Research Square

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The Moderating Role of Perceived Teacher Responses to Peer Victimization on Peer Relationship Quality: A Three-Wave Longitudinal Study Across One Academic Year

Qiran Wang
Zhejiang International Studies University
Aibin Tang
tangaibin@zisu.edu.cn

Zhejiang International Studies University

Research Article

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Abstract

Background

Peer victimization can undermine children's peer relationships, yet its longitudinal, potentially bidirectional link with peer relationship quality and the role of perceived teacher responses remain unclear. Guided by Social Safety Theory, this study examined whether perceived public intervention and private support showed contrasting prospective associations and moderated the victimization–peer relationship link across one academic year.

Methods

A three-wave longitudinal study followed 569 Chinese upper-elementary students nested within 12 classrooms. Students reported verbal, physical, relational, and cyber victimization, peer relationship quality, and perceived teacher responses. Cross-lagged path models, moderated regression models, and random-intercept cross-lagged panel models were estimated. Bias-reduced cluster-robust inference and an exact wild-cluster bootstrap were used to address the small number of classrooms.

Results

No victimization subtype predicted poorer peer relationship quality across the first interval. Across the second, verbal and relational victimization showed robust negative associations, whereas physical and cyber victimization did not survive the small-cluster corrections. Within children, increases in verbal victimization preceded declines in both intervals. During the first interval, perceived public intervention predicted poorer subsequent peer relationship quality and steepened the negative verbal-victimization slope, whereas private support predicted better quality and attenuated that slope. This interval difference was significant for public intervention and borderline for private support.

Conclusions

Perceived public intervention and private support showed contrasting, time-dependent prospective associations with children's peer relationship quality. Victimization effects differed by subtype and analytical level. Later between-child associations were clearest for verbal and relational victimization, whereas within-child verbal effects appeared across both intervals. The single-reporter, single-school design and the small number of classrooms preclude causal interpretation and warrant replication.

Background

Peer victimization is the repeated exposure of a child to intentional harmful actions by one or more peers [1]. It remains one of the most common adverse experiences of middle childhood. Contemporary

research distinguishes at least four forms, verbal, physical, relational, and cyber victimization, which differ in visibility, target, and developmental correlates [2–5]. A large body of work links peer victimization to internalizing symptoms such as depression and anxiety [6]. Comparatively less longitudinal research has examined its association with a more proximal outcome, the quality of a child's relationships with classmates. This omission matters. Perceived classmate support is a marker of successful socioemotional adjustment in its own right, and a resource that can buffer children against further victimization [7].

A related open question concerns whether peer victimization exerts a uniform influence on peer relationship quality, regardless of its form or the point in the school year at which it occurs. Much prior work has implicitly treated victimization as a single construct with a stable, form-general effect. Verbal, physical, relational, and cyber victimization differ in how the harm is enacted, how visible it is to bystanders, and whether its effects accumulate gradually or register immediately [2, 4]. It is therefore plausible that different forms of victimization show different prospective associations with peer relationship quality, and that these associations are not necessarily constant across a school year. The present study treats this possibility as a central empirical question rather than assuming a uniform, form-general effect from the outset.

Teachers are widely regarded as the most consequential adults in the classroom ecology of bullying [8]. Head teachers in Chinese primary schools typically remain with the same class across an entire academic year. Their responses to observed or reported victimization are therefore highly visible, repeated, and embedded within an ongoing relationship with the class as a whole. These conditions make the classroom an informative setting in which to examine how teachers' responses unfold over time. Experimental and survey research converges on one conclusion. Teachers' responses to bullying shape the immediate incident and, beyond it, students' broader beliefs about classroom norms, fairness, and safety [9, 10]. This literature has generally treated teacher response as a single, undifferentiated construct. It is typically operationalized as the presence, frequency, or perceived effectiveness of adult intervention. Few studies have systematically distinguished responses along a dimension we argue is critical, whether the response is visible to the peer group.

Two teachers may both respond promptly and consistently to a bullying incident. Yet they may do so in ways that differ fundamentally in whether the victimized student is publicly marked as a target. A teacher who reprimands the aggressor in front of the class, or requires a public apology, intervenes in a manner that every peer observer can see. A teacher who instead speaks privately with the victimized student, offers individualized comfort, and quietly monitors the situation intervenes in a manner that is functionally invisible to classmates. Research on adult social support outside the bullying literature has long recognized that the visibility of support shapes its psychological consequences. Support visible to a recipient can also signal that the recipient is in need, imposing self-evaluative and social costs that offset or even reverse its intended benefit. Invisible support delivers assistance without this cost [11–13]. Three questions remain open. Does this visibility distinction extend to children's experiences of

teacher responses to victimization? Does it extend to peer relationship quality specifically? And does its protective or exacerbating role stay constant across a school year?

The present study addresses these questions using three waves across one academic year of data from 569 upper-elementary students in China. We integrate Social Safety Theory [14, 15] with the visible and invisible support distinction from the social support literature [11, 13]. Social Safety Theory is a biologically grounded framework for understanding how experiences of social threat and social safety shape psychological adjustment. From these two frameworks we derive and test a series of predictions. We allow explicitly for the possibility that victimization form and timing within the school year moderate the strength of these associations. First, we test whether peer victimization forecasts subsequent declines in peer relationship quality, examining verbal, physical, relational, and cyber victimization separately across two semester-long intervals, and testing whether this association is bidirectional. Second, we test whether two dimensions of perceived teacher response, public intervention and private support, are differentially associated with subsequent peer relationship quality and whether those associations remain stable across the school year. Third, we test whether these dimensions moderate the prospective association between victimization and peer relationship quality in opposing directions. In doing so, the study extends Social Safety Theory to Chinese upper-elementary students and to classroom-based teacher responses to bullying.

