




# The Concurrent and Longitudinal Relations Between Competitive Classroom Climate and Learning Motivation Among Chinese Adolescent Students: The Mediating Roles of Social Comparisons

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**Purpose:** Over the past decade, cross-sectional studies have established a link between competitive classroom climate and learning motivation. However, the precise predictive direction has remained unclear, and the potential mechanisms underlying the link have yet to be investigated. According to the social comparison theory, competitive classroom climate is positively associated with learning motivation, and upward and downward comparison may play a role in mediating this process.

**Patients and Methods:** Data were obtained from a three-wave study of 476 Chinese senior high school students (45.4% boys, 54.6% girls) aged 14–18 years. Structural equation modeling was performed to test different models.

**Results:** Concurrent and longitudinal analyses revealed that higher competitive classroom climate was associated with higher learning motivation. Moreover, upward comparison mediated the relation between competitive classroom climate and learning motivation. However, downward comparison did not mediate these relations.

**Conclusion:** From the perspective of practice, the results provide evidence for how to promote learning motivation by cultivating competitive classroom climate and applying effective social comparison strategies.

**Keywords:** competitive classroom climate, upward comparison, downward comparison, learning motivation

## Introduction

The relation between classroom climate and learning motivation has received much public attention in recent years.<sup>1–3</sup> Past research revealed that a cooperative classroom climate has positive effects on students' learning motivation.<sup>4,5</sup> However, as students move from junior to senior high school, the culture of the classroom often changes, with increased emphasis placed on competition at the senior high level.<sup>6</sup> Although there is empirical evidence that intergroup competition has a positive effect on motivation in the working environment,<sup>7</sup> the nature of the effect of competitive climate on learning motivation in the classroom remains unclear.

Furthermore, few research studies have explored the underlying mechanisms behind this relation. According to the social comparison theory (SCT), social comparison is an important feature of the classroom environment<sup>8,9</sup> and plays a pivotal role in linking classroom climate and motivation.<sup>10</sup> It is plausible that social comparison mediates the association between competitive classroom climate and learning motivation.

The present study aimed to examine the effect of competitive classroom climate on high school students' learning motivation and the mediating role of social comparison in the association between classroom climate and learning motivation by a three-wave longitudinal investigation.

## Competitive Classroom Climate and Learning Motivation

Competitive classroom climate refers to the degree to which students perceive the competitive nature of their classroom environment.<sup>11</sup> The classroom is the main environment not only for the implementation of a school's educational functions but also for adolescents' knowledge acquisition, moral education, socialization, and self-education.<sup>12,13</sup> Climate substantially affects the quality of interactions among the students and the interactions between the students and the teachers.<sup>14</sup> It also reflects the norms, values, and goals that represent the broader educational missions of the classroom.<sup>15</sup> However, classroom structure is different between the East and the West. American students move from classroom to classroom based on the subject that they are learning, while in most East Asian public schools, teachers are the ones who move in and out of classrooms. Students stay put, in fixed seats with fixed classmates over multiple years. In China, when adolescent students take an exam, one of the direct consequences is the calculation of class rank. Previous research found that ranking caused children to compete against each other to attain goals, which led to a competitive classroom climate.<sup>16</sup> Thus, it's important to explore the effects of competitive classroom climate among Chinese students.

Previous empirical findings suggested that competitive classroom climate may be positively associated with learning motivation. For instance, according to Epstein and Harackiewicz,<sup>17</sup> competitive climate can increase people's motivation to work harder. The authors suggested that competition increases individuals' concern about their competence and desire to do well. Similarly, several studies revealed that competitive climate can increase a sense of challenge or excitement, either of which can promote motivation.<sup>7,18</sup> Previous study found that competitive classroom climate was positively associated with Chinese adolescents' motivation to actively learn.<sup>19</sup> Based on the above empirical evidence, competitive classroom climate can have positive effects on learning motivation.

