The Mechanism of Shared Positive Experiences in Promoting Teacher-Student Relationships: The Mediating Role of Emotional Connection

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Abstract

Based on questionnaire surveys, field experiments, and laboratory experiments, this study examined the influence of positive shared experiences on teacher-student relationships among adolescents and its underlying mechanisms. The results indicate: (1) positive shared experiences positively influence teacher-student relationships, with different types of experiences (recollection, imagination, and exemplars) all demonstrating a facilitative effect; (2) positive emotional connection plays a stable mediating role in the relationship between positive shared experiences and teacher-student relationships. This study preliminarily proposes a "Shared Experience Relationship Effect Model," advancing research on the influencing mechanisms of teacher-student relationships, and possesses good ecological validity and practical educational value.

Full Text

The Mechanism by Which Positive Co-Experience Promotes Teacher-Student Relationships: The Mediating Role of Emotional Bonding

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Abstract

Based on questionnaire surveys, field experiments, and laboratory experiments, this study examined the influence of positive co-experience on teacher-student relationships among adolescents and its underlying mechanism. The results demonstrated that: (1) positive co-experience positively influences teacher-student relationships, with different types of experiences (recollection, imagination, and exemplars) all showing facilitative effects; (2) positive emotional bonding consistently mediates the relationship between positive co-experience and teacher-student relationships. This study preliminarily proposes a "Co-Experience Relationship Effect Model," advancing research on the mechanisms influencing teacher-student relationships and demonstrating strong ecological validity and practical educational value.

Keywords: teacher-student relationship, positive co-experience, experience type, emotional bonding

1. Problem Statement

Teacher-student relationships influence students' classroom engagement, academic achievement, and learning motivation (Pianta et al., 2012), and high-quality teacher-student relationships are also closely related to the mental health of both teachers and students (Veldman et al., 2013). As an important attachment relationship during adolescence—a period when individuals develop their self-identity—teacher-student relationships hold particularly significant meaning for adolescent growth and development (Verschueren & Koomen, 2012).

Revealing the mechanisms that influence teacher-student relationships is a prerequisite for realizing their educational and nurturing value. In recent years, researchers have primarily investigated the factors affecting teacher-student relationships from the perspectives of individual characteristics and behaviors of students or teachers (Sewell et al., 2013) and objective external environments (Liang et al., 2020). However, insufficient attention has been paid to co-experience between teachers and students—a factor that directly reflects relational attributes—and its effects. Co-experience is both common and crucial in daily life (Haj-Mohamadi et al., 2018). Research indicates that teacher-student relationships originate from instructional interactions and jointly participated campus activities (Krane et al., 2017), and these positive co-experiences between teachers and students are universally present in educational practice and hold universal value. From the perspective of relational connotation, positive co-experience may be more fundamental among factors influencing teacher-student relationships. Relationships are typically defined as enduring connections between individuals, manifested as continuity across different contexts and activities, shared history, and interdependence (Collins & Repinski, 1994). Positive co-experience can transform "I" into "we" at the psychological level, thereby generating greater trust and willingness to interact (Hopkins et al., 2016). In this sense, co-experience is not only a manifestation of relationships but also a

foundation for their development. Previous studies have discovered the role of positive co-experience in the development of interpersonal relationships such as peer relationships (Moon & Ke, 2020), but research in the domain of teacher-student relationships remains scarce, and discussions of its mechanisms are even rarer.

1.1 Positive Co-Experience and Its Relational Effects

Co-experience refers to two or more individuals participating in the same activity (Miao et al., 2021). In terms of the nature of experiences, it includes various types such as real-time reported or recalled authentic experiences (Barber, 2014), imagined virtual experiences (Stathi et al., 2011), and vicarious experiences when observing exemplars (Denisenkova & Nisskaya, 2016). Based on event valence, it can be divided into positive and negative co-experiences (Berman et al., 2002), with positive co-experience receiving more attention and its effects manifesting across all stages of relationship establishment, maintenance, and restoration (EMR) (Cook et al., 2018).

First, positive co-experience serves as the foundation for establishing interpersonal relationships. Wolf et al. (2015) found that even when pairs of strangers merely looked at a screen together without other interactions, participants reported experiencing a relatively positive relationship with the other person. Second, positive co-experience strengthens relationship maintenance. Previous research has found that after traveling together, the quality of interpersonal relationships improves (de Bloom et al., 2016). Fredrickson (2016) further discovered that even low-frequency co-experiences of positive emotional events are considered effective methods for enhancing relationship quality. Finally, when interpersonal conflicts occur, positive contact and other co-experiences facilitate relationship restoration. Webb et al. (2017) demonstrated that synchronous walking movements between conflicting parties help them discover more potential solutions. Thus, positive co-experience demonstrates facilitative effects at all stages of relationship development.

According to the developmental assets model, relationships are important external resources for adolescents (Benson, 2003). Positive co-experiences with family members and peers help establish positive relational schemas (Wang et al., 2013), and improvements in teacher-student relationship quality are inseparable from the support of positive co-experience (Krane et al., 2017). International research on positive teacher-student co-experience provides evidence in this regard. In a feedback experiment where teachers and students shared similarities, teachers who perceived multiple similarities with a student tended to report better teacher-student relationships with that student (Gehlbach et al., 2016). Subsequently, Aasheim et al. (2018) implemented the "Incredible Years Teacher Classroom Management (IY-TCM)" program as an intervention for school-wide teacher-student relationships and found that joint participation in the program had a modest positive effect on changes in teacher-student closeness and conflict. More recent research has also found that positive interactive experiences

between teachers and students on social networks can promote relationship development, not limited to traditional face-to-face experiences (Kasperski & Blau, 2020). In summary, there is reason to speculate that positive co-experience similarly has a positive impact on teacher-student relationships among Chinese adolescents. Furthermore, according to the Generalization Effect of Social Information (Kocsor & Bereczkei, 2017), individuals' experiences with specific participants influence their expectations and impressions of the specific social group to which those participants belong, causing cognition of specific individuals within a group to generalize to the group as a whole. Neuroscience also provides evidence (Moseley & Vlaeyen, 2015) that the precision of the brain' s encoding of relationships with specific individuals determines the degree of generalization. Therefore, we speculate that positive co-experience may not only affect the relationship between the student and the specific teacher in the experience but may even generalize to the teacher group, thereby exerting a "love me, love my dog" transfer effect.