Theoretical Framework and Literature Review

Peer Victimization as a Threat to Social Safety

Peer victimization is conventionally defined as repeated exposure to intentional negative actions by one or more peers under a power imbalance that leaves the target unable to easily defend themselves [1]. Its forms differ in how the harm is enacted. Verbal victimization involves name-calling and insults, physical victimization involves hitting, pushing, or property theft, and relational victimization involves exclusion, rumor-spreading, and the manipulation of peer relationships [4]. Cyber victimization is harassment conducted through digital media [5]. These subtypes correlate only modestly, consistent with their status as distinct experiences rather than indicators of a single underlying trait.

Social Safety Theory [14, 15] offers a parsimonious account of why victimization should be expected to erode children's relationships with their peers, regardless of which specific form it takes. The theory proposes that the human brain and immune system evolved to treat the maintenance of safe, stable social bonds as a fundamental priority. Experiences that signal social threat are therefore hypothesized to activate a coordinated neural, immunological, and psychological stress response. These threatening experiences include rejection, exclusion, devaluation, and conflict. The response is disproportionate to the objective severity of any single incident, because the underlying threat-detection system evolved to treat social danger as comparably consequential to physical danger. Applied to peer victimization, Social Safety Theory implies that repeated verbal, physical, relational, or cyber victimization functions as a recurring signal that the classroom peer group is not a safe context. Over time, this should degrade the

child's broader appraisal of relationships with classmates, above and beyond the discrete emotional impact of any single incident.

Direct empirical support for this pathway comes from a large longitudinal cohort in which childhood peer bullying predicted adolescent mental health problems, an association substantially explained by the development of interpersonal distrust [16]. In other words, victimization degraded not merely momentary affect. It degraded the child's generalized belief that other people, including peers, could be relied upon. If repeated victimization erodes trust in peers as a general class, then perceived classmate support should be one of the outcomes most proximally affected. Perceived classmate support is fundamentally an appraisal of whether one's peer group can be relied upon for friendship, help, and enjoyment [7]. On this basis, we predicted that each form of peer victimization would negatively predict subsequent peer relationship quality, and, for reasons developed below, that this negative association would strengthen over the course of the school year (H1). The reverse direction, from peer relationship quality to subsequent victimization, is theoretically less settled, and two established literatures make opposing predictions. On one account, children with weaker peer relationships are more readily selected as targets, so that lower peer relationship quality should predict higher subsequent victimization and set in motion a self-reinforcing downward spiral [2]. On a competing account, aggression in middle childhood is in part an instrument of status competition, so that socially central, well-regarded children may attract rather than repel certain forms of victimization, particularly verbal victimization enacted before an audience; this account predicts that higher peer relationship quality will forecast higher subsequent victimization [17, 18]. Because both predictions are theoretically defensible, we advanced them as competing hypotheses and committed to neither in advance, allowing the data to adjudicate between them (H2).

Social Safety Theory also offers a basis for a further prediction. Different forms of victimization may not erode peer relationship quality on the same timetable. The strength of victimization's prospective association with peer relationship quality may itself increase as exposure accumulates across a school year. Verbal and physical victimization are typically acute, discrete events. A single instance of name-calling or shoving is immediately recognizable as a threat, both to the target and to observers. Relational victimization operates differently. It works through the gradual reconfiguration of a child's position within the peer network, driven by exclusion and the redirection of others' loyalties rather than any single, unambiguous act [4]. Because this harm accumulates, its association with declining peer relationship quality may take longer to become detectable, emerging only once enough relational slights have shifted the child's peer standing. This reasoning forms the temporal component of H1. We therefore predicted that the negative association between victimization and peer relationship quality would strengthen across the school year, being weaker across the first interval and stronger across the second, and that this pattern would be clearest for relational victimization.

The Visibility of Teacher Response

Teachers are the most consistently present authority figure in the classroom and occupy a uniquely powerful position in its social ecology. A teacher's response to a bullying incident communicates something to the entire class, not merely to the victim and aggressor. It communicates whether such behavior will be tolerated [8]. An experimental vignette study with upper-elementary students tested this idea directly [9]. Compared with students who read about teacher non-response, students who read about an active teacher response perceived stronger anti-bullying norms, expected less future victimization in the depicted classroom, and were more willing to report bullying themselves. Complementary longitudinal evidence points to the same conclusion [10]. Children's perceptions of how their teacher typically responded to peer harassment moderated the association between victimization and subsequent adjustment. Teacher response therefore does more than accompany the victimization-adjustment link. It actively shapes its trajectory.

This literature has generally treated teacher response to bullying as a single continuum. Most studies distinguish active or engaged responses from passive non-response. Few studies differentiate among the many forms that an active response can take. We argue that one such differentiating feature has been overlooked in the school bullying literature. This feature is whether the response is visible to the surrounding peer group. An analogous distinction has a well-developed evidence base in adult social support research. Support delivered without the recipient's explicit awareness, termed invisible support, was first shown to produce better adjustment to stress than support the recipient consciously registered [12]. A subsequent experiment showed that visible support undermined self-efficacy and increased negative affect [11]. It did so precisely because it made salient, to both the recipient and any onlookers, the fact that the recipient was in need of help. This body of work has since been synthesized into a single conclusion [13]. Visible support carries an inherent social-evaluative cost. It can be read by observers, and by the recipient, as a public marker of vulnerability. This cost is entirely absent from support delivered privately.

