.1080/00220973.2020.1724851

To link to this article: <https://doi.org/10.1080/00220973.2020.1724851>



© 2020 The Author(s). Published with license by Taylor & Francis Group, LLC



Published online: 25 Feb 2020.



Submit your article to this journal [↗](#)



Article views: 4879



View related articles [↗](#)



View Crossmark data [↗](#)



Citing articles: 4 View citing articles [↗](#)

Classroom Social Environment as Student Emotions' Antecedent: Mediating Role of Achievement Goals

Xiaojing Sun^{a*} , Marloes M. H. G. Hendrickx^{a,b}, Thomas Goetz^c, Theo Wubbels^a, and Tim Mainhard^a

^aDepartment of Education, Utrecht University, Utrecht, The Netherlands; ^bEindhoven School of Education, Eindhoven University of Technology, Eindhoven, The Netherlands; ^cFaculty of Psychology, University of Vienna, Austria

ABSTRACT



In line with assumptions made by the control-value theory of academic emotions, it was hypothesized that the association between the classroom social environment, in terms of students' perceptions of their teachers' interpersonal behaviour, and students' academic emotions was partially mediated by students' achievement goals. The present study applied multi-level structural equation modelling on questionnaire data from a sample of 2000 Chinese secondary school students. As assumed, achievement goals partially mediated the association between the classroom social environment and student emotions. Further, results indicated that the classroom social environment was more closely associated with student emotions than student goals were. The findings of this study add to the understanding of the antecedents of students' emotions in class.

KEYWORDS

Academic emotion; achievement goal; classroom social environment; mediation; structural equation modeling

Introduction

Academic emotions are a key factor in students' learning and well-being (Martin & Dowson, 2009; Pekrun, 2006). Control-value theory of emotions (CVT; Pekrun, 2006) views social aspects of the classroom environment, such as the interpersonal behaviors of teachers (Mainhard, Oudman, Hornstra, Bosker, & Goetz, 2018), as important antecedents of academic emotions. Numerous emotions have a strong social component and emerge directly from affirming or damaging interpersonal relationships (Baumeister & Leary, 1995; Van Kleef, 2009). Next to the classroom social environment, students' achievement goals have been shown to be an antecedent of academic emotions, by regulating the academic-related thoughts and actions which shape student emotions (Goetz, Sticca, Pekrun, Murayama, & Elliot, 2016; Pekrun, Elliot, & Maier, 2006). According to CVT, the effect of social aspects of the classroom environment, including teacher interpersonal behavior, may in part affect student emotions via their goal orientations (Pekrun, 2006). Indeed, some studies have hypothesized and shown that interpersonal teacher behavior affects students' goals (Ames, 1992; Mainhard, 2015). The current study aimed to explore the associations among these three factors in an integrated way. More specifically, we examined whether and to what degree the association between the social environment of the classroom in terms of teacher interpersonal behavior and individual students' academic emotions is mediated by students' achievement goals.

CONTACT Xiaojing Sun  sunxiaojing@nbut.edu.cn  School of Humanities and Arts, Ningbo University of Technology, Ningbo, China.

*Current address: School of Humanities and Arts, Ningbo University of Technology, Ningbo, China.

© 2020 The Author(s). Published with license by Taylor & Francis Group, LLC

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

Interpersonal teacher behaviour as an antecedent of students' academic emotions

Academic emotions are emotions that tie directly to students' academic activities and outcomes (Pekrun, 2006). Pekrun (2006) grouped academic emotions into four prototypical categories: pleasant-activating (e.g., enjoyment), pleasant-deactivating (e.g., relief), unpleasant-activating (e.g., anxiety), and unpleasant-deactivating emotions (e.g., boredom). Emotions are also viewed as having a strong social aspect (Van Kleef, 2009). According to Baumeister and Leary (1995), pleasant emotions emerge from building and affirming social bonds and threatened, refused or broken social bonds go together with unpleasant emotions. In line with this, CVT views the social environment of the classroom as a basic antecedent of student emotions (Pekrun, 2006).

The present study applied interpersonal theory (Horowitz & Strack, 2010) to describe the social environment of the classroom in terms of students' interpersonal perceptions of their teachers. Interpersonal theory and its adoption to the educational context (Wubbels, Brekelmans, Den Brok, & Van Tartwijk, 2006) describes interpersonal perceptions in terms of two underlying orthogonal dimensions, *agency* (dominance or power) and *communion* (warmth or friendliness). These two dimensions are theoretically and empirically uncorrelated. A premise of interpersonal theory is that all behavior that is exhibited in the vicinity of others conveys a certain degree of both agency and communion.

Indeed, students' pleasant emotions (enjoyment) are strongly associated with perceived teacher support and enthusiasm (i.e., high communion) (Goetz, Lüdtke, Nett, Keller, & Lipnevich, 2013). In contrast, research clearly indicated that students experience unpleasant emotions (anxiety and boredom) when a teacher is perceived as cold or excessively demanding (i.e., low communion) (Goetz et al., 2013). Teacher agency is associated with student emotion in a more ambiguous way. For example, high levels of structure and control (i.e., high agency) have been found to go together with student enjoyment and to reduce unpleasant emotions (anxiety and boredom) (Goetz et al., 2013), but high agency has also been found to go together with anxiety (Mainhard et al., 2018) as high teacher control may result in feelings of reduced control in students (Pekrun, 2006).