1.2 The Mechanism by Which Positive Co-Experience Promotes Relationship Development

How does positive co-experience promote relationship development? As emotional bonds, interpersonal relationships are based on mutual emotional investment (Bian & Miao, 2020). They depend not only on the quality of interaction between the parties but also on individuals' internal perceptions and feelings toward others, such as sense of belonging, trust, and emotional bonding (Sabol & Pianta, 2012). These factors have increasingly attracted widespread attention in interpersonal relationship development (Slanbekova et al., 2019; Wood & Kinnunen, 2020). Among them, emotional bonding may be one of the core mechanisms through which positive co-experience promotes interpersonal relationships.

Emotional bonding refers to the perceived strength of emotional connection during the process of bidirectionally establishing affective interpersonal relationships (Toyoda, 2000), with positive emotional bonding manifested as emotional experiences such as anticipation, hope, happiness, and pride (Wood & Kenyon, 2018). These emotions provide the foundation for solid relationship quality (Wood & Kinnunen, 2020). On the one hand, co-experiences such as participating in activities or collaborating on tasks together (Haj-Mohamadi et al., 2018; Miao et al., 2021) form the basis for establishing affective relationships and emotional bonding. Research shows that compared to sharing negative experiences, when participants share positive experiences with each other, listeners' positive emotions toward one another increase (Warchol, 2015). Compared to viewing alone, individuals experience deeper positive emotional bonding when viewing pleasant photos with friends (Shteynberg et al., 2014). According to the Effect of Group-Shared Emotion Theory, emotions generated in co-experience are richer than those in solitary experience (Wang et al., 2017). Individuals evaluate the situation and emotional events during positive co-experience, and when

individual emotions are confirmed by others' emotions, a positive emotional amplification effect occurs. On the other hand, the establishment of positive emotional bonding is also a fundamental condition for further promoting interpersonal relationships (Fredrickson, 2016). According to Attachment Theory, the tendency toward emotional convergence between people is a primitive form of interpersonal coordination that generates attachment relationships (Keltner & Haidt, 1999). Positive emotional bonding formed through co-experience enables both parties to form attachments, thereby promoting interpersonal relationship development (Noller & Feeney, 2000). The accumulation of positive emotional bonding in co-experience also promotes perceived resources related to relationship quality such as connectedness, security, and support (Fredrickson, 2016), thus exerting relationship-promoting effects.

Education is a process of emotional practice (Hargreaves, 2000). In school education, daily interactions and activity participation between teachers and students not only evoke emotional experiences in both parties but also establish emotional bonding that becomes the core of teacher-student attachment relationships (Cross & Hong, 2012). Research shows that teacher-student emotional bonding is a result of bidirectional construction, representing a process where teachers' and students' psychological states and behaviors interact to form emotional relationships (Frenzel et al., 2018). Once formed, this emotional bonding triggers cognitive and emotional states in both parties during future co-experiences (Koenen, Vervoort, et al., 2019), thereby generating cumulative effects on relationship development. These effects may also be related to variables that influence teacher-student emotional practice, such as gender and student cadre status. For example, previous research has found that girls have more harmonious teacher-student relationships with their teachers than boys (Kurdi & Archambault, 2018), while student cadres have higher interaction frequency with teachers (Huang et al., 2021). In summary, positive co-experience is essentially a process of positive emotional bonding, which in turn serves as the emotional foundation for future co-experiences. Thus, it is not difficult to speculate that emotional bonding is an important mechanism through which positive co-experience promotes teacher-student relationships.

As previously mentioned, co-experience has different types. Research shows that recalling authentic positive co-experiences with others helps individuals maintain positive emotions toward co-experiencers (Brown et al., 2021; Puente & Cavazos, 2016). Imagined positive co-experience, though a virtual experience (Stathi et al., 2011), can similarly evoke emotions akin to authentic experiences, enhancing the expression of emotional and behavioral reactions (Garcia et al., 2002), thereby promoting relationship development. Relationships are a learning process (Yeadon, 2013), and according to Social Learning Theory, exemplars or role models can promote social development (Bandura, 1978). In school life, adolescents may also receive vicarious reinforcement and feedback from others' experiences (exemplar observation), thereby enhancing their own emotional bonding with teachers and promoting teacher-student relationships. In conclusion, we infer that whether through recollection, imagination, or observation

of exemplars, positive co-experience has teacher-student relationship-promoting effects due to the role of positive emotional bonding.

1.3 Research Design

Based on the above literature review and theoretical derivation, this study adopts an education-oriented positive perspective to explore the influence of positive co-experience on teacher-student relationships and proposes two core hypotheses: different types of positive co-experience can positively predict teacher-student relationships (Hypothesis 1); and emotional bonding mediates the relationship between positive co-experience and teacher-student relationships (Hypothesis 2). Using adolescent students as participants, three studies were conducted to test these hypotheses: Study 1 examined the relationships at the macro level through questionnaire surveys; Studies 2 and 3, based on field and laboratory experiments respectively, drew on previous measurement methods for interpersonal relationships (Koenen et al., 2019) and used state teacher-student relationships as the dependent variable to further explore the effects of positive co-experience and different types of experiences on state teacher-student relationships at the micro level and reveal the mediating role of emotional bonding.