This distinction maps naturally onto two response styles that are common in Chinese primary school classrooms. Both styles were represented in the present study's measure of perceived teacher response. Public intervention includes loudly reprimanding the aggressor in front of the class, handling the incident so that the whole class is aware of it, and requiring a public apology. By definition, this response is visible to every classmate present. From a Social Safety Theory perspective, this visibility is not incidental. Publicly identifying a student as the target of an incident serious enough to warrant classroom-wide correction constitutes a second, distinct exposure of the victimized child to peer evaluation. This second exposure is layered on top of the original victimization experience. A public response may therefore prolong or compound the child's exposure to social threat, rather than resolve it. Private support includes quietly comforting the victimized student, talking with them individually to understand what happened, and offering coping guidance away from classmates' attention. Private support addresses the child's distress without this additional exposure. It may be experienced as direct evidence that at least one relationship within the classroom, the relationship with the teacher, remains reliably safe.

Based on this reasoning, we advanced a single hypothesis about teacher response, organized around its visibility (H3). We predicted that perceived private support would positively predict subsequent peer relationship quality and would buffer the prospective association between victimization and peer relationship quality, whereas perceived public intervention would negatively predict peer relationship quality and would exacerbate that association, each net of concurrent victimization exposure and prior peer relationship quality. We additionally expected this moderating role to be strongest for victimization forms whose original harm is itself witnessed by peers. Verbal victimization, such as name-calling or public mockery, is frequently enacted in front of an audience. Its social currency for the aggressor often depends on that audience [2]. A public teacher response to verbal victimization does not introduce an entirely new form of exposure. Instead, it prolongs and re-narrates an already public event, and may even repeat the very content that caused the initial harm in front of the same peers who witnessed it. Physical victimization is different. It is often distressing primarily because of its threat to bodily safety rather than its social-evaluative content. Relational victimization is, by its nature, frequently covert. A teacher cannot easily correct a shifting pattern of exclusion or rumor through a single public reprimand. For this reason, we expected the visibility mechanism central to H3 to be most clearly detectable for verbal victimization. We treated its extension to other victimization forms as an open, subtype-specific empirical question. We did not treat this extension as a uniform prediction.

Head teachers' response styles and the classroom social climate they cultivate may change over an academic year. In the participating classes, all head teachers assumed formal responsibility for the head-teacher role at the beginning of the study year, although each had previously taught the same class as a subject teacher. T1 therefore marked the beginning of a new classroom-management and pastoral role rather than the beginning of all teacher–student contact. Social Safety Theory holds that the informational value of a social signal, whether threatening or reassuring, is evaluated against prior experience with the same social environment. Early responses from a newly appointed head teacher may therefore carry greater informational weight as students form expectations about that teacher's management and support practices. Later responses may add comparatively less new information, while the cumulative exposure to victimization may continue to accrue. This reasoning formed the basis for H4: we expected the prospective associations involving perceived teacher response, including its moderation of the victimization–peer relationship link, to be more pronounced across the first interval than the second.

The Present Study

The present study was guided by Social Safety Theory [14, 15] and the visible and invisible support distinction [11, 13]. It followed 569 Chinese upper-elementary students across three waves within one academic year. We tested the following four hypotheses. Verbal, physical, relational, and cyber victimization were examined separately throughout, and we did not assume the four forms to be equivalent.

H1: Peer victimization will negatively predict subsequent peer relationship quality (H1a), and this negative association will strengthen across the school year, being weaker across the first interval and stronger across the second (H1b). Because H1b is a claim about accumulation within a given child, we test it both at the between-child level, using cross-lagged panel models, and at the within-child level, using random-intercept cross-lagged panel models.

H2: The reverse direction is theoretically contested, and we test two competing accounts. A vulnerability account predicts that lower peer relationship quality will lead to higher subsequent victimization, producing a downward spiral, whereas a social-salience account predicts that higher peer relationship quality will lead to higher subsequent victimization, particularly verbal victimization. We commit to neither account in advance and allow the data to adjudicate between them.

H3: As a function of its visibility, teacher response will shape peer relationship quality. Perceived private support will positively predict peer relationship quality and buffer the association between victimization and peer relationship quality, whereas perceived public intervention will negatively predict peer relationship quality and exacerbate that association. This pattern will be most clearly detectable for verbal victimization.

H4: The effects of teacher response specified in H3 will be more pronounced across the first interval than the second.

Across these four hypotheses, the study formally tests whether associations differ between the two intervals rather than assuming either stability or change.

Methods

Participants and Procedure

Participants were students in Grades 3 through 5 at a primary school in Henan Province, China, recruited using a cluster convenience sampling approach. Data were collected at three time points, each corresponding to a distinct point in the academic calendar rather than repeated measurement within a single semester: September 2024 (T1), January 2025 (T2), and June 2025 (T3). All participating head teachers began serving formally as the head teacher of their respective class at the start of September 2024, coinciding with the beginning of data collection. Before this appointment, each had taught the same class as a subject teacher but had not served as its head teacher. Thus, T1 marked the start of the teachers' formal classroom-management and pastoral responsibility, although the teachers were not entirely unfamiliar to the students.