## Social Comparisons as Potential Mediators

For humans, social comparison is inevitable. Social comparison theory (SCT) states that people have a fundamental desire to evaluate their opinions and abilities when they are uncertain about their situation.<sup>8</sup> According to Festinger, individuals tend to form appraisals by comparing themselves with people of similar opinions and abilities.<sup>8,10</sup> Previous studies found that those who compared more scored low on self-esteem and scored high on depression.<sup>20,21</sup>

In learning settings, students are constantly being compared with peers through class ranking systems.<sup>22</sup> Class rankings after tests or exams inevitably lead adolescent students to compare their test scores with the scores of others. Ranking comparison is a specific type of social comparison that is defined as a process whereby students compare themselves with same-age peers to evaluate their competence in a given subject.<sup>8</sup> According to the SCT, in many instances, it is difficult to make a judgment about one's abilities without a reference for comparison. Therefore, individuals tend to self-evaluate by comparing themselves to others.<sup>8,10</sup> Students can select the direction of this comparison according to individual needs and momentary motivations. Upward comparison is defined as comparison with others who perform better than oneself. In contrast, downward comparison refers to comparison with others who perform worse than oneself.<sup>23</sup> Given that adolescents spend most of their time in school settings, social comparison is a common process in the lives of adolescents.

A competitive classroom climate may lead to increased upward and downward comparisons by adolescents. During adolescence, a critical period of physical and mental development, social comparison provides a mean of gathering information about the social world. According to Krayer et al,<sup>24</sup> it is natural for adolescents to compare themselves with their peers. Previous research on classroom climate found that a competitive classroom climate provides extensive opportunities for social comparisons.<sup>10</sup> The authors suggested that competitive classroom climate is characterized by high levels of performance evaluation with a focus on academic achievement and that it evokes a strong interest in students to compare themselves socially. During competition, students tend to engage in upward comparison to determine their subjective likelihood of winning or obtaining a desired status.<sup>25</sup> In addition, competition puts pressure on students.

Under stressful circumstances, students are likely to make comparisons with others who are doing poorly.<sup>26</sup> Thus, a competitive classroom climate would be positively associated with upward comparison and downward comparison.

Regarding the second stage of the mediation process, upward and downward comparison have been identified as incentive factors for learning motivation.<sup>27,28</sup> In China, many students are still influenced by the Confucian heritage culture.<sup>29</sup> According to Confucian thought, when we see men of virtue and talent, we should think of equaling them; when we see men of contrary character, we should turn inwards and examine ourselves. This may explain the effect of upward comparison and downward comparison on learning motivation among Chinese students. On the one hand, observing others' success may lead students to develop feelings of self-confidence and self-efficacy and to set higher personal goals.<sup>10</sup> Upward comparison can provide students with useful information for self-improvement,<sup>27</sup> which is positively associated with learning motivation among American adolescents.<sup>30</sup> On the other hand, downward comparison can help students gather information about the personal mistakes that they need to correct and can generate the positive affect that is essential for self-enhancement.<sup>28,31</sup> Comparison with those who are inferior might help students to maintain positive self-evaluations by reducing learning anxiety,<sup>32</sup> which can increase their motivation to learn.<sup>33</sup> These findings suggest potential associations between competitive classroom climate and increased upward and downward comparison, which further increases students' learning motivation.

## The Present Study

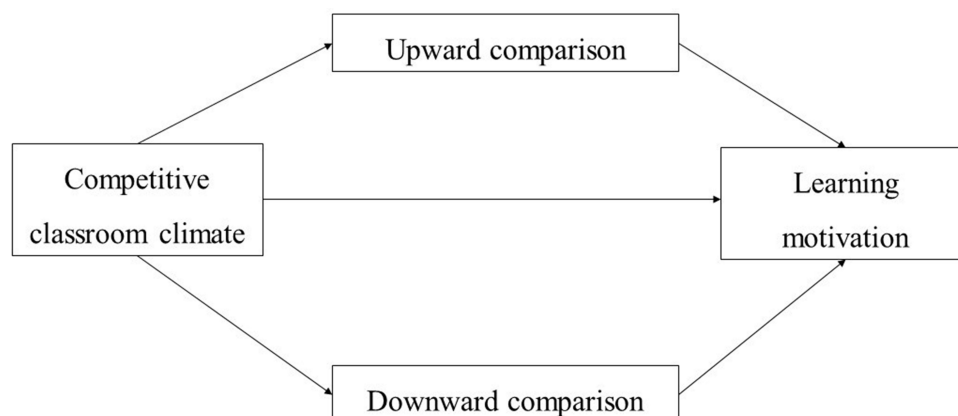
Classroom climate is a dynamic process that is continually changing.<sup>15,34</sup> Students may have difficulty adjusting to class rules and teacher expectations at the beginning of the semester, but they may become more acculturated to their classroom climate over time.<sup>15</sup> However, relatively more classroom climate studies used cross-sectional study designs and treated students' perceptions of school climate as stagnant.<sup>3</sup> Therefore, more longitudinal research is needed to explore the long-term effects of competitive classroom climate on students' learning motivation.<sup>3</sup>