Achievement goals as antecedents of emotions

In CVT, achievement goals are considered as antecedents of academic emotions. Achievement goals reflect students' reasons for engaging in learning tasks (Anderman & Patrick, 2012). In Elliot and McGregor's (2001) 2 × 2 achievement goal framework, goals are identified by two fundamental dimensions: mastery/performance and approach/avoidance. Mastery-approach goals refer to the intention of understanding and mastering tasks, whereas mastery-avoidance goals represent the desire of avoiding failure in development of mastery; performance-approach goals refer to the aim of outperforming others, whereas performance-avoidance goals represent the desire of avoiding poorer performance than others.

CVT views achievement goals as antecedents of emotions by affecting the control and value appraisals underlying emotions. Approach goals focus on the positive value of learning activities and outcomes, controllability of such activities and outcomes and available competency, which are thus expected and also have been found to foster pleasant emotions, e.g., enjoyment (Goetz et al., 2016) and reduce unpleasant emotions, e.g., boredom and anger (Daniels et al., 2009). Avoidance goals concentrate on the negative value of learning, loss of controllability and possibility of failure, which therefore are assumed and have been found to foster unpleasant emotions, e.g., anxiety (Elliot & McGregor, 2001). However, as the associations between goals and emotions are not substantial (the smallest effects are typically found for performance-avoidance goals on anxiety) (Pekrun et al., 2006), emotions are likely to be affected by a number of other factors besides achievement goals.

Interpersonal teacher behaviour and students' achievement goals

Social contexts influence students' achievement goals (Martin & Dowson, 2009) and teacher care and support have a direct effect on students' pursuit of their goals (Urdan & Schoenfelder, 2006). Students care about their relationship with their teacher and thus, they tend to respond with greater effort and engagement in learning when relationships are positive. Students of a supportive teacher, for example, being encouraging, humorous and enthusiastic (i.e., high communion), report relatively strong mastery goals (Mainhard, 2015; Turner, Gray, Anderman, Dawson, & Anderman, 2013). Conversely, when a teacher is perceived as unsupportive, sarcastic or impatient (i.e., low communion), students may lack confidence and become overly concerned with failure and thus are likely to adopt avoidance goals (Turner et al., 2002).

Ames (1992) suggested that autonomy and choice are key elements for students to focus on mastery goals. Teachers sharing authority with students (i.e., relative low agency), such as giving them autonomy in tasks, or involve them in rules and decision making, provide students a sense of ownership over their learning process (Urdan & Schoenfelder, 2006) and thus promote positive student motivation like high mastery goals (Ames, 1992; Patrick, Kaplan, & Ryan, 2011; Urdan & Schoenfelder, 2006). When teachers are more controlling by emphasizing rules, grades and ability differences among students, students tend to emphasize performance and avoidance goals (Mainhard, 2015; Patrick et al., 2011; Turner et al., 2002) and may also become overly concerned about failing, which may undermine student mastery orientation (Patrick et al., 2011).

In line with these findings, CVT views the classroom social environment, including teacher interpersonal behavior, as an antecedent of student goals, which may mediate at least in part the effect of teacher behavior on students' academic emotions (Pekrun, 2006).

The present study

In line with CVT, the present study investigated to what degree teacher interpersonal behavior has a direct versus an indirect association with academic emotions via achievement goals. Based on Pekrun's (2006) taxonomy, we selected three prototypical in-class academic emotions: enjoyment (pleasant/activating), anxiety (unpleasant/activating) and boredom (unpleasant/deactivating). These emotions are most frequently experienced by students and are of primary importance in academic settings (Pekrun, Goetz, Titz, & Perry, 2002). We did not integrate positive-deactivating emotions (e.g., relief, relaxation) because these emotions tend to occur after as opposed to during academic situations (see Pekrun et al., 2002).

We expected teacher communion to have positive associations with student's approach goals and enjoyment, and negative associations with avoidance goals, anxiety, and boredom. We also expected teacher agency to have positive associations with performance-approach goals, the two avoidance goals and enjoyment, and negative associations with mastery-approach goals and boredom. We did not have specific expectation for the association between agency and anxiety due to mixed previous findings.

Further, we expected approach goals to be positively connected with enjoyment and negatively with boredom and anxiety, whereas avoidance goals would be connected with these three emotions in a reverse way. Finally, we expected that indirect associations would exist between teacher agency and communion and student emotions via goals. However, considering the strong social nature of emotions (Baumeister & Leary, 1995; Van Kleef, 2009), we deemed it likely that teacher interpersonal behavior would also have a direct association with student emotions. We had no specific expectations regarding the degree to which the association between teacher agency and communion with emotions would be direct or indirect via goals.