2.1.1 Participants

Through cluster sampling, 1,420 participants from 30 classes in two middle schools in Anhui Province were surveyed on-site, yielding 1,273 valid participants with a mean age of 14.84 $\pm$ 1.58 years, including 684 males and 589 females. The distribution across grades 7 through 12 was 176, 268, 227, 203, 194, and 205 students, respectively.

2.1.2 Research Instruments

Self-Compiled Positive Co-Experience Questionnaire. First, an open-ended questionnaire was administered to 80 middle school students and 20 teachers from two middle schools in Shanghai, collecting 32 positive teacher-student co-experience events. Two psychology professors and 24 graduate students evaluated the typicality of these events, selecting 24 items scoring above 3 (on a 4-point scale) to form the initial questionnaire, using a 4-point scale from "never" to "always." Next, 244 students from another middle school in Shanghai completed the preliminary questionnaire. After item analysis, the top 27% and bottom 27% of participants showed significant differences at the 0.001 level on all items. Exploratory factor analysis retained 16 items forming a single dimension, with factor loadings ranging from 0.51 to 0.77, cumulatively explaining 37.76% of total variance, with KMO = 0.90 and Bartlett' s test = 1706.34. Finally, another 226 students from a Shanghai middle school completed the questionnaire, yielding Cronbach' s $\alpha = 0.89$. Confirmatory factor analysis results were: ^{2}/df = 2.61, NFI = 0.80, IFI = 0.86, CFI = 0.86, RMSEA = 0.08, SRMR = 0.048, indicating acceptable reliability and validity.

Teacher-Student Relationship Questionnaire. The questionnaire revised by Zou et al. (2007) was adopted, comprising four dimensions: intimacy, conflict, support, and satisfaction, rated on a 1-5 scale, with original Cronbach' s α coefficients of 0.71-0.87. In this study, three dimensions (intimacy, support, and satisfaction) were selected, with good confirmatory factor analysis indices (n = 250): ^{2}/df = 2.27, NFI = 0.85, IFI = 0.91, CFI = 0.91, RMSEA = 0.07, SRMR = 0.065. Cronbach' s α = 0.86.

Positive Emotional Bonding Questionnaire. Adapted from the Relationship Closeness Induction Task questionnaire (Sedikides et al., 1999) and emotional bonding measurement (Bastian et al., 2014), it contains 5 items (e.g., "How much do you trust your teacher?") rated on a 1-5 scale (from "not at all" = 1 to "very much" = 5). Confirmatory factor analysis showed good indices (n = 250): ^{2}/df = 2.63, NFI = 0.97, IFI = 0.98, CFI = 0.98, RMSEA = 0.08, SRMR = 0.033. Cronbach' s α = 0.83.

Academic Performance Level Self-Assessment. Following the approach of Lu et al. (2009), participants were asked to recall recent examinations and self-evaluate their overall learning level within the class, divided into three levels: above-average, average, and below-average.

2.2.1 Common Method Bias Test

To control for common method bias, questionnaires were distributed anonymously. Harman' s single-factor analysis was used to test the severity of common source error in this study' s data. Before factor rotation, the first factor explained 24.41% of the variance (below the 40% cutoff) (Zhou & Long, 2004), indicating no serious common method bias.

2.2.2 Hypothesis Testing

Correlation analysis was conducted among gender, student cadre status, self-assessed academic level, positive co-experience, positive emotional bonding, and teacher-student relationships. Results showed that except for gender, all other variables were significantly correlated with each other (see Table 1).

Table 1 Descriptive Statistics and Correlation Matrix of Variables (N = 1273)

Note: Gender and student cadre status are dummy variables: male = 0, female = 1; student cadre = 0, non-cadre = 1. $p < 0.05$, **p* < 0.01,** $p < 0.001$. The same applies below.

Using student cadre status as a control variable, positive co-experience as the independent variable, teacher-student relationship as the dependent variable, and positive emotional bonding as the mediating variable, Hayes' (2013) SPSS macro PROCESS Model 4 was used to test the mediating effect of positive emotional bonding between positive co-experience and teacher-student relationships. Results showed (see Table 2) that positive co-experience significantly predicted

positive emotional bonding, $a = 0.51$, SE = 0.04, $p < 0.001$. When positive co-experience and positive emotional bonding were entered simultaneously into the regression equation, positive co-experience significantly predicted teacher-student relationships, $c' = 0.26$, SE = 0.03, $p < 0.001$, and positive emotional bonding significantly predicted teacher-student relationships, $b = 0.34$, SE = 0.02, $p < 0.001$. Bias-corrected percentile Bootstrap method indicated that the mediating effect of positive emotional bonding between positive co-experience and teacher-student relationships was significant, $ab = 0.17$, BootSE = 0.02, 95% CI [0.15, 0.21]. The proportion of mediating effect to total effect was $ab/(ab + c') = 38.64\%$.

PROCESS Model 5 was used to test the moderating effect of self-assessed academic level. Results showed (Table 2, Figure 1 [Figure 1: see original paper]) that the direct positive effect of positive co-experience on teacher-student relationships was not significant ($\beta = 0.07$, $p = 0.34$), while the interaction term between positive co-experience and self-assessed academic level significantly positively predicted teacher-student relationships ($\beta = 0.08$, $p = 0.01$), indicating a moderating effect of self-assessed academic level. Simple slope tests showed that the positive predictive effect of positive co-experience on teacher-student relationships increased with higher self-assessed academic levels: for below-average students, the positive predictive effect was not significant (simple slope = 0.08, $t = 1.56$, $p = 0.12$, 95% CI [-0.02, 0.18]); for average students, the effect was significant (simple slope = 0.28, $t = 7.70$, $p < 0.001$, 95% CI [0.21, 0.35]); and for above-average students, the effect was also significant (simple slope = 0.27, $t = 6.99$, $p < 0.001$, 95% CI [0.19, 0.35]) (see Appendix).