At baseline (T1), 650 questionnaires were distributed and 632 were returned, a response rate of 97.23%. Initial screening excluded 27 questionnaires because of response patterns indicating inattentive responding or because missing data exceeded 10% on core study variables, leaving 605 valid baseline cases. Twenty-seven students discontinued participation at T2 or T3 because of school transfer,

extended medical leave, or repeated absence. A final longitudinal quality-control review excluded nine additional complete cases that did not meet the analytic inclusion criteria. The final analytic sample therefore comprised 569 students.

The 27 students lost to follow-up represented 4.46% of the valid baseline sample. The additional nine exclusions were quality-control exclusions rather than longitudinal attrition. All retained cases had complete, correctly ID-matched data at all three waves, and no missing values remained on any study variable used in the analyses.

Of the final analytic sample, 273 (48.0%) were boys and 296 (52.0%) were girls. Students were distributed across Grade 3 (n = 192), Grade 4 (n = 190), and Grade 5 (n = 187). The sample was drawn from 12 natural classrooms, with 45 to 49 retained students per classroom. At each wave, students completed the questionnaire during regular class time. A unique identifier assigned at T1 was used to match responses across waves while keeping individual answers confidential from classmates and teachers.

All study procedures involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Declaration of Helsinki and its later amendments. The study protocol was approved by the Ethics Committee of Zhejiang International Studies University (Approval No. 2024/23) on 5 March 2024. Because the participants were minors, written informed consent was obtained from the parents or legal guardians of all participating students, and the students provided assent before each wave of data collection. Participation was voluntary, responses were kept confidential, and no monetary compensation was provided. Written permission to conduct the study was also obtained from the participating school before data collection began.

Measures

All measures were administered in Chinese during regular class time. The head teacher read standardized instructions aloud and remained available to clarify item wording without commenting on responses. Students completed the questionnaire individually using their unique longitudinal identifier. Unless otherwise noted, higher scores indicate higher levels of the target construct. Longitudinal configural, metric, and scalar invariance were evaluated for each multi-item measure before interpreting change over time, following recommended practice [19].

Peer Victimization

Students' experiences of peer victimization were assessed with four single-indicator items, one for each canonical form of victimization. The verbal, physical, and relational items were adapted from the three corresponding dimensions of the Delaware Bullying Victimization Scale–Student (DBVS-S) [20], for which a validated Chinese revision is available [21]. Because the Chinese revision of the DBVS-S covers only these three face-to-face forms, the cyber-victimization item was written for the present study following standard conceptualizations of cyber victimization as harassment enacted through digital

media [5]. Each source dimension of the DBVS-S contains four items; to keep respondent burden manageable across three waves, we selected or adapted a single representative item per form, and we note this deviation from the full instrument as a limitation. Whereas the original DBVS-S uses a 6-point frequency scale, students in the present study reported how frequently they had experienced each behavior at school over the preceding period on a 5-point frequency scale, ranging from 1 (never) to 5 (several times a week or more), with intermediate anchors of 2 (once or twice), 3 (two or three times a month), and 4 (about once a week). These anchors follow widely used frequency conventions for distinguishing occasional from chronic victimization in the bullying literature [22]. Item stems were as follows. Verbal: “Some classmates called me hurtful names, made fun of me, or insulted me.” Physical: “Some classmates deliberately pushed, hit, or kicked me, or took my belongings.” Relational: “Some classmates deliberately ignored or excluded me in class, or turned others against me so that they would not play with me.” Cyber: “Some classmates posted embarrassing messages or photos about me on their phones, in WeChat groups, or online.” For supplementary analyses, a composite traditional-victimization index was computed by summing the verbal, physical, and relational items. Cyber victimization was retained as a separate indicator throughout, given evidence that it occurs less frequently, largely off campus, and may not form a single construct with the three face-to-face forms [5].

Perceived Teacher Response to Peer Victimization

Children’s perceptions of how their head teacher typically responded when a classmate was victimized were assessed with eight items capturing two conceptually distinct dimensions, each measured by four items. Consistent with the original Perceived Teacher Response Scale (PTRS) [10], students indicated how often their head teacher responded in each way on a 5-point frequency scale ranging from 1 (never) to 5 (all of the time).

Public intervention (4 items) was assessed using items drawn from the active, publicly directed response strategy of the Perceived Teacher Response Scale (PTRS) [10], specifically the reprimand-aggressors dimension, with wording retained to preserve comparability with the original instrument. These items describe a teacher who addresses victimization openly before the whole class: publicly criticizing the student who bullied, handling the incident in front of the whole class so that everyone knows about it, requiring a public apology or written self-criticism, and publicly stressing classroom discipline and openly punishing rule-breaking.

Private support (4 items) was developed for the present study to capture a private, individualized, and emotionally supportive response to a victimized child. This dimension was grounded in the distinction between visible and invisible support [11–13]. Items were generated from this framework and refined through expert content review. They described quietly comforting the targeted student, discussing the incident privately, teaching self-protection strategies, and attending to the student’s feelings away from classmates’ attention. The dimension is conceptually distinct from the independent-coping strategy in the original PTRS, which reflects teacher indifference. Maximum-likelihood confirmatory factor analyses supported the hypothesized two-factor structure at every wave (Table 1). McDonald’s omega ranged

from .87 to .89 for public intervention and from .86 to .86 for private support across waves. Configural, metric, and scalar invariance were supported.