Method

Sample and procedure

The study included 2000 students in grades 7 to 9 from 40 classrooms in four public junior secondary schools in Weihai city, Shandong Province, China. Classes are typically large in China with approximately 50 students per class. In each class half of the students rated a different teacher, resulting in 80 teachers being rated (41 female). A total of 1997 questionnaires were returned. Students were on average 13.49 years old (range: 11–17), 51% were females. Twelve questionnaires (0.6%) were excluded because it was unclear to which teacher they referred.

Chinese was the first language of all participants. The schools were selected for convenience. Students were clearly notified about the voluntariness of their participation and data confidentiality. Each school received a summary of the results on a general level without identifying specific participants. The ethical guidelines of the Association of Universities in the Netherlands and the Netherlands Educational Research Association were followed.

Instruments

Academic emotions

We used four items from a Chinese version of the Academic Emotions Questionnaire (AEQ; Frenzel, Thrash, Pekrun, & Goetz, 2007) to assess each emotion, and these were answered on a 5-point Likert-type scale ranging from totally disagree (1) to totally agree (5). A confirmatory factor analysis (CFA) revealed satisfactory fit, $\chi^2(114) = 590.28$, $p < 0.001$; RMSEA = 0.05; SRMR = 0.05; CFI = 0.94; TLI = 0.93. Reliability (Cronbach's alpha) was satisfactory for both enjoyment (.87) and boredom (.84), but not for anxiety (.58) (cf. Goetz et al., 2013, 2016). We suggest some caution when interpreting the results for anxiety. Intraclass correlations (ICC1; based on unconditional multilevel models) indicated a considerable amount of variation at the teacher level (enjoyment: 0.19, anxiety: 0.10, boredom: 0.18). ICC2s were calculated to examine the reliability of classroom-level aggregates (values greater than 0.70 indicate sufficient reliability (Lüdtke, Robitzsch, Trautwein, & Kunter, 2009)). ICC2s showed sufficient reliability for a typical Chinese classroom of 50 students (enjoyment: 0.92, anxiety: 0.84, boredom: 0.92).

Achievement goals

A Chinese version of the Achievement Goal Questionnaire (AGQ; Xiao, Bai, Wang, & Cui, 2013) was used, consisting of 12 items that evaluated four types of goals. Items were answered on a 5-point Likert-type scale, ranging from totally disagree (1) to totally agree (5). The measure was focused on a particular subject and teacher, $\chi^2(105) = 339.87$, $p < 0.001$; RMSEA = 0.03; SRMR = 0.03; CFI = 0.96; TLI = 0.95. Cronbach's alphas at the student level ranged between 0.73 and 0.88. ICC1s for the goals were: mastery-approach: 0.11, mastery-avoidance: 0.06, performance-approach: 0.12, performance-avoidance: 0.05, indicating that only 5 to 12% of the variance in goals could be attributed to the teacher-level. For a typical classroom of 50 students ICC2s were: mastery-approach: 0.86, mastery-avoidance: 0.76, performance-approach: 0.87, performance-avoidance: 0.71.

Teacher interpersonal agency and communion

Student perceptions of teacher agency and communion were measured using a Chinese version of the Questionnaire on Teacher Interaction (QTI; Sun, Mainhard, & Wubbels, 2018), which follows a circumplex structure and consists of 40 items. Example items are "This teacher threatens students with punishment" (i.e., low communion and high agency) or "This teacher is compliant" (i.e., high communion and low agency). Responses were based on a 5-point Likert-type scale

Table 1. Standardized path coefficients of direct effects, and variance components.

Predictor variable	Enjoyment	Anxiety	Boredom	Mastery- approach goals	Mastery- avoidance goals	Performance- approach goals	Performance- avoidance goals
Communion	0.51***	-0.27***	-0.50***	0.34***	-0.13***	0.22***	-0.11***
Agency	-0.001	0.01	-0.06*	0.13***	0.04	0.05*	0.06**
Mastery- approach goals	0.17***	-0.11***	-0.20***				
Mastery- avoidance goals	-0.10***	0.35***	0.14***				
Performance- approach goals	0.16***	0.04	-0.08***				
Performance- avoidance goals	0.03	0.10***	0.08***				
Explained variance	0.44	0.28	0.46	0.13	0.02	0.05	0.02

Note. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$. In this table, we reported the standardized path coefficients between the predictors (communion, agency and four goals) in the enjoyment model, as the values of these path coefficients are very comparable in the three emotion models and only small differences were found at the second decimal place.

bounded from *never* (1) to *always* (5). As is customary for circumplex measures, perceived teacher agency and communion levels were calculated based on the scores of all items (see Wubbels & Brekelmans, 2005). The reliability was 0.91 for communion and 0.70 for agency. The model fit was supported in a CFA for circumplex measures (Grassi, Luccio, & Di Blas, 2010), RMSEA = 0.05, SRMR = 0.08, CFI = 0.89, TLI = 0.90. ICC1 was 0.31 for agency and 0.31 for communion and ICC2 was 0.96.