Based on the literature reviewed, to elucidate the underlying mechanism between competitive classroom climate and learning motivation, the present study tested the concurrent and longitudinal impact of competitive classroom climate on learning motivation and the mediation mechanism behind such an impact. As presented in our mediation model (see Figure 1), we hypothesized that (1) competitive classroom climate has a positive effect on students' learning motivation, and (2) upward comparison and downward comparison mediate the relationship between competitive classroom climate and students' learning motivation.

## Materials and Methods

### Participants

The data for this study were drawn from a three-wave longitudinal study. Measures of the relevant constructs were administered to the students at three time points at 6-month intervals. We recruited 476 students from an urban, public



**Figure 1** The hypothesized model.

high school located in Ningxia, China. All participants were students in Grades 10 and 11, and did not reside in school after school hours. A total of 476 students (45.37% male and 54.63% female; age:  $M = 15.61$  years,  $SD = 1.26$ ) participated in this study at Time 1 (T1), with 123 (25.84% of T1) students lost at Time 2 (T2) and 55 (11.55% of T1) students lost at Time 3 (T3). The final sample comprised 61.3% 10th graders, and 38.7% 11th graders. The detailed demographic characteristics of the participants are in Table 1.

Independent sample  $t$ -tests were conducted to analyze whether the loss of participants was biased. Specifically, the data of participants who completed all three questionnaires were encoded as 1. Otherwise, they were encoded as 0. Important variables at T1 were used for analysis. Results showed there was no significant difference in the competitive classroom climate ( $t = -0.07, p > 0.05$ ), upward comparison ( $t = -0.10, p > 0.05$ ), downward comparison ( $t = -1.66, p > 0.05$ ), and learning motivation ( $t = 1.42, p > 0.05$ ) between the complete and incomplete data. This suggested the missing data were not different from a random pattern.

## Procedures

All materials and procedures were approved by the Academic Ethics Committee of the Faculty of Psychology at Beijing Normal University in China. Parents provided written informed consent for the participation of their children. The children were assured of anonymity and that neither their names nor any identifying information would be collected. The first wave of data was collected in November 2019, and participants were re-assessed 6 months later and then 12 months later. The participants completed questionnaires on demographic variables, competitive classroom climate, upward and downward comparison, and learning motivation in all three waves.

## Measures

### Competitive Classroom Climate

Four items were used to measure competitive classroom climate and were modified from the Competitive Psychological Climate Scale developed by Brown et al.<sup>11</sup> The scale evaluating the degree to which students perceive competitive classroom climate (eg, “My teacher often compares my grades with others’ grades”). The response options incorporated a 5-point Likert scale, which ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). In particular, internal consistency in this study was good in the first wave ( $\alpha = 0.70$ ), the second wave ( $\alpha = 0.83$ ), and the third wave ( $\alpha = 0.75$ ). The results of CFA indicated that structural validity of model was acceptable in the first wave ( $\chi^2/df = 1.64$ , CFI = 0.99, TLI = 0.98, RMSEA = 0.04, SRMR = 0.02), the second wave ( $\chi^2/df = 1.83$ , CFI = 0.99, TLI = 0.97, RMSEA = 0.05, SRMR = 0.03), and the third wave ( $\chi^2/df = 2.56$ , CFI = 0.98, TLI = 0.92, RMSEA = 0.07, SRMR = 0.03).

### Upward Comparison and Downward Comparison

To assess students’ upward comparison and downward comparison, we used the Chinese version of the Academic Social Comparison Scale developed and validated by Xu.<sup>35</sup> The upward comparison subscale consists of seven items (eg, “I like to compare with my classmates who perform better than me”). The downward comparison subscale consists of six items (eg, “I like to compare with my classmates who perform worse than me”). The participants responded on a 5-point scale ranging from *strongly disagree* to *strongly agree*. The ASC reported good reliability and validity in studies with middle school students.<sup>35</sup> In this study, Cronbach’s alphas for the upward comparison subscale and the downward comparison subscale were 0.84 and 0.95 in the first wave, 0.91 and 0.95 in the second wave, and 0.76 and 0.94 in the third wave, respectively. The results of CFA indicated that structural validity of model was acceptable in the first wave ( $\chi^2/df = 2.77$ , CFI = 0.97, TLI = 0.97, RMSEA = 0.06, SRMR = 0.05),