Table 2 Moderated Mediation Model (N = 1273)

Study 1 also found significant differences in teacher-student relationships across classes ($F = 16.86$, $p < 0.001$). Therefore, the average positive emotional bonding score for each class was taken as a Level-2 variable for further multilevel analysis. Results showed that class-level positive emotional bonding had no significant effect on teacher-student relationships ($\beta = 0.01$, $p = 0.98$), and the moderating effect of class-level positive emotional bonding on the influence of positive co-experience on teacher-student relationships was not significant ($\beta = 0.10$, $p = 0.65$).

2.3 Summary

Study 1 verified the hypotheses at the overall macro level: positive co-experience directly and positively predicted teacher-student relationships, with positive emotional bonding playing a partial mediating role that was moderated by self-assessed academic level. However, the survey in Study 1 could not reveal the causal relationship between positive co-experience and teacher-student relationships, and all positive co-experiences were self-reported by participants. Therefore, Studies 2 and 3 adopted experimental research to directly manipulate positive co-experience and control for participants' self-assessed academic level

(measured the same way as in Study 1) to further explore the causal relationship between positive co-experience and state teacher-student relationships at the micro level and the mechanism of emotional bonding.

3.1 Experimental Design

A mixed experimental design of 2 (time: pre-test/post-test) × 3 (positive co-experience group: sharing and recall group/simple recall group/no recall group) was adopted, with the latter as a between-subjects variable. According to G*Power 3.1 calculations, with statistical power set at 1 - β = 0.80, two-tailed test α = 0.05, and effect size* d* = 0.80, the minimum sample size required for ANOVA was 81 participants. Using a school-based research paradigm (Zhang et al., 2022), all 369 junior high school students from grades 6–9 in a Shanghai middle school were included as the pre-test sample, with 305 valid participants matched in the post-test. The mean age was 12.71 ± 1.30 years, including 153 males and 152 females, with 99, 77, 82, and 47 students in the four grades, respectively. One to two classes from each grade were randomly selected for each positive co-experience group. Tests showed no significant differences among the three groups in self-assessed academic level ($F = 0.50$, $p = 0.60$).

3.2 Research Instruments

Teacher-Student Relationship Questionnaire. Same as in Study 1, with Cronbach' s $\alpha = 0.73$ in this experiment.

State Teacher-Student Relationship Measurement. To ensure result stability, two measurement tools were used for the dependent variable. First, the Psychological Distance Scale. Using the Inclusion of Other in the Self scale (Aron et al., 1992), state teacher-student relationships were measured by the degree of circle overlap reflecting psychological distance, on a 7-point scale. Second, drawing on Koenen et al.' s (2019) method for measuring teacher-student relationships, the vignette task designed by Brophy and McCaslin (1992) after nearly 100 teacher interviews was adopted to measure state teacher-student relationships, containing 5 scenarios with 3 questions each. The Chinese version after translation was discussed by two psychology professors and seven graduate students, with question wording adjusted to better fit the Chinese educational context. Exploratory factor analysis revealed that the three questions formed three dimensions, with Cronbach' s α coefficients of 0.76, 0.85, and 0.94, respectively. Confirmatory factor analysis showed good fit: ^{2}/df = 2.70, NFI = 0.93, IFI = 0.96, CFI = 0.96, RMSEA = 0.09, SRMR = 0.037.

Positive Co-Experience Measurement. Same as in Study 1, with Cronbach' s $\alpha = 0.90$ in this experiment.

Emotional Bonding Measurement. Following Wood and Kenyon (2018), emotional bonding characteristics can be expressed through emotional vocabulary. Therefore, drawing on the Positive and Negative Affect Schedule (PANAS,

Watson et al., 1988) and the Academic Emotions Questionnaire (Dong & Yu, 2007), four emotion words were selected: "happy," "sad," "proud," and "nervous." Participants reported their emotional experiences in the relationship with their teacher (item: "My relationship with the teacher who participated in the sports festival with me is happy/sad/proud/nervous") rated on a 1–5 scale. The correlation coefficients for positive and negative emotional bonding words were 0.54 and 0.46, respectively, $ps < 0.001$.

3.3 Experimental Procedure

Using the school-wide sports festival as an authentic context for teacher-student co-experience, the first phase was the pre-test: three days before the sports festival, the teacher-student relationship questionnaire, psychological distance scale, and positive co-experience questionnaire were administered by class. The second phase was the positive co-experience: on the day of the sports festival, all teachers and students participated in various activities, with photos taken of teachers and students participating together. Afterward, photo albums were made by class, with consistent photo quantity (11 photos), duration (60 seconds), and resolution (2000 × 1500 pixels). The third phase was the post-test: three days after the sports festival, the post-test was implemented. Students in the sharing and recall group watched the photo album and then shared their sports festival experiences with their homeroom teachers before completing measurements of psychological distance, vignette task, and emotional bonding. Students in the simple recall group only watched the album before post-test measurement. The no recall group completed measurements directly.

3.4.1 Manipulation Check

One-way ANOVA on pre-test data showed no significant differences among the three groups in total positive co-experience scores, $F(2, 302) = 1.46$, $p = 0.23$; psychological distance, $F(2, 302) = 1.43$, $p = 0.06$; or teacher-student relationships, $F(2, 302) = 2.74$, $p = 0.24$. This indicated that the three groups were homogeneous before the sports festival positive co-experience.

3.4.2 Hypothesis Testing

Descriptive statistics are presented in Table 3 . ANOVA was conducted on post-test positive and negative emotional bonding across the three groups. Results showed a significant main effect for positive emotional bonding, $F(2, 302) = 5.69$, $p = 0.004$, $^{2} = 0.04$. Post-hoc tests found no difference between the sharing and recall group and the simple recall group ($M = 3.79$, SD = 0.91, $p = 1.00$), but both were significantly higher than the no recall group ($M = 3.79$, SD = 0.91, $p = 0.003$); the simple recall group was also significantly higher than the no recall group ($p = 0.04$). The main effect for negative emotional bonding was not significant, $F(2, 302) = 0.90$, $p = 0.41$.