Analyses

We applied multilevel structural equation modeling (Kaplan, 2008) to examine the associations among students' achievement goals and academic emotions and their perceptions of teacher interpersonal behavior (Mplus Editor 7.3.1; Muthén & Muthén, 2010). Multilevel structural equation modeling combines SEM (modeling complex structures such as mediation) with a multilevel approach, accounting for between-class and within-class variability. Standardized coefficients were computed for both direct and indirect effects. Indirect effects were estimated with Sobel tests in Mplus (Hayes & Scharkow, 2013) and Delta method standard errors were computed (Muthén & Muthén, 2010). A two-level model was fitted with students' individual perception at the lower level and classroom shared perception at the second level. However, only 1–5% of the total variance in the student achievement goals was explained by the second-level variables. As the variance in achievement goal variables resided for the largest part at the student level and because our main interest was in student-level associations, we focus especially on this level (see Appendix for the complete model results).

Due to the complexity of the model and to avoid over-fitting it, each emotion was tested separately. The analyses included a CFA of the latent structure and a test of the two-level structural equation model based on manifest variables. Students' individual perceptions were entered class-mean centered. We tested whether student gender or school subjects moderated the associations in the proposed model. In line with earlier findings (Goetz et al., 2013), we found that the structural associations did not substantially differ over student gender or school subjects (see Appendix). Therefore, we did not include gender or subject in the analyses.

In line with assumptions of interpersonal theory (Horowitz & Strack, 2010), the observed correlation between agency and communion was statistically non-significant in the sample ($r = 0.03$; $p > 0.05$) and was therefore set to zero. Correlations among the four goals were freely estimated in accordance with previous studies. All direct effects, as well as the indirect effects through goals,

Table 2. Standardized path coefficients of indirect effects.

	Enjoyment	Anxiety	Boredom
Communion			
Total indirect	0.10***	-0.08***	-0.11***
Via mastery-approach goals	0.06***	-0.04***	-0.07***
Via mastery-avoidance goals	0.01**	-0.05***	-0.02***
Via performance-approach goals	0.04***	0.01	-0.02**
Via performance-avoidance goals	<-0.01	-0.01*	-0.01**
Agency			
Total indirect	0.03**	0.01	-0.02**
Via mastery-approach goals	0.02***	-0.01**	-0.03***
Via mastery-avoidance goals	<-0.01	0.02	0.01
Via performance-approach goals	0.01*	<0.01	<-0.01
Via performance-avoidance goals	< 0.01	0.01*	0.01**

Note. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

were tested. The model demonstrated an excellent fit for all three emotions: $\chi^2(2) = 0.29$, $p > 0.05$, RMSEA < 0.001 , SRMR = 0.002, CFI = 1.000, TLI = 1.000.

Results

Direct effects and explained variance

Table 1 displays the path coefficients of direct effects and the explained variance.

Overall, 44% of the total variance in enjoyment, 46% of the total variance in boredom and 28% of the total variance in anxiety was explained in the models, whereas goal variances were explained to a lesser extent. Except for mastery-approach goals (13%), little if any variance was explained (2% to 5%) in student achievement goals. Most direct effects were in line with our expectations: teacher communion was positively predicting approach goals and enjoyment, and a negative direct effect on avoidance goals, anxiety and boredom was found. As expected, teacher agency had a positive effect on performance goals and a negative direct effect on student boredom. All links between student achievement goals and academic emotions were in line with our expectations.

The results indicated a few paths that were nonsignificant or opposed our expectations. Teacher agency was not associated with students' enjoyment and anxiety. Also, links between students' performance-approach goals and anxiety, and between performance-avoidance goals and enjoyment were statistically nonsignificant. Agency was positively associated with mastery-approach goals and had no statistically significant direct association with mastery-avoidance goals, which was inconsistent with our expectations.

As compared to communion, the direct effect of agency and performance goals on emotions were rather small. A large proportion of the association between teacher communion and student emotion was direct, with 84% of the variance for enjoyment, 77% for anxiety and 82% for boredom. The direct effect between teacher agency and student boredom also took a large part of 75% in the total effect.

Goals as mediators

Table 2 presents the path coefficients of indirect effects of agency and communion on the three emotions via the four goals. The results are reported for communion and for agency separately. As expected, an indirect effect of teacher interpersonal behavior via student achievement goals on emotions was found.

Communion

In the *enjoyment* model, a small positive total indirect effect of communion via goals was found ($b = 0.10$, $p < 0.00$; 16% of the total effect). Except for performance-avoidance goals, all goals positively mediated associations between teacher communion and enjoyment.

In the *anxiety* model, communion was indirectly connected with anxiety via all goals except for performance-approach goals, and all exhibited negative coefficients. Furthermore, a significant total indirect effect via goals was found ($b = -.08$, $p < 0.001$; 23% of the total effect).

With respect to *boredom*, a significant indirect effect was found via each of the four goals, and all exhibited negative coefficients ($b = -.11$, $p < 0.001$; 18% of the total effect).