**Table 1** Demographics of the Participants

	Number (N)	Age				Gender (%)	
		Minimum	Maximum	Mean	SD	Male	Female
Grade 10	292	14	16	15.25	0.47	47.9%	52.1%
Grade 11	184	15	18	16.37	0.54	39.7%	60.3%

the second wave ( $\chi^2/df=2.73$ , CFI = 0.97, TLI = 0.96, RMSEA = 0.07, SRMR = 0.05), and the third wave ( $\chi^2/df=2.37$ , CFI = 0.98, TLI = 0.97, RMSEA = 0.06, SRMR = 0.05).

### Learning Motivation

Ten items were used to measure learning motivation and were modified from the Work Preference Inventory developed by Robinson et al.<sup>36</sup> Each item was rated on a 5-point scale ranging from *strongly disagree* to *strongly agree* (eg, “I enjoy learning new things.”). Cronbach’s alphas for this scale were 0.78 in the first wave, 0.80 in the second wave, and 0.80 in the third wave. The results of CFA indicated that structural validity of model was acceptable in the first wave ( $\chi^2/df = 3.38$ , CFI = 0.94, TLI = 0.91, RMSEA = 0.07, SRMR = 0.05), the second wave ( $\chi^2/df = 2.78$ , CFI = 0.95, TLI = 0.92, RMSEA = 0.07, SRMR = 0.06), and the third wave ( $\chi^2/df = 3.62$ , CFI = 0.95, TLI = 0.91, RMSEA = 0.07, SRMR = 0.06). See [Appendix 1](#) for the full version of the questionnaire.

### Control Variables

Evidence showed that competitive classroom climate likely increases with students’ age<sup>6</sup> and that women generally score higher on learning motivation than men do.<sup>29</sup> To obtain more accurate estimates and reduce the likelihood of spurious relations between competitive classroom climate and learning motivation, we controlled for age and gender.

### Data Analysis

To address the substantive questions of interest in this study, structural equation modeling (SEM) was performed using Mplus 7.<sup>37</sup> First, we calculated descriptive statistics and correlation analyses for the main variables. Then, we tested the mediation effect of upward comparison and downward comparison between competitive classroom climate and learning motivation with cross-sectional and longitudinal data. We measured model fit based on the SEM cut-off criteria for the ratio of chi-square to degrees of freedom ( $\chi^2/df$ ), Tucker–Lewis index (TLI), comparative fit index (CFI), the standardized root mean square residual (SRMR), and the root means square error of approximation (RMSEA) fit indexes.<sup>38</sup> Following the general rules, CFI or TLI values higher than 0.90 and RMSEA values lower than 0.08 suggest an acceptable model fit.<sup>39</sup> Standardized coefficients ( $\beta$ ) are used to interpret the effect of each independent variable on the outcome.

## Results

### Descriptive Statistics and Correlations

Table 2 presents the means, standard deviations, and correlations of the minimum, maximum, Skewness, Kurtosis, KMO, and Bartlett’s test of sphericity. Correlations between study variables at all occasions are presented in Table 3. Correlations among the study variables showed that all constructs were stable over time. Correlations between Competitive classroom climate, upward comparison, and learning motivation were significant and in the expected direction at most time points. However, correlations with downward comparison were smaller and not always significant.

### The Relation Between Competitive Classroom Climate and Learning Motivation

To investigate the relation between competitive classroom climate and learning motivation, we tested a cross-lagged model that included competitive classroom climate and learning motivation at the three waves (see Figure 2). This model was found to provide an acceptable fit to the data ( $\chi^2/df = 2.91$ , CFI = 0.98, TLI = 0.90, SRMR = 0.02, RMSEA = 0.06). The autoregressive effects (ie, prediction of a variable by its own level at the previous occasion) describe the stability of the competitive classroom climate and learning motivation from T1 to T3 ( $\beta = 0.27\text{--}0.90$ ,  $p_s < 0.05$ ). The result also showed that competitive classroom climate significantly increased learning motivation from Wave 1 to Wave 2 ( $\beta = 0.11$ ,  $p < 0.05$ ), and from Wave 2 to Wave 3 ( $\beta = 0.10$ ,  $p < 0.05$ ).