ANOVA with psychological distance as the dependent variable showed significant main effects for time, $F(1, 302) = 15.28$, $p < 0.001$, $^2 = 0.05$, 95% CI [0.01, 0.10]; group, $F(2, 302) = 3.12$, $p = 0.04$, $^2 = 0.02$, 95% CI [0.00, 0.06]; and a non-significant time × group interaction, $F(2, 302) = 1.16$, $p = 0.26$, $^2 = 0.01$. One-way ANOVA on post-test vignette task scores showed significant differences, $F(2, 302) = 4.55$, $p = 0.01$, $^2 = 0.03$, 95% CI [0.00, 0.07], with post-hoc multiple comparisons revealing that the sharing and recall group scored significantly higher than both the simple recall group ($p = 0.05$) and the no recall group ($p = 0.02$).

Table 3 Descriptive Statistics (N = 305)

To further test whether positive and negative emotional bonding mediate the effect of positive co-experience on teacher-student relationships, the no recall group was used as the reference, and the independent variable was coded as dummy variables (Dummy 1: simple recall group = 1, no recall group = 0, sharing and recall group = 0; Dummy 2: no recall group = 0, simple recall group = 0, sharing and recall group = 1). Psychological distance and vignette task scores were used as dependent variables, and emotional bonding as the mediating variable. Relative mediation effects were tested using the Bootstrap method.

Analysis with positive emotional bonding as the mediator showed that when psychological distance was the dependent variable, the simple recall group showed a non-significant total effect ($c = 0.22$, $p = 0.36$) and direct effect ($c' = 0.08$, $p = 0.70$), but a significant indirect effect through positive emotional bonding ($ab = 0.30$, 95% CI [0.03, 0.59]). The sharing and recall group showed a significant total effect ($c = 0.56$, $p = 0.01$) and non-significant direct effect ($c' = 0.16$, $p = 0.44$), but a significant indirect effect through positive emotional bonding ($ab = 0.40$, 95% CI [0.14, 0.68]) (Figure 2 [Figure 2: see original paper] left). When vignette task was the dependent variable, the simple recall group showed a non-significant total effect ($c = 0.06$, $p = 0.52$) and direct effect ($c' = 0.01$, $p = 0.95$), but a significant indirect effect through positive emotional bonding ($ab = 0.05$, 95% CI [0.01, 0.11]). The sharing and recall group showed a significant total effect ($c = 0.23$, $p = 0.008$) and non-significant direct effect ($c' = 0.16$, $p = 0.06$), but a significant indirect effect through positive emotional bonding ($ab = 0.07$, 95% CI [0.03, 0.24]) (Figure 2 right).

Analysis with negative emotional bonding as the mediator showed that when psychological distance was the dependent variable, the simple recall group showed non-significant total ($c = 0.22$, $p = 0.36$) and direct effects ($c' = 0.20$, $p = 0.41$), with a non-significant indirect effect through negative emotional bonding ($ab = 0.02$, 95% CI [-0.01, 0.06]). The sharing and recall group showed a significant total effect ($c = 0.56$, $p = 0.01$) and direct effect ($c' = 0.55$, $p = 0.02$), with a non-significant indirect effect through negative emotional bonding ($ab = 0.01$, 95% CI [-0.03, 0.04]). When vignette task was the dependent variable, the simple recall group showed non-significant total ($c = 0.06$, $p = 0.52$) and direct effects ($c' = 0.04$, $p = 0.62$), with a non-significant indirect effect through nega-

tive emotional bonding ($ab = 0.01$, 95% CI [-0.01, 0.04]). The sharing and recall group showed a significant total effect ($c = 0.23$, $p = 0.008$) and direct effect ($c' = 0.23$, $p = 0.01$), with a non-significant indirect effect through negative emotional bonding ($ab = 0.003$, 95% CI [-0.02, 0.03]).

Figure 2 Mediating Effect of Positive Emotional Bonding

3.5 Summary

Study 2, through a field experiment highlighting ecological validity, further discovered at the micro level the promoting effect of positive teacher-student co-experience on teacher-student relationships and the mediating role of emotional bonding. Results showed that even a single concrete positive teacher-student co-experience (sports festival) had a positive promoting effect on state teacher-student relationships, while sharing and recalling this positive co-experience promoted positive emotional bonding, thereby showing a greater effect on teacher-student relationships. This accumulation led to the stable promoting effect on teacher-student relationships revealed in Study 1. The sports festival was an authentic positive teacher-student co-experience; do imagined virtual experiences and observed exemplar experiences also have this effect? Study 3 addresses this question.

4.1 Experimental Design

A mixed experimental design of 4 (positive co-experience type: recall/imagination/exemplar/control) × 2 (teacher category: specific teacher/group teacher) was adopted, with the latter as a within-subjects variable. According to G*Power 3.1 calculations, with statistical power set at 1 - $\beta = 0.80$, two-tailed test $\alpha = 0.05$, and effect size* d* = 0.80, the minimum sample size required for ANOVA was 92 participants. The experiment was conducted in another public middle school in Shanghai, with 152 valid participants, mean age 12.45 ± 0.54 years, including 64 males and 88 females. Tests showed no significant differences among the four randomly assigned groups in self-assessed academic level ($F = 2.24$, $p = 0.76$).

4.2 Research Instruments

Positive Emotional Bonding Measurement. Same as in Study 1, with Cronbach' s $\alpha = 0.81$ in this experiment.

Vignette Task. Same as in Study 2, with Cronbach' s α coefficients of 0.80, 0.77, and 0.84 in this experiment.