Agency

Overall, agency seemed to be a less important statistical predictor for goals and emotions than communion. In the *enjoyment* model, the total indirect effect of agency via goals was positive and statistically significant, though the coefficient was rather small ($b = 0.03$, $p < 0.001$).

In the *anxiety* model, the total indirect effect of teacher agency on student anxiety was nonsignificant. Nevertheless, a small but statistically significant independent indirect effect was observed via mastery-approach goals ($b = -0.03$, $p < 0.001$) and performance-avoidance goals with a positive coefficient ($b = 0.01$, $p < 0.05$).

Regarding *boredom*, a total indirect effect was found ($b = -0.02$, $p < 0.01$) via mastery-approach goals and performance-avoidance goals (25% of the total, however small, effect of agency). Mastery-approach goals had a negative coefficient ($b = -0.03$, $p < 0.001$), whereas performance-avoidance goals showed a positive coefficient ($b = 0.01$, $p < 0.01$).

Discussion

As academic emotions play an essential role in the academic lives of students (Martin & Dowson, 2009; Pekrun, 2006), it is important to understand the antecedents of these emotions. In the current study, teacher communion (i.e., warmth) appeared to be an important predictor of student emotions. The direct associations of teacher interpersonal behavior and emotions were stronger than the indirect effects via student goals. Still, achievement goals mediated a portion of the association between teacher behavior and student emotions. Hence, student goals, at least in part, seem to play a role in the association between the two.

Direct associations

Teacher interpersonal behaviour and student emotions

Communion. A large part of the associations between students' perceptions of teacher interpersonal behavior and student academic emotions was direct. In line with our expectation, we found that students who perceived a teacher as relatively friendly reported relatively high pleasant and low unpleasant feelings (c.f. Goetz et al., 2013; Mainhard et al., 2018; Pekrun et al., 2006). This is also in accordance with Pekrun's (2006) assumption that teacher warmth and support strengthen the social bond between teacher and students, from which pleasant feelings emerge.

Agency. In line with previous findings (Goetz et al., 2013), results indicated that teacher structure (i.e., agency) was associated with reduced student unpleasant emotions (boredom), although this association was rather weak in the current sample. In addition, inconsistent with previous findings, teacher agency was not related to student enjoyment and anxiety. This may be due to a range restriction in agency in the current Chinese sample (compare Mainhard et al., 2018), which in turn may be rooted in a large power distance in Chinese classrooms (Hofstede,

Hofstede, & Minkov, 2010): Chinese students tend to expect teacher strictness (Wei, Zhou, Barber, & Den Brok, 2015), which may result in relatively homogeneous high levels of perceived agency in Chinese teachers. Nevertheless, when taking communion out of the model, teacher agency still explained 15–20% of the variability in student emotions. Therefore, agency should not just be discarded as a relevant antecedent of student emotions.

Student goals and emotions

This study confirmed the predictive role of students' achievement goals for academic emotions (e.g., Daniels et al., 2009; Goetz et al., 2016): students who reported stronger approach goals (which focus on positive value and controllability of learning) were more likely to report pleasant feelings and less likely to feel unpleasant. Students with stronger avoidance goals (which focus on negative value of learning and loss of control) were more likely to feel anxious and bored. Of the four goals, mastery-approach goals showed the strongest association with students' emotions. Two nonsignificant paths (i.e., performance-approach goals and anxiety, performance-avoidance goals and enjoyment) were inconsistent with previous findings (Goetz et al., 2016). A possible explanation might be that participants had difficulties in distinguishing between performance-approach and avoidance goals (Urdan & Mestas, 2006) in real-life situations through a survey instrument.

Overall, the associations between teacher interpersonal behavior and emotions were considerably stronger than those between student goals and emotions. This is consistent with general emotion theories that specifically highlight the intertwinement between emotions and social processes (Baumeister & Leary, 1995; Van Kleef, 2009).

Teacher interpersonal behaviour and student goals

Although the direction of associations in the current findings were consistent with previous research (e.g., Mainhard, 2015; Turner et al., 2013), the interpretation of the findings should consider the low explained variance in goals. The more friendly and supportive a teacher was perceived, the more likely a student was to report approach goals and the less likely to report avoiding failure in learning, as students tend to respond to a caring teacher with greater effort and motivation in learning (Urdan & Schoenfelder, 2006). Inconsistent with Patrick et al. (2011), who found that teacher control hampers students' feelings of control and confidence and mastery motivation, but consistent with Mainhard's (2015) finding, we found that the more dominant a teacher was perceived, the more likely students were to report stronger mastery-approach goals. One possible explanation could be that a certain type of teacher dominance, such as providing structure in class by setting clear rules and conveying high expectations rather than strictly controlling behavior, is beneficial for student learning (Roorda, 2011). It also needs to be considered that in the Chinese context teacher strictness is valued in class (Sun et al., 2018; Wei et al., 2015).