### Indirect Effects Through Upward Comparison and Downward Comparison

Four parallel multiple mediator models were established to test the indirect effects of competitive classroom climate on learning motivation through upward comparison and downward comparison, controlling for age and gender.

**Table 2** The Mean and Standard Deviation of Main Variables

Variable	M	SD	Minimum	Maximum	Skewness	Kurtosis	KMO	Bartlett's Test of Sphericity		
								$\chi^2$	df	p
1 T1 CCC	2.85	0.76	1	5	0.19	-0.06	0.69	212.99	6	< 0.001
2 T2 CCC	2.89	0.70	1	5	0.40	0.26	0.64	166.93	6	< 0.001
3 T3 CCC	2.93	0.72	1	5	0.06	0.14	0.62	185.95	6	< 0.001
4 T1 UC	3.65	0.78	1	5	-0.37	-0.02	0.83	1334.86	21	< 0.001
5 T2 UC	3.36	0.81	1	5	-0.37	0.43	0.90	1536.52	21	< 0.001
6 T3 UC	3.41	0.84	1	5	-0.40	0.19	0.88	1433.04	21	< 0.001
7 T1 DC	1.76	0.89	1	5	1.43	1.82	0.93	2812.72	15	< 0.001
8 T2 DC	2.05	0.81	1	5	0.36	-0.42	0.92	2066.95	15	< 0.001
9 T3 DC	2.09	0.81	1	5	0.78	1.09	0.92	2225.21	15	< 0.001
10 T1 LM	3.60	0.61	1	5	-0.12	0.43	0.77	1120.76	45	< 0.001
11 T2 LM	3.50	0.59	1	5	-0.01	0.37	0.81	1053.36	45	< 0.001
12 T3 LM	3.65	0.58	1	5	-0.29	0.52	0.79	1261.46	45	< 0.001

**Table 3** Correlations for the Study Variables

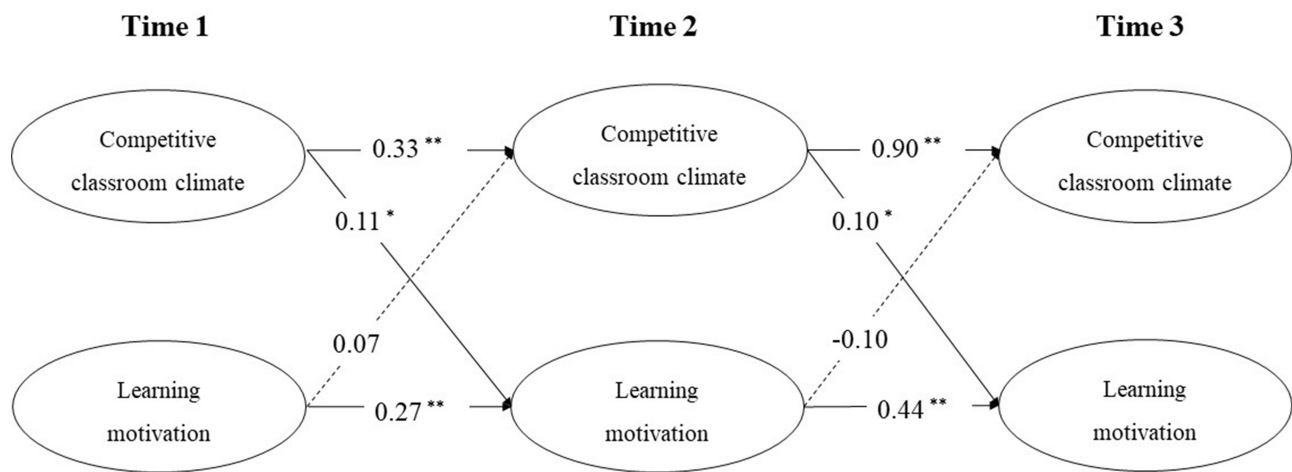
Variable	Correlations										
	1	2	3	4	5	6	7	8	9	10	11
1 T1 CCC											
2 T2 CCC	0.34**										
3 T3 CCC	0.27**	0.32**									
4 T1 UC	0.25**	0.14**	0.12*								
5 T2 UC	0.08	0.12*	0.17**	0.38**							
6 T3 UC	0.08	0.08	0.16**	0.23**	0.48**						
7 T1 DC	0.10*	0.02	0.10	0.03	-0.02	-0.02					
8 T2 DC	-0.08	0.07	-0.05	-0.05	-0.08	-0.14*	0.23**				
9 T3 DC	0.01	0.07	0.19**	-0.01	-0.03	-0.07	0.27**	0.26**			
10 T1 LM	0.20**	0.15**	0.13**	0.37**	0.24**	0.12*	0.07	-0.03	-0.04		
11 T2 LM	0.11*	0.25**	0.09	0.31**	0.59**	0.35**	-0.01	-0.18*	-0.06	0.30**	
12 T3 LM	0.07	0.06	0.29**	0.25**	0.42**	0.56**	0.14	-0.14*	-0.06	0.23**	0.47**