Emotion Measurement. Six emotion words were selected from the Positive and Negative Affect Schedule (PANAS, Watson et al., 1988): "happy," "warm," "moved," "nervous," "helpless," and "sad" to test the effectiveness of positive co-experience manipulation, rated on a 1-5 scale.

Cronbach' s α coefficients for positive and negative emotion words were 0.74 and 0.69, respectively.

4.3 Experimental Procedure

The experiment was completed in a quiet computer room at the participants' school using E-prime. First, participants in each group were manipulated regarding positive co-experience type: the recall group recalled their most memorable co-experience with a teacher in the past year; the imagination group imagined their most anticipated future co-experience with a teacher; the exemplar group observed others' co-experiences with a teacher; and the control group read a neutral story describing a teacher' s work. To enhance cognitive processing of information in the co-experience events, recall and imagination groups were required to recall or anticipate "the weather, season, and teacher' s identity at that time," and immediate emotional experiences were measured for all four groups. Next, participants' psychological distance and positive emotional bonding with both the specific teacher (from the co-experience) and the group teacher (all subject teachers) were measured, followed by completion of the vignette task.

4.4.1 Manipulation Check

No significant differences were found among the four groups in negative emotional experience after positive co-experience manipulation, $F(3, 148) = 0.52$, $p = 0.67$. However, significant differences existed in positive emotional experience, $F(3, 148) = 14.03$, $p < 0.001$, $^2 = 0.22$, with the recall group ($M = 3.19$, SD $= 0.14$), imagination group ($M = 3.53$, SD $= 0.14$), and exemplar group ($M = 3.36$, SD $= 0.14$) all showing higher positive emotional experience than the control group ($M = 2.27$, SD $= 0.16$), $ps < 0.001$.

4.4.2 Hypothesis Testing

Descriptive statistics are presented in Table 4 . ANOVA with psychological distance as the dependent variable showed significant main effects for teacher category, $F(1, 148) = 35.53$, $p < 0.001$, $^2 = 0.19$, 95% CI [0.09, 0.30]; group, $F(3, 148) = 4.76$, $p = 0.003$, $^2 = 0.09$, 95% CI [0.01, 0.17]; and a significant teacher category × group interaction, $F(3, 148) = 4.37$, $p = 0.006$, $^2 = 0.08$, 95% CI [0.00, 0.11]. Further simple effects analysis revealed that the recall group scored significantly higher on psychological distance with specific teachers than with group teachers, $F(1, 148) = 6.53$, $p = 0.01$, $^2 = 0.04$; the imagination group scored significantly higher with specific teachers than with group teachers, $F(1, 148) = 18.17$, $p < 0.001$, $^2 = 0.11$; the exemplar group scored significantly higher with specific teachers ($M = 5.50$, SD $= 0.99$) than with group teachers, $F(1, 148) = 28.38$, $p < 0.001$, $^2 = 0.16$; and the control group showed no difference between specific and group teachers, $F(1, 148) = 0.03$, $p = 0.86$.

ANOVA with vignette task scores as the dependent variable showed (Figure 3 [Figure 3: see original paper]) significant main effects for teacher category, $F(1,$

148) = 23.82, $p < 0.001$, $^2 = 0.14$, 95% CI [0.04, 0.22]; group, $F(3, 148) = 3.96$, $p = 0.01$, $^2 = 0.07$, 95% CI [0.00, 0.75]; and a marginally significant teacher category × group interaction, $F(3, 148) = 2.94$, $p = 0.058$, $^2 = 0.06$. Further simple effects analysis revealed that the recall group scored significantly higher on vignette tasks with specific teachers than with group teachers, $F(1, 148) = 18.12$, $p < 0.001$, $^2 = 0.11$; the imagination group scored significantly higher with specific teachers than with group teachers, $F(1, 148) = 13.26$, $p = 0.001$, $^2 = 0.07$; the exemplar group scored significantly higher with specific teachers than with group teachers, $F(1, 148) = 4.64$, $p = 0.05$, $^2 = 0.03$; and the control group showed no difference between specific and group teachers, $F(1, 148) = 0.01$, $p = 0.92$.

Table 4 Descriptive Statistics (N = 152)

One-way ANOVA on psychological distance ratings for group teachers showed marginally significant differences, $F(3, 148) = 2.23$, $p = 0.088$, $^2 = 0.04$, 95% CI [0.00, 0.11], with post-hoc multiple comparisons finding that recall, imagination, and exemplar groups all scored higher than the control group, $ps < 0.05$. ANOVA on vignette task ratings showed no significant differences among the four groups, $F(3, 148) = 2.00$, $p = 0.116$, though mean values showed recall and imagination groups still higher than exemplar and control groups. These results suggest to some extent that the effect of positive co-experience on participants' relationships with group teachers was influenced by their relationships with specific teachers.

To further test whether positive emotional bonding mediates the effect of positive co-experience type on teacher-student relationships, the control group was used as reference, and the independent variable was coded as dummy variables (Dummy 1: exemplar group = 1, control group = 0, imagination group = 0, recall group = 0; Dummy 2: control group = 0, exemplar group = 0, imagination group = 1, recall group = 0; Dummy 3: control group = 0, exemplar group = 0, imagination group = 0, recall group = 1). Psychological distance and vignette task scores were used as dependent variables, and positive emotional bonding as the mediating variable. Relative mediation effects were tested using the Bootstrap method.

Results showed that when psychological distance was the dependent variable (Figure 4 [Figure 4: see original paper] left), the exemplar group showed a significant total effect ($c = 0.95$, $p < 0.001$) and non-significant direct effect ($c' = 0.24$, $p = 0.33$), but a significant indirect effect through positive emotional bonding ($ab = 0.71$, 95% CI [0.38, 1.07]). The imagination group showed a significant total effect ($c = 1.20$, $p < 0.001$) and non-significant direct effect ($c' = 0.35$, $p = 0.17$), but a significant indirect effect ($ab = 0.85$, 95% CI [0.51, 1.26]). The recall group showed a significant total effect ($c = 0.89$, $p < 0.001$) and non-significant direct effect ($c' = 0.17$, $p = 0.49$), but a significant indirect effect ($ab = 0.72$, 95% CI [0.35, 1.13]).