Peer Relationship Quality

Peer relationship quality was operationalized as perceived classmate support and measured with four items adapted from the Classmate subscale of the Child and Adolescent Social Support Scale (CASSS) [7]. The original subscale contains 10 items; four items with strong loadings and broad content coverage were selected to limit respondent burden across repeated administrations. Students rated agreement on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree). The items assessed friendship and inclusion, classmates' willingness to help, enjoyment of classmates' company, and friendliness and care within the class. The scale was unidimensional at every wave (Table 1), internally consistent (ω = .88, .89, and .87), and configural, metric, and scalar invariant across waves.

Covariates

All substantive models included four covariates: gender (1 = boy, 2 = girl), grade level (3, 4, or 5), classroom leadership status (1 = classroom leader, 0 = not a classroom leader), and only-child status (1 = only child, 0 = not an only child).

Data Analytic Strategy

Data screening and preliminary analyses were conducted in IBM SPSS Statistics 29.0. Confirmatory factor analyses, longitudinal measurement-invariance tests, cross-lagged panel models, and RI-CLPMs were estimated in Mplus 8.11 using maximum-likelihood estimation. Moderated regressions and small-cluster robust analyses were conducted in R 4.4.3. We first evaluated common method bias using an unrotated principal-components diagnostic and a single-factor confirmatory model [23]. We then examined factor structure, McDonald's omega, and longitudinal configural, metric, and scalar invariance for the multi-item measures [19]. Descriptive statistics, random-intercept likelihood-ratio tests of the Wave effect, and zero-order correlations were calculated before the longitudinal models.

Because students were nested within only 12 classrooms, all substantive regressions accounted for classroom clustering. We used CR2 bias-reduced cluster-robust standard errors with coefficient-specific Satterthwaite degrees of freedom [24–26]. Focal coefficients were additionally evaluated using a null-imposed, CR2-studentized exact wild-cluster bootstrap with Rademacher weights; all 2^{12}=4,096 classroom sign patterns were enumerated [27]. And conventional cross-lagged models conflate stable between-child differences with within-child change, a random-intercept cross-lagged panel model (RI-CLPM) was additionally estimated for each victimization subtype [28, 29]. Each victimization indicator and the peer-relationship-quality score was standardized within wave. With only three waves, the RI-CLPMs were treated as sensitivity analyses rather than definitive causal models.

To test H1 and H2, standardized two-wave cross-lagged path models were estimated for each subtype and interval [30]. Peer relationship quality at t + 1 was regressed on prior peer relationship quality and

victimization, and the reverse path was estimated in parallel, controlling for gender, grade, classroom leadership status, and only-child status. Supplementary models entered all four subtypes simultaneously and used a composite traditional-victimization index. Pooled person-period models formally tested interval differences through Predictor × Period interactions.

To test H3 and H4, moderated regressions predicted peer relationship quality at t + 1 from prior peer relationship quality, victimization, public intervention, private support, and the Victimization × Public Intervention and Victimization × Private Support terms. Verbal victimization was the confirmatory test because the proposed visibility mechanism was expected to be clearest for a victimization form commonly enacted before an audience. Models for physical, relational, and cyber victimization were exploratory; their 12 interaction tests were adjusted with the Benjamini–Hochberg false discovery rate procedure [31]. Significant interactions were probed at ± 1 SD of the moderator.

Results

Preliminary Analyses

Sample and Missing Data

The analytic sample comprised 569 upper-elementary students (273 boys [48.0%], 296 girls [52.0%]) nested within 12 classrooms across Grades 3 (n = 192), 4 (n = 190), and 5 (n = 187). Students were assessed in September 2024, January 2025, and June 2025. There were no missing data on any study variable among retained cases.

Common Method Bias

Because all measures were collected from the student at each occasion, common method bias was evaluated using two complementary diagnostics [23]. The 20 Wave-1 items produced five components with eigenvalues greater than 1; the first component accounted for 18.7% of the total correlation-matrix variance. A single-factor confirmatory model fit very poorly, $\chi^2(170) = 3712.59$, $p < .001$, CFI = .266, TLI = .179, RMSEA = .192. These diagnostics do not indicate a dominant single-method factor, although they cannot rule out all forms of shared-reporter bias.

Measurement Models and Invariance

Maximum-likelihood confirmatory factor analyses supported the two-factor PTRS model at each wave and the single-factor peer-relationship-quality model, showing acceptable to adequate fit to the data. The two-factor PTRS fit was acceptable at T1, $\chi^2(19) = 58.24$, $p < .001$, CFI = .945, TLI = .921, RMSEA = .068; T2, $\chi^2(19) = 52.10$, $p < .001$, CFI = .952, TLI = .930, RMSEA = .061; and T3, $\chi^2(19) = 64.80$, $p < .001$, CFI = .938, TLI = .912, RMSEA = .074. At T1, the one-factor PTRS alternative fit substantially worse, $\chi^2(20) = 845.20$, $p < .001$, CFI = .592, TLI = .450, RMSEA = .265. McDonald's omega ranged from .86 to .89 across the teacher-response subscales and from .87 to .89 for peer relationship quality. Configural, metric, and scalar invariance were supported.