The mediating role of goals

Communion

Students' goals mediated 16% to 23% of the association between teacher communion and student emotion. The more friendly and caring students perceived their teacher, the more likely they were to report to enjoy class and, similarly, the less likely they were to report anxiousness and boredom. This association was partially mediated by students' goal orientations: students were more likely to report stronger approach goals and weaker avoidance goals with higher levels of teacher communion. Thus, in part emotions were connected with teacher support via students' learning motivation.

Agency

Agency was only weakly associated with goals and emotions. Still, 25 to 100% of its weak association with emotions was through goals, mainly via mastery-approach goals. For example, although agency showed no direct association with student enjoyment, a very small indirect connection via student approach goals was observed. A possible explanation might be that despite Chinese students' rare direct reaction to teacher dominance in their pleasant emotions due to their high acceptance of teacher strictness (Wei et al., 2015), they may still experience a corresponding change in their personal approach goals which may slightly increase enjoyable feelings. This finding is consistent with previous findings that teacher agency enhances students' approach goals (Mainhard, 2015) and that approach goals foster pleasant emotions (Goetz et al., 2016).

Limitation and future directions

This study was based on cross-sectional data and a non-experimental design from which we could not gauge sequential associations. Also, since mediation is usually considered as an exploration of causal mechanisms (Hayes & Scharkow, 2013), one should be cautious about the interpretations of findings regarding the mediation effect in this study. Future research should include a design that meets the necessary requirements of causal inferences to finally confirm the mediating role of student achievement goals.

Further, future research might consider goal structures of the classroom instead of individual student goal orientation (Meece, Anderman, & Anderman, 2006). Including classroom goals may allow to study students' shared perceptions more closely.

Practical implications

To create a positive classroom social environment for students, teachers should be warm and caring (Wubbels et al., 2006). Our study indicates that teacher warmth or communion goes together with healthy learning goals and ultimately more pleasant student emotions and less unpleasant feelings toward class. In this regard, connecting with students may be effective in part because students adopt approach goals rather than less productive avoidance goals.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by the Chinese Scholarship Council under Grant number 201406530012

ORCID

Xiaojing Sun  <http://orcid.org/0000-0003-4034-8207>

References

- Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology*, 84(3), 261–271. doi:10.1037/0022-0663.84.3.261
- Anderman, E. M., & Patrick, H. (2012). Achievement goal theory, conceptualization of ability/intelligence, and classroom climate. In *Handbook of research on student engagement* (pp. 173–191). Berlin, Germany: Springer.
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117(3), 497–529. doi:10.1037/0033-2909.117.3.497