When vignette task was the dependent variable (Figure 4 right), the exemplar

group showed a non-significant total effect (c = 0.08, p = 0.57) and direct effect (c' = -0.13, p = 0.36), but a significant indirect effect through positive emotional bonding (ab = 0.21, 95% CI [0.10, 0.35]). The imagination group showed a significant total effect (c = 0.40, p = 0.005) and non-significant direct effect (c' = 0.14, p = 0.33), but a significant indirect effect (ab = 0.25, 95% CI [0.13, 0.41]). The recall group showed a significant total effect (c = 0.43, p = 0.003) and non-significant direct effect (c' = 0.21, p = 0.14), but a significant indirect effect (ab = 0.21, 95% CI [0.10, 0.36]).

Figure 4 Mediating Effect of Positive Emotional Bonding

4.4 Summary

Study 3, through a rigorous laboratory experiment, further verified at the micro level the promoting effect of positive teacher-student co-experience on teacher-student relationships and the mediating role of positive emotional bonding. This effect was found not only in recalled authentic positive co-experience contexts but also in imagined and exemplar experience contexts. Moreover, the positive relationships demonstrated by participants in different positive co-experience groups toward specific teachers could even transfer to the teacher group.

5.1 Positive Co-Experience Has Stable Promotional Effects on Teacher-Student Relationships

As a social contextual factor that reflects the essence of relationships and is both common and important, co-experience significantly influences daily interpersonal interactions and relationship development (Moon & Ke, 2020). For adolescents, teacher-student relationships are positive educational resources for completing academic tasks and developing physical and mental health. Recent studies have found that teacher-student interactions, sharing, and other positive co-experiences are closely related to teacher-student relationships (Aasheim et al., 2018; Frenzel et al., 2018), but systematic direct evidence is still lacking. Therefore, this study systematically examined the influence of positive co-experience on teacher-student relationships through three studies. Results consistently indicated that positive co-experience has a stable facilitatory effect on teacher-student relationships across survey, field experiment, and laboratory experiment.

Study 1's questionnaire survey found that positive teacher-student co-experience can directly promote teacher-student relationship development, consistent with previous research (Reis et al., 2011). Study 2 found that current positive co-experience (sports festival) had a promoting effect on state teacher-student relationships (significant time main effect), while sharing and recalling this positive co-experience was essentially another positive co-experience, with this cumulative effect further promoting teacher-student relationship development. This is consistent with previous findings (Barber, 2014), and Van Bergen et al.' s (2020)

recent research also showed that students experienced higher intimacy when recalling positive co-experiences with teachers. Study 3, using the control group as baseline, compared the effects of different positive co-experience types (recall, imagination, exemplar) on teacher-student relationships. Results not only replicated the promoting effect of recalled positive co-experience on teacher-student relationships but also found that imagination and exemplar experiences had similar promoting effects. A study of fourth-grade students found that when students read beloved books, they imagined "co-acting" with characters and developed empathy (Parsons, 2013). Regarding the effect of exemplar experiences, according to Social Learning Theory (Bandura, 1978), interpersonal relationship development, like other social information, can be enhanced through vicarious reinforcement (Ma et al., 2011). Study 3 further found that the promoting effect of positive co-experience on adolescents' relationships with specific teachers could even transfer to the teacher group, supporting the generalization effect of social information in positive co-experience (Kocsor & Bereczkei, 2017). That is, students' positive co-experiences with specific teachers shape impressions and relationships with the group (teacher group) to which they belong. Thus, the influence of positive co-experience on interpersonal relationships can exert not only "point-to-point" specific effects but also "point-to-surface" radiating effects.

5.2 Stable Mediating Role of Positive Emotional Bonding

All three studies consistently indicated that positive emotional bonding plays a stable mediating role between positive co-experience and teacher-student relationships. In Study 1, the mediating effect of positive emotional bonding accounted for 38.64% of the total effect, with self-assessed academic level playing a moderating role. Compared to below-average students, positive emotional bonding strengthened the predictive effect of positive co-experience on teacher-student relationships among average and above-average students. This may be because these students tend to perceive more support and warmth from teachers (Kurdi et al., 2018) and more easily establish positive teacher-student emotional bonding.

Study 2 measured positive and negative emotional bonding using emotion words and similarly found a mediating role for positive emotional bonding. Relative to the no recall group, the sharing and recall group showed relative mediation effects, while the simple recall group did not, possibly due to the positive effect of sharing. A series of studies have revealed that sharing is a characteristic of the most basic human relationships and a condition for establishing emotional bonding (Christophe & Rimé, 1997). Knight and Eisenkraft' s (2015) meta-analysis showed that sharing positive emotions between individuals facilitates and maintains group cohesion. In summary, sharing positive co-experiences helps further enhance positive teacher-student emotional bonding, thereby promoting teacher-student relationship development.

Regarding Study 3' s results, recall, imagination, and exemplar priming all enhanced adolescents' positive emotional bonding levels with teachers. Because co-

experiences are deeply encoded and elaborately processed during recall (Shteynberg et al., 2014), teachers and students experience more pleasant emotions during the process of recalling and sharing previous positive co-experiences, awakening positive emotional bonding. Similarly, positive emotional bonding can be evoked under imagined positive co-experience. Post-experiment interviews revealed that adolescents in the imagination group most anticipated "playing games with teachers" as a positive co-experience. When participants imagined playing games with teachers, their own pleasant emotions increased and psychological distance decreased, consistent with previous findings that games help establish more harmonious teacher-student relationships (Meriläinen et al., 2020). Finally, observing exemplar positive co-experiences can activate teacher-student positive emotional bonding. Research shows that when observing exemplar behaviors, participants not only understand behavioral purposes but also experience the behavior as if executing it themselves (Lepage & Théoret, 2007). Similarly, when participants see other students and teachers co-experiencing an event, they can understand the event' s meaning from the perspective of the actors, receiving vicarious reinforcement and feedback. This process aligns with the essence of Social Learning Theory (Bandura, 1978).