Table 1

Fit Indices and Reliability for Measurement Models at Each Wave

Model	Wave	χ^2	df	p	CFI	TLI	RMSEA	ω
PTRS (2-factor)	T1	58.24	19	< .001	.945	.921	.068	.88 / .86
PTRS (2-factor)	T2	52.10	19	< .001	.952	.930	.061	.89 / .86
PTRS (2-factor)	T3	64.80	19	< .001	.938	.912	.074	.87 / .86
PTRS (1-factor)	T1	845.20	20	< .001	.592	.450	.265	—
Peer Relationship Quality	T1	11.40	2	.003	.958	.932	.089	.88
Peer Relationship Quality	T2	9.85	2	.007	.964	.942	.081	.89
Peer Relationship Quality	T3	12.15	2	.002	.951	.923	.092	.87

Note. PTRS = Perceived Teacher Response Scale. For the two-factor PTRS models, ω values are given as public intervention / private support. All models estimated by maximum likelihood.

Longitudinal invariance analyses supported configural, metric, and scalar invariance for all three multi-item scales based on conventional criteria (changes in CFI ≤ .01). For public intervention, χ^2 values were 98.40 (df = 51), 105.12 (df = 57), and 114.65 (df = 63) for the configural, metric, and scalar models, respectively. The corresponding values were 104.20, 112.50, and 124.10 for private support and 88.50, 93.40, and 101.80 for peer relationship quality. All models had CFI values ranging from .93 to .96, and changes in CFI across nested models were within acceptable limits (ΔCFI ≤ .006). The single-item victimization indicators could not be evaluated for measurement invariance and should be interpreted accordingly.

Descriptive Statistics and Correlations

Verbal, physical, and relational victimization declined across the three waves, whereas cyber victimization remained stable, $\chi^2(2) = 0.56$, $p = .756$. Private support declined steadily, and public intervention showed a small non-monotonic change, $\chi^2(2) = 10.12$, $p = .006$. Peer relationship quality increased from T1 to T2 and then declined at T3, $\chi^2(2) = 202.54$, $p < .001$. Means, standard deviations, and likelihood-ratio tests are shown in Panel A of Table 2.

Table 2

Descriptive Statistics, Time Trends, and Zero-Order Correlations

Panel A. Descriptive statistics and overall time trends								
Variable	**T1 M(SD)**	**T2 M(SD)**	**T3 M(SD)**	**$\chi^2(2)$**			**p**	
Verbal victimization	1.75 (0.94)	1.64 (0.79)	1.50 (0.70)	43.82			< .001	
Physical victimization	1.57 (0.79)	1.42 (0.62)	1.36 (0.56)	66.55			< .001	
Relational victimization	1.74 (0.95)	1.69 (0.91)	1.55 (0.75)	26.61			< .001	
Cyber victimization	1.40 (0.64)	1.42 (0.63)	1.41 (0.62)	0.56			.756	
Public intervention	2.86 (0.99)	2.97 (0.93)	2.87 (0.93)	10.12			.006	
Private support	3.49 (0.95)	3.36 (0.94)	3.08 (0.97)	136.44			< .001	
Peer relationship quality	3.10 (0.76)	3.31 (0.93)	2.82 (0.85)	202.54			< .001	
Panel B. Zero-order correlations among study variables								
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1. Verbal Vic. (T1)	—							
2. Physical Vic. (T1)	.31**	—						
3. Relational Vic. (T1)	.24**	.33**	—					
4. Cyber Vic. (T1)	.37**	.41**	.35**	—				
5. Public Intervention (T1)	−.06	−.06	−.02	−.02	—			
6. Private Support (T1)	−.06	.00	−.02	−.10*	.25**	—		
7. Peer Relationship Quality (T1)	−.34**	−.15**	−.33**	−.14**	−.06	−.08*	—	

Note. Panel A: $\chi^2(2)$ and p values are likelihood-ratio tests of the Wave effect from random-intercept models; all items/scales range from 1 to 5. Panel B: N = 569; Vic. = victimization. * p < .05. ** p < .01.

Panel A. Descriptive statistics and overall time trends								
8. Peer Relationship Quality (T2)	−.27**	−.13**	−.13**	−.07	−.16**	.11**	.57**	—
9. Peer Relationship Quality (T3)	−.26**	−.10*	−.30**	−.11**	−.13**	−.01	.55**	.60**

Note. Panel A: $\chi^2(2)$ and p values are likelihood-ratio tests of the Wave effect from random-intercept models; all items/scales range from 1 to 5. Panel B: N = 569; Vic. = victimization. * p < .05. ** p < .01.

Wave-1 verbal, physical, and relational victimization were negatively correlated with peer relationship quality at both later waves. Cyber victimization was associated with poorer T3 peer relationship quality (r = − .11, p < .01) but not T2 peer relationship quality (r = − .07, p = .090). Public intervention at T1 was unrelated to baseline peer relationship quality but correlated negatively with T2 and T3 peer relationship quality (r = − .16 and − .13). Private support was weakly negative at baseline (r = − .08), positive at T2 (r = .11), and unrelated to T3 peer relationship quality. Panel B of Table 2 reports the complete matrix.

Cross-Lagged Associations Between Victimization and Peer Relationship Quality

Standardized path models tested prospective bidirectional associations for each victimization subtype across both intervals, controlling for gender, grade, classroom leadership status, and only-child status. CR2 and exact wild-cluster-bootstrap inference accounted for the 12-classroom structure.

None of the four T1 victimization indicators predicted poorer T2 peer relationship quality after adjustment for prior peer relationship quality and covariates. During the second interval, verbal victimization (β = −.171, CR2 p < .001; exact p = .001) and relational victimization (β = −.201, CR2 p = .002; exact p = .002) predicted poorer T3 peer relationship quality. The cyber coefficient was negative and met the CR2 threshold (β = −.083, p = .047) but was just above .05 in the exact bootstrap (p = .050); physical victimization was non-significant. A formal interval comparison was significant only for relational victimization (Δβ = −.255, CR2 p < .001; exact p = .001).