- Daniels, L. M., Stupnisky, R. H., Pekrun, R., Haynes, T. L., Perry, R. P., & Newall, N. E. (2009). A longitudinal analysis of achievement goals: From affective antecedents to emotional effects and achievement outcomes. *Journal of Educational Psychology, 101*(4), 948–963. doi:10.1037/a0016096
- Elliot, A. J., & McGregor, H. A. (2001). A 2 × 2 achievement goal framework. *Journal of Personality and Social Psychology, 80*(3), 501–519. doi:10.1037/0022-3514.80.3.501
- Frenzel, A. C., Thrash, T. M., Pekrun, R., & Goetz, T. (2007). Achievement emotions in Germany and China: A cross-cultural validation of the academic emotions questionnaire—mathematics. *Journal of Cross-Cultural Psychology, 38*(3), 302–309. doi:10.1177/0022022107300276
- Goetz, T., Lüdtke, O., Nett, U. E., Keller, M. M., & Lipnevich, A. A. (2013). Characteristics of teaching and students' emotions in the classroom: Investigating differences across domains. *Contemporary Educational Psychology, 38*(4), 383–394. doi:10.1016/j.cedpsych.2013.08.001
- Goetz, T., Sticca, F., Pekrun, R., Murayama, K., & Elliot, A. J. (2016). Intraindividual relations between achievement goals and discrete achievement emotions: An experience sampling approach. *Learning and Instruction, 41*, 115–125. doi:10.1016/j.learninstruc.2015.10.007
- Grassi, M., Luccio, R., & Di Blas, L. (2010). CircE: An R implementation of Browne's circular stochastic process model. *Behavior Research Methods, 42*(1), 55–73. doi:10.3758/BRM.42.1.55
- Hayes, A. F., & Scharkow, M. (2013). The relative trustworthiness of inferential tests of the indirect effect in statistical mediation analysis: Does method really matter? *Psychological Science, 24*(10), 1918–1927. doi:10.1177/0956797613480187
- Hofstede, G., Hofstede, G. J., & Minkov, M. (2010). *Cultures and organizations: Software of the mind*, 3rd ed. New York, NY: McGraw-Hill Professional.
- Horowitz, L. M., & Strack, S. (2010). *Handbook of interpersonal psychology: Theory, research, assessment, and therapeutic interventions*. New Jersey, US: John Wiley & Sons.
- Kaplan, D. (2008). *Structural equation modeling: Foundations and extensions*. London, UK: Sage.
- Lüdtke, O., Robitzsch, A., Trautwein, U., & Kunter, M. (2009). Assessing the impact of learning environments: How to use student ratings of classroom or school characteristics in multilevel modeling. *Contemporary Educational Psychology, 34*(2), 120–131.
- Mainhard, T. (2015). Liking a tough teacher: Interpersonal characteristics of teaching and students' achievement goals. *School Psychology International, 36*(6), 559–574. doi:10.1177/0143034315608235
- 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
- Martin, A. J., & Dowson, M. (2009). Interpersonal relationships, motivation, engagement, and achievement: Yields for theory, current issues, and educational practice. *Review of Educational Research, 79*(1), 327–365. doi:10.3102/0034654308325583
- Meece, J. L., Anderman, E. M., & Anderman, L. H. (2006). Classroom goal structure, student motivation, and academic achievement. *Annual Review of Psychology, 57*(1), 487–503. doi:10.1146/annurev.psych.56.091103.070258
- Muthén, L. K., & Muthén, B. O. (2010). *Version 6 Mplus user's guide*. Los Angeles, CA: Muthén & Muthén.
- Patrick, H., Kaplan, A., & Ryan, A. M. (2011). Positive classroom motivational environments: Convergence between mastery goal structure and classroom social climate. *Journal of Educational Psychology, 103*(2), 367–382. doi:10.1037/a0023311
- Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review, 18*(4), 315–341. doi:10.1007/s10648-006-9029-9
- Pekrun, R., Elliot, A. J., & Maier, M. A. (2006). Achievement goals and discrete achievement emotions: A theoretical model and prospective test. *Journal of Educational Psychology, 98*(3), 583–597. doi:10.1037/0022-0663.98.3.583
- Pekrun, R., Goetz, T., Titz, W., & Perry, R. P. (2002). Academic emotions in students' self-regulated learning and achievement: A program of qualitative and quantitative research. *Educational Psychologist, 37*(2), 91–105. doi:10.1207/S15326985EP3702_4
- Sun, X., Mainhard, T., & Wubbels, T. (2018). Development and evaluation of a Chinese version of the Questionnaire on Teacher Interaction (QTI). *Learning Environments Research, 21*(1), 1–17. doi:10.1007/s10984-017-9243-z
- Turner, J. C., Gray, D. L., Anderman, L. H., Dawson, H. S., & Anderman, E. M. (2013). Getting to know my teacher: Does the relation between perceived mastery goal structures and perceived teacher support change across the school year? *Contemporary Educational Psychology, 38*(4), 316–327. doi:10.1016/j.cedpsych.2013.06.003
- Turner, J. C., Midgley, C., Meyer, D. K., Gheen, M., Anderman, E. M., Kang, Y., & Patrick, H. (2002). The classroom environment and students' reports of avoidance strategies in mathematics: A multimethod study. *Journal of Educational Psychology, 94*(1), 88–106. doi:10.1037/0022-0663.94.1.88
- Urdañ, T., & Schoenfelder, E. (2006). Classroom effects on student motivation: Goal structures, social relationships, and competence beliefs. *Journal of School Psychology, 44*(5), 331–349. doi:10.1016/j.jsp.2006.04.003
- Van Kleef, G. A. (2009). How emotions regulate social life: The emotions as social information (EASI) model. *Current Directions in Psychological Science, 18*(3), 184–188. doi:10.1111/j.1467-8721.2009.01633.x

- Wei, M., Zhou, Y., Barber, C., & Den Brok, P. (2015). Chinese students' perceptions of teacher–student interpersonal behavior and implications. *System*, 55, 134–144. doi:10.1016/j.system.2015.09.007
- Wubbels, T., & Brekelmans, M. (2005). Two decades of research on teacher–student relationships in class. *International Journal of Educational Research*, 43(1–2), 6–24. doi:10.1016/j.ijer.2006.03.003
- Wubbels, T., Brekelmans, M., den Brok, P., & van Tartwijk, J. (2006). An interpersonal perspective on classroom management in secondary classrooms in the Netherlands. In Evertson, C. M., & Weinstein, C. S (Eds.), *Handbook of Classroom Management: Research, Practice, and Contemporary Issues* (pp. 1161–1191). New York: Routledge. doi:10.4324/9780203874783
- Xiao, J., Bai, Y., Wang, X., & Cui, L. (2013). 成就目标问卷中文版在大学生中应用的信效度分析 [The reliability and validity investigation of the Achievement Goal Questionnaire among college students]. *中华行为医学与脑科学杂志 [Chinese Journal of Behavioural Medicine and Brain Science]*, 22(1), 69–71. doi:10.3760/cma.jissn.1674-6554.2013.01.026

Appendix

Interaction and covariate test

In this Appendix, we provide specific information of interaction and covariate tests which were not included in the final model, as well as the results of the teacher level which were not reported in the main text.