Note: \* $p < 0.05$ , \*\* $p < 0.01$  (two-tailed).

Abbreviations: CCC, competitive classroom climate; UC, upward comparison; DC, downward comparison; LM, learning motivation.

### Concurrent Mediation Analysis

We estimated mediation models in a structural equation modeling framework to examine the indirect effect(s) of competitive classroom climate on learning motivation through upward comparison and downward comparison.<sup>40</sup>



**Figure 2** The cross-lagged longitudinal relationships between competitive classroom climate and learning motivation. **Notes:** Dashed lines represent nonsignificant relations; Solid lines represent significant relations. Standardized coefficients ( $\beta$ ) are used to interpret the effect of each independent variable on the outcome. Within-time correlations, and paths from the covariates student gender, student age, and items that constructed the latent variables are not drawn in the figure were not presented for reasons of clarity.\* $p < 0.05$ ; \*\* $p < 0.01$ .

Model 1, Model 2, and Model 3 are the parallel multiple mediator models in the first wave, the second wave, and the third wave, respectively. These models demonstrated relatively good model fit (see Table 4). In the concurrent models, the indirect effect from competitive classroom climate to learning motivation through upward comparison was significant in all three waves (Wave 1:  $\beta = 0.09, p < 0.01, 95\% \text{ CI: } [0.06, 0.14]$ ; Wave 2:  $\beta = 0.07, p < 0.05, 95\% \text{ CI: } [0.01, 0.13]$ ; Wave 3:  $\beta = 0.09, p < 0.05, 95\% \text{ CI: } [0.03, 0.16]$ ). Contrary to our expectations, the indirect effect from competitive classroom climate to learning motivation through downward comparison was not significant in all three waves (Wave 1:  $\beta = 0.01, p > 0.05, 95\% \text{ CI: } [-0.01, 0.03]$ ; Wave 2:  $\beta = -0.01, p > 0.05, 95\% \text{ CI: } [-0.03, 0.01]$ ; Wave 3:  $\beta = -0.01, p > 0.05, 95\% \text{ CI: } [-0.03, 0.01]$ ).