This analysis suggests that during positive co-experiences, people promote the establishment of positive emotional bonding through multiple processes including cognition, behavior, and motivation, thereby promoting relationship development. Cognitively, both parties direct more cognitive resources toward shared goals and event meanings, generating more positive and profound understanding and emotions (Shteynberg et al., 2014), which in turn promotes positive contact behaviors (Hopkins et al., 2016). This pathway of positive emotional bonding is more prominent in teacher-student relationship development because teachers are viewed as caregivers and attachment figures at school (Verschueren & Koomen, 2012). Positive teacher-student co-experience establishes positive emotional bonding that promotes mutual attachment and interpersonal scripts, which are considered conditions for teacher-student relationship development (Thijs et al., 2008). The role of positive emotional bonding can also be viewed from a motivational perspective. According to Basic Psychological Needs Theory, satisfaction of relatedness needs is the foundation for maintaining interpersonal relationships and the internal driving force for their development. Adolescents with high basic psychological needs are more inclined to actively establish good teacher-student relationships (Chhuon & Wallace, 2014). It should be noted that Study 2 did not find a mediating role for negative emotional bonding. Some studies have found that negative co-experience also has interpersonal promoting effects, but these effects result from positive emotional bonding established between co-experiencers. This seems to indicate that interpersonal relationship quality and development are not directly determined by the valence of co-experienced events (positive or negative) itself but by the mediating role of positive emotional bonding established between parties during co-experience.

5.3 Contributions and Limitations

We attempt to summarize the findings at the theoretical level as the "Co-Experience Relationship Effect." Two points of analysis are offered: First, from the perspective of relationship essence, relationships are processes where living beings establish intersections and connections in the same time and space, and positive co-experience and positive emotional bonding are inherent components of good relationships. Second, different types of positive co-experience can promote relationship development through their respective internal pathways by arousing positive emotional bonding: for authentic positive co-experiences, recall can awaken positive emotional bonding, and sharing can further enhance this bonding; for virtual positive co-experiences, imagination helps evoke positive emotional bonding; and exemplar experiences form positive emotional bonding through vicarious reinforcement mechanisms. Individuals who establish positive emotional bonding through different pathways are more willing to help each other and establish interpersonal relationships (Wang, 2008), thereby forming a positive perspective of "Co-experience–Emotional Bonding–Relationships" (CER) 良性发展. This may be the mechanism underlying the positive co-experience relationship effect. This model expands the application of developmental assets theory in the interpersonal relationship domain. Adolescents' positive co-experiences with others are processes of developing external resources, with each positive co-experience accumulating into deeper emotional bonding and attachment, thereby promoting interpersonal relationship development (Benson, 2003). Thus, the CER model represents a dynamic process where co-experience (external resource) is internalized into emotional bonding (internal resource) and manifested as interpersonal relationships.

This research offers positive implications for educational practice, with strong ecological validity enhancing the generalizability of findings. First, the study found that positive co-experience has a positive promoting effect on teacher-student relationships, suggesting that educators should not only value positive co-experiences with students (such as participating in sports festivals) but also better leverage their promoting effects through sharing, recalling, or envisioning these experiences. Second, the study revealed that the influence of positive co-experience on teacher-student relationships is mediated across contexts by positive emotional bonding, suggesting that educators should focus on establishing positive emotional bonding and attachment relationships with students through shared attention, interactive contact, and satisfaction of relatedness needs.

This study also has several limitations. First, it did not explore the influence of positive co-experience on teacher-student relationships from the teacher' s perspective. Previous research has measured teachers' perceived teacher-student relationships and compared differences between student-perceived and teacher-perceived relationships (Poulou, 2017). Second, Koenen et al. (2019) suggest that emotional bonding promoted by co-experience influences emotions in future co-experiences, indicating that longitudinal tracking studies are needed to

examine interactive relationships between variables and the dynamic process of the co-experience relationship effect. Third, co-experience has different valence types (Berman et al., 2002). Although this study revealed cross-contextual promoting effects of positive co-experience, what influence does negative co-experience have on teacher-student relationships? Additionally, co-experiencing parties have different gender combinations—does the gender of the parties play a role? These questions require further investigation. Moreover, this study only explored the mechanism of emotional factors, but factors influencing interpersonal relationship formation and development are complex and diverse. Future research should examine the roles of cognitive (Shteynberg, 2015) and motivational (Camiré et al., 2019) variables in co-experience promoting relationship development.

Conclusion

Based on questionnaire surveys, field experiments, and laboratory experiments, this study examined the influence of positive co-experience on adolescent teacher-student relationships and its mechanism. Results showed that: (1) positive co-experience promotes the development of adolescent teacher-student relationships, with the promoting effect being more significant when recalling and sharing previous positive co-experiences; (2) different types of positive co-experience (recall, imagination, and exemplar) all promote teacher-student relationships, with recall, imagination, and exemplar positive co-experience groups showing better teacher-student relationships than the control group, and this effect can even transfer from relationships with specific teachers to the school-wide teacher group; (3) positive emotional bonding plays a stable mediating role between positive co-experience and teacher-student relationships.

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Appendix

Multilevel Analysis Results of Class Emotional Bonding and Co-Experience Effects on Middle School Students' Teacher-Student Relationships (Due to space limitations, not included in the main text, now appended here)

Simple Slope Figures (Due to space limitations, not included in the main text, now appended here)

Note: Figure translations are in progress. See original paper for figures.