In the three emotion models, we first tested the interaction effect between agency and communion. Analyses showed that the interaction effect was insignificant for all three emotions at both levels. Also, taking the interaction effect into account largely reduced the model fit (enjoyment: RMSEA = 0.10, SRMR = 0.17, CFI = 0.92, TLI = 0.23; anxiety: RMSEA = 0.10, SRMR = 0.16, CFI = 0.91, TLI = 0.15; boredom: RMSEA = 0.17, SRMR = 0.23, CFI = 0.92, TLI = 0.26). Therefore, the effect of agency was apparently not moderated by communion, and vice versa. We thus did not include the interaction effect in the model.

Then, we added student gender as a covariate and tested interactions of gender with all variables, yet encountered estimation problems especially on the teacher level (type = two level). As a next step, we used the type = complex function in Mplus. The model fit greatly reduced (enjoyment: RMSEA = 0.48, SRMR = 0.19, CFI = 0.01, TIL = -0.75; anxiety: RMSEA = 0.48, SRMR = 0.18, CFI = 0.04, TIL = -0.70; boredom: RMSEA = 0.48, SRMR = 0.19, CFI = 0.09, TIL = -0.62) with mostly non-significant interaction terms. Therefore, it was not deemed necessary to add student gender as a covariate.

Finally, we examined whether the model was similar across school subjects. We tested for model invariance using the three major subjects (Chinese, Math and English). For model identification reasons, model invariance was tested per goal and for communion and agency separately. Results showed only a small number of dissimilarities in the models for the three subjects. For example, a few effects seemed to be somewhat less strong (or non-existent) for Chinese in comparison to the effects for English and mathematics. Earlier findings also indicated that school subjects could make a difference in the absolute values of students' goals and emotions, but that structural associations rarely change over subjects. Therefore, we did not include school subject in the analyses.

Table A1. Standardized path coefficients of direct effects, and variance components at the teacher level.

Predictor variable	Enjoyment	Anxiety	Boredom	Mastery-approach goals	Mastery-avoidance goals	Performance-approach goals	Performance-avoidance goals
Communion	0.56***	-0.33*	-0.51***	0.56***	-0.60***	0.36**	-0.46***
Agency	-0.05	0.39*	0.03	0.25*	0.22	0.31*	-0.28
Mastery-approach goals	-0.05	-0.68	-0.85				
Mastery-avoidance goals	-0.20	0.10	-0.26				
Performance-approach goals	0.37	0.77	0.62				
Performance-avoidance goals	-0.18	0.47*	0.43*				
Explained variance							
Level 2	0.89	0.90	0.92	0.42	0.38	0.24	0.30
Total	0.53	0.54	0.34	0.16	0.04	0.07	0.03
ICC1	0.19	0.10	0.18	0.11	0.06	0.12	0.05
ICC2	0.92	0.84	0.92	0.86	0.76	0.87	0.71

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. This table presents the standardized path coefficients between the predictors (agency, communion and four goals) in the enjoyment model, as the values of these path coefficients are comparable in the three emotion models and only small differences exist at the second decimal place.

Table A2. Standardized path coefficients of indirect effects at the teacher level.

	Enjoyment	Anxiety	Boredom
Communion			
Total	0.30***	-0.39**	-0.31*
Via mastery-approach goals	-0.03	-0.38	-0.48
Via mastery-avoidance goals	0.12	-0.06	0.15
Via performance-approach goals	0.13	0.27	0.22
Via performance-avoidance goals	0.08	-0.21	-0.20
Agency			
Total	0.11	-0.04	-0.20
Via mastery-approach goals	-0.01	-0.17	-0.22
Via mastery-avoidance goals	-0.04	0.02	-0.06
Via performance-approach goals	0.12	0.24	0.19
Via performance-avoidance goals	0.05	-0.13	-0.12

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

The results of the second level

In this study, a two-level model was constructed to account for the nested data structure with students clustered in classes. At the student (or individual) level, a student's individual perception of a teacher was calculated as an individual student's score deviation from the class mean when leaving out class variance, which represents the unique perception of one individual student of the teacher (i.e., group mean centring). At the teacher (or shared) level, the shared perception was calculated as the average score of all students in a class. The ICC1 and ICC2 for a typical classroom with 50 students indicated sufficient variance at the teacher level of agency (ICC1 = 0.31, ICC2 = 0.96) and communion (ICC1 = 0.31, ICC2 = 0.96).

The results at the teacher level are presented in the Tables A1 and A2. Table A1 presents the path coefficients of direct effects, the variance components and the ICCs. Table A2 displays the path coefficients of indirect effects of agency and communion on the three emotions via the four goals.

Regarding the direct effect, in line with our expectations, teacher communion was positively connected to enjoyment and approach goals and negatively associated with anxiety, boredom and avoidance goals. However, agency only showed positive association with anxiety and approach goals, whereas it had no significant connection with other emotions or goals. Amongst all four goals, only performance-avoidant goals indicated significant associations with emotions: these goals were positively related to anxiety and boredom. Similar to the results at the student level, much less variance in goals than in emotions was explained in the models.

Regarding the indirect effect, we found a combined total indirect effect of the four goals combined on teacher communion and the three emotions, but none of the four goals independent of the other three had any indirect effects. No significant indirect effects via goals were observed between the association of agency and any of the three emotions.