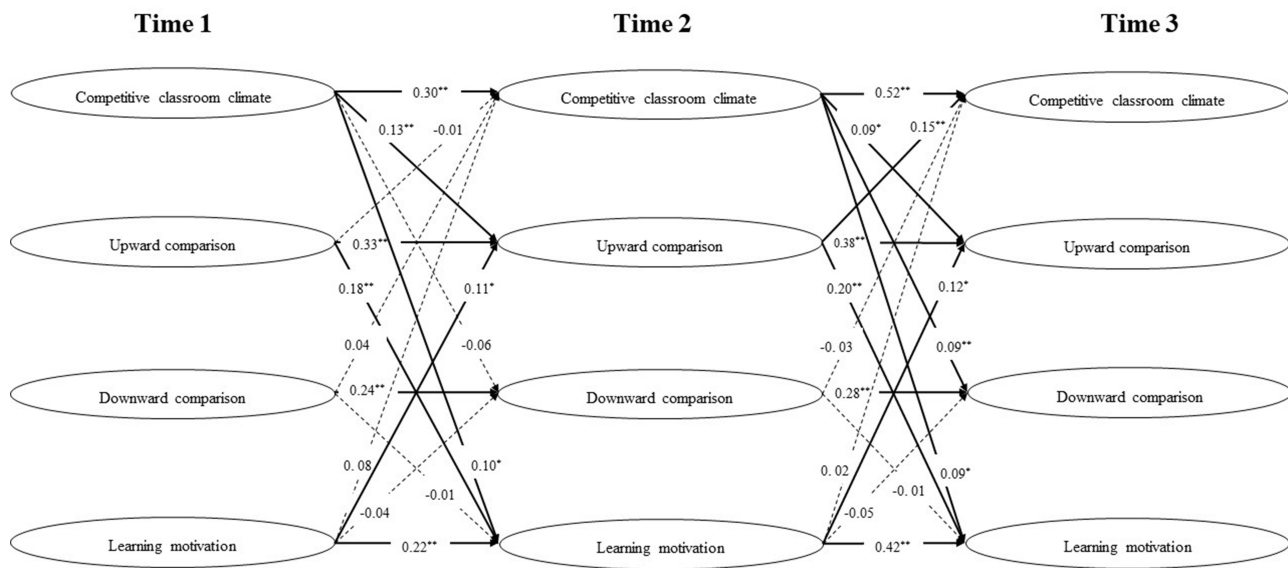
### Longitudinal Mediation Analyses

We examined a cross-lagged model that included competitive classroom climate, upward comparison, downward comparison, and learning motivation; each was measured at all three waves. In this model, we specifically investigated the indirect effect of competitive classroom climate at Wave 1 on learning motivation at Wave 3 through upward comparison and downward comparison at Wave 2. The model had an acceptable fit by most criteria,  $\chi^2/df = 2.44, \text{ CFI} = 0.95, \text{ TLI} = 0.91, \text{ RMSEA} = 0.06, \text{ SRMR} = 0.05$ . As illustrated in Figure 3, competitive classroom climate at Wave 1 was significantly related to upward comparison at Wave 2 ( $\beta = 0.13, p < 0.01$ ). Upward comparison at Wave 2 was significantly related to learning motivation at Wave 3 ( $\beta = 0.20, p < 0.01$ ). The longitudinal indirect effect of competitive classroom climate on learning motivation through upward comparison was significant ( $\beta = 0.04, p < 0.05, 95\% \text{ CI: } [0.01, 0.19]$ ). However, competitive classroom climate at Wave 1 did not significantly predict downward comparison at Wave 2 ( $\beta = -0.06, p > 0.05$ ). Downward comparison at Wave 2 did not significantly predict

**Table 4** Fit Indices for All Three Wave Models

	$\chi^2/df$	CFI	TLI	SRMR	RMSEA 90% CI	
					LL	UL
Model 1	3.23	0.96	0.87	0.03	0.04	0.10
Model 2	2.84	0.99	0.94	0.03	0.05	0.09
Model 3	4.61	0.98	0.90	0.03	0.06	0.11

**Notes:** Model 1 is the parallel multiple mediator models in the first wave. Model 2 is the parallel multiple mediator models in the second wave. Model 3 is the parallel multiple mediator models in the third wave.



**Figure 3** The cross-lagged panel model for competitive classroom climate, upward comparison, downward comparison, and learning motivation.

**Notes:** Dashed lines represent nonsignificant relations; Solid lines represent significant relations. Standardized coefficients ( $\beta$ ) are used to interpret the effect of each independent variable on the outcome. Within-time correlations, and paths from the covariates student gender, student age, and items that constructed the latent variables are not drawn in the figure were not presented for reasons of clarity.\* $p < 0.05$ ; \*\* $p < 0.01$ .

learning motivation at Wave 3 ( $\beta = -0.01$ ,  $p > 0.05$ ). The longitudinal indirect effect of competitive classroom climate on learning motivation through downward comparison was not significant ( $\beta = 0.01$ ,  $p > 0.05$ , 95% CI:  $[-0.01, 0.02]$ ).

## Discussion

In this study, we focused on learning motivation from a developmental perspective. The current study demonstrated the concurrent and longitudinal relations between competitive classroom climate and learning motivation. It also validated the mediating role of upward comparison between competitive classroom climate and learning motivation.

### The Relation Between Competitive Classroom Climate and Learning Motivation

Using a cross-lagged model, our research found that competitive classroom climate was positively associated with learning motivation over time. The results were in line with theoretical arguments that competitive classroom climate has been recognized as an opportunity to improve students' academic achievement.<sup>3</sup> As predicted, competitive classroom climate could help students to set specific goals, enhance their sense of challenge, and increase their learning motivation to study.<sup>41</sup> Thus, competitive classroom climate appears to serve as a booster to learning for adolescents. Our findings support recent calls to broaden the lens on how classroom climate shapes student outcomes over time<sup>15</sup> and provide evidence for the positive effect of competitive classroom climate on learning motivation.