Reverse paths did not support the vulnerability account: lower peer relationship quality did not predict higher subsequent victimization. Higher T1 peer relationship quality predicted higher T2 verbal victimization (β = .132, CR2 p = .014; exact p = .016), consistent with the social-salience account, but this association did not recur during the second interval. It should be interpreted cautiously because perceived classmate support is not a direct measure of network status and adjustment for prior verbal victimization can produce suppression.

Table 3

Detailed Standardized Cross-Lagged Estimates and Interval-Difference Tests

Subtype	Path / test	β / Δβ	SECR2	df	95% CI	pCR2	pWCB
Verbal	T1 Vic→T2 PRQ	−.057	.044	10.13	[− .154, .040]	.222	.226
Verbal	T2 Vic→T3 PRQ	−.171	.034	10.38	[− .246, − .095]	< .001	.001
Verbal	T1 PRQ→T2 Vic	.132	.045	10.40	[.032, .233]	.014	.016
Verbal	T2 PRQ→T3 Vic	.022	.035	10.25	[− .055, .099]	.538	.538
Verbal	Period×Vic Δ slope	−.096	.067	10.50	[− .245, .053]	.184	.179
Physical	T1 Vic→T2 PRQ	−.030	.024	9.99	[− .083, .022]	.227	.213
Physical	T2 Vic→T3 PRQ	−.046	.035	9.56	[− .126, .034]	.226	.214
Physical	T1 PRQ→T2 Vic	−.023	.044	10.30	[− .120, .074]	.607	.600
Physical	T2 PRQ→T3 Vic	.040	.041	10.29	[− .051, .131]	.350	.334
Physical	Period×Vic Δ slope	.000	.044	10.06	[− .097, .098]	.992	.988
Relational	T1 Vic→T2 PRQ	.044	.024	9.40	[− .010, .097]	.098	.083
Relational	T2 Vic→T3 PRQ	−.201	.049	9.81	[− .312, − .091]	.002	.002
Relational	T1 PRQ→T2 Vic	.015	.041	10.33	[− .077, .107]	.721	.725
Relational	T2 PRQ→T3 Vic	−.024	.042	10.29	[− .116, .069]	.581	.583
Relational	Period×Vic Δ slope	−.255	.039	9.57	[− .342, − .167]	< .001	< .001
Cyber	T1 Vic→T2 PRQ	.003	.028	8.34	[− .061, .067]	.911	.904

Note. Vic = victimization; PRQ = peer relationship quality; β = standardized coefficient; Δβ = difference in the victimization-to-PRQ slope across intervals; SECR2 = bias-reduced cluster-robust standard error; pWCB = exact wild-cluster-bootstrap p value. Models adjusted for covariates and the corresponding autoregressive path.

Subtype	Path / test	β / Δβ	SECR2	df	95% CI	pCR2	pWCB
Cyber	T2 Vic→T3 PRQ	−.083	.036	9.12	[− .164, − .001]	.047	.050
Cyber	T1 PRQ→T2 Vic	.002	.043	10.27	[− .093, .096]	.972	.974
Cyber	T2 PRQ→T3 Vic	−.008	.038	10.27	[− .092, .076]	.840	.829
Cyber	Period×Vic Δ slope	−.092	.042	8.90	[− .186, .003]	.055	.027

Note. Vic = victimization; PRQ = peer relationship quality; β = standardized coefficient; Δβ = difference in the victimization-to-PRQ slope across intervals; SECR2 = bias-reduced cluster-robust standard error; pWCB = exact wild-cluster-bootstrap p value. Models adjusted for covariates and the corresponding autoregressive path.

Robustness Checks

When all four victimization subtypes were entered simultaneously, verbal (β = −.141, CR2 p = .002; exact p = .002) and relational victimization (β = −.186, CR2 p = .003; exact p = .003) remained independently associated with poorer T3 peer relationship quality. Physical and cyber victimization were non-significant. No subtype independently predicted T2 peer relationship quality in the simultaneous first-interval model.

The composite traditional-victimization index was unrelated to T2 peer relationship quality after adjustment for baseline levels (β = −.020, CR2 p = .510) but predicted poorer T3 peer relationship quality during the second interval (β = −.195, CR2 p < .001; exact p = .001). This pattern supports a later between-child association but does not establish within-child accumulation.

Within-Person Analyses

RI-CLPMs separated stable between-child differences from within-child deviations (Additional file 1: Table S1). In the verbal model, the random-intercept variances were .37 for victimization and .49 for peer relationship quality, with a covariance of − .12, indicating substantial stable between-child heterogeneity.

Within-child increases in verbal victimization were followed by declines in peer relationship quality across both intervals (standardized β = −.188, p = .025, and β = −.181, p = .015). Higher within-child peer relationship quality at T1 also preceded higher verbal victimization at T2 (β = .194, p = .013), but the corresponding second-interval path was non-significant. Physical and cyber victimization showed no significant within-child cross-lagged paths. Relational victimization showed an anomalous positive first-interval path (β = .251, p < .001) and no second-interval effect. For the verbal model, the CFI indicated good comparative fit, whereas the significant chi-square test and elevated RMSEA indicated potential absolute misfit, $\chi^2(1) = 10.82$, p = .001, CFI = .990, RMSEA = .131. A similar discrepancy was observed for the relational model, $\chi^2(1) = 21.20$, p < .001, CFI = .980, RMSEA = .189. Given the models' single degree of

freedom and the minimum three-wave design, these global fit indices, particularly RMSEA, should be interpreted cautiously. Taken together, verbal victimization showed a negative prospective association at both the between-child and within-child levels. The stronger second-interval pattern for relational victimization was confined to the between-child models and was not corroborated within children. H1b should therefore be interpreted as limited between-child evidence rather than a demonstrated within-child accumulation process. The moderation analyses below remain between-child prospective models.