### The Mediating Role of Upward Comparison and Downward Comparison

In this study, we explored the potential mechanisms underlying the association between competitive classroom climate and learning motivation. The two dimensions of social comparison yielded different patterns in relation to this connection. As hypothesized, competitive classroom climate was positively related to upward comparison, which, in turn, was related to higher learning motivation. For upward comparison, similar patterns occurred for both concurrent and longitudinal associations between competitive classroom climate and learning motivation. This finding is reasonable and consistent with previous research. Specifically, in a competitive context, seeing another person succeed may increase students' desire to improve themselves, which results in increased upward comparison.<sup>10,27</sup> When comparing upward, students report wanting to sit next to someone who is slightly better than themselves during a seating arrangement. Learning with a more capable student can lead to self-improvement, which further increases learning motivation in adolescents.<sup>42</sup>



However, the mediating role of downward comparison in the relation between competitive classroom climate and learning motivation behavior was not significant. It is plausible that senior high school students face substantial academic pressure due to the National College Entrance Examination in China, which is essentially the sole selection criterion for college admission. As the primary method to enter tertiary education in China, the National College Entrance Examination is often referred to as a “single wooden pole bridge” for millions of senior high school students to attend a university in a metropolis and potentially to have a better life afterward,<sup>43</sup> which increases their desire to maintain upward comparison rather than downward comparison tendencies. Another possible explanation is that continued comparison with others doing poorly may lead to a sense of complacency.<sup>44</sup> The sense of complacency may be effective in alleviating negative moods and boosting self-esteem; however, it is likely to weaken learning motivation.<sup>26</sup>

## Theoretical Implications

Our findings have important theoretical implications. First, research on classroom climate and learning motivation of adolescents in Chinese societies has only begun in recent years and is still scarce.<sup>45</sup> Our findings extend previous research that considered competitive classroom climate. Second, the present study extends SCT by using concurrent and longitudinal data to show how competitive classroom climate indirectly affects learning motivation through upward comparison. In addition, the present study distinguished the differences between upward comparison and downward comparison in predicting learning motivation. Thus, considering the target selection of comparison is prominent.<sup>10</sup>

## Practical Implications

Our findings also provide practical implications in several ways. Specifically, the findings suggest that competitive classroom climate can improve students' learning motivation over time. The competition allows students to exploit their real capabilities and maximize their true potentials. Evidence shows that competitive classroom climate may be activated through fighting for trophies. Thus, to improve students' learning motivation, teachers could encourage their students to compete against each other and make the competitions about more than simply winning one trophy. In addition, as suggested from the results of this research, upward comparison with a superior other who has achieved success can improve learning motivation. Our findings can increase teachers' understanding of the potential benefits of upward comparison. Although the upward comparison is common among adolescent students, teachers can improve students' upward comparison by building class ranking system, setting achievement goals for students, and forming peer buddy study groups.

## Limitations, and Future Directions

Even though evidence provided in this study supports the concurrent and longitudinal association between competitive classroom climate and learning motivation, several limitations to this study should be noted. First, the study relied solely on student-reported data, which increases the likelihood of self-report or social desirability bias. Future research would benefit from collecting multisource data to replicate our study. Second, recent studies found that if a comparison standard is too far off from the individual's standing, the comparison to more successful others may be counterproductive, and a decrease in motivation will lead to effort withdrawal.<sup>46</sup> Thus, it is vital that future research identify and investigate the environmental circumstances and individual differences that moderate the effects of upward comparison on motivation. Finally, learning motivation can be divided into three subtypes, which are intrinsic motivation, extrinsic motivation, and amotivation.<sup>29</sup> Future research is needed to explore the effect of social comparison on different types of learning motivation.

## Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

## Ethics Statement

This study was carried out following the recommendations of the Ethical Principles of Psychologists and Code of Conduct by the American Psychological Association (APA). All participants gave written informed consent following the Declaration of Helsinki. The ethics committee of the Faculty of Psychology at Beijing Normal University approved the study.

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## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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## Disclosure

The authors report no conflicts of interest in this work.

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