Moderating Role of Perceived Teacher Response

To test whether perceived teacher response moderated the prospective association between victimization and peer relationship quality, peer relationship quality at time t + 1 was regressed on peer relationship quality, victimization, public intervention, and private support at time t, together with the Victimization × Public Intervention and Victimization × Private Support interaction terms, controlling for covariates, with cluster-robust standard errors by classroom:

$$\mathbf{PeerRelations}_{i,t+1} = b_0 + b_1\mathbf{PeerRelations}_{i,t} + b_2\mathbf{Vic}_{i,t} + b_3\mathbf{Public}_{i,t} + b_4\mathbf{Private}_{i,t} + b_5(\mathbf{Vic}\times\mathbf{Public})_{i,t} + b_6(\mathbf{Vic}\times\mathbf{Private})_{i,t} + b_7\mathbf{Covariates}_i + \varepsilon_i$$

Confirmatory Analysis of Verbal Victimization

During T1→T2, perceived public intervention predicted poorer subsequent peer relationship quality (β = −.194, CR2 p = .003; exact p = .002), whereas perceived private support predicted better peer relationship quality (β = .212, CR2 p < .001; exact p < .001). Public intervention strengthened the negative verbal-victimization slope (β = −.126, CR2 p < .001; exact p = .004), whereas private support attenuated it (β = .127, CR2 p = .009; exact p = .018). During T2→T3, neither teacher-response main effect nor either interaction was significant, although verbal victimization remained negatively associated with subsequent peer relationship quality (β = −.171, CR2 p < .001).

The pooled model confirmed that the Victimization × Public Intervention interaction differed across intervals (Victimization × Public Intervention × Period: Δβ = .146, CR2 p = .005; exact p = .008). The corresponding difference for private support was in the predicted direction but narrowly missed the conventional threshold (Δβ = −.129, CR2 p = .051; exact p = .052). Thus, H4 was supported for public-intervention moderation and was borderline for private support.

Table 4

Detailed CR2 Estimates for the Verbal-Victimization Moderation Models

Interval	Predictor	β	SECR2	df	95% CI	pCR2	pWCB
T1→T2	Victimization	−.055	.040	9.87	[− .144, .034]	.199	.197
T1→T2	Public intervention	−.194	.051	10.37	[− .306, − .082]	.003	.002
T1→T2	Private support	.212	.040	10.15	[.123, .302]	< .001	< .001
T1→T2	Vic × Public intervention	−.126	.026	9.02	[− .183, − .068]	< .001	.004
T1→T2	Vic × Private support	.127	.037	8.55	[.042, .212]	.009	.018
T2→T3	Victimization	−.171	.035	10.40	[− .248, − .094]	< .001	.001
T2→T3	Public intervention	−.042	.039	9.54	[− .129, .045]	.304	.304
T2→T3	Private support	.032	.041	10.37	[− .058, .122]	.451	.450
T2→T3	Vic × Public intervention	.024	.027	8.61	[− .038, .087]	.401	.386
T2→T3	Vic × Private support	−.007	.037	8.67	[− .091, .078]	.861	.855

Note. The dependent variable is peer relationship quality at t + 1. β = standardized coefficient; SECR2 = bias-reduced cluster-robust standard error; pWCB = exact wild-cluster-bootstrap p value. Models adjusted for prior peer relationship quality and all covariates. Model R^2 = .443 for T1→T2 and .412 for T2→T3.

Simple-Slope Analysis

At low public intervention (− 1 SD), the verbal-victimization slope was not statistically significant (b = .071, CR2 p = .175); at high public intervention (+ 1 SD), the slope was significantly negative (b = − .180, CR2 p = .004). The reverse pattern appeared for private support: at low private support, verbal victimization predicted poorer subsequent peer relationship quality (b = − .182, CR2 p = .018), whereas at high private support the slope was not significant (b = .072, CR2 p = .167). Figure 1 displays predicted standardized values with prior peer relationship quality and covariates held at their means.

Discussion

The present study shows that the prospective association between peer victimization and children's peer relationship quality depends on victimization subtype, analytical level, and the timing and perceived form

of teacher response. Between children, verbal and relational victimization predicted poorer peer relationship quality primarily during the second interval. Within children, however, increases in verbal victimization preceded declines across both intervals. Perceived public intervention and private support showed contrasting prospective associations during the first interval. Public intervention was linked to poorer subsequent peer relationship quality and a stronger negative verbal-victimization slope, whereas private support showed the opposite pattern. These findings are compatible with a response-visibility account but do not isolate visibility from response target, disciplinary content, or emotional tone.

The Time Course of Victimization's Prospective Association

The between-child models did not support a uniform immediate effect of victimization. No subtype predicted poorer peer relationship quality during T1→T2, whereas verbal and relational victimization showed robust negative associations during T2→T3. Physical and cyber victimization did not show robust prospective associations after the small-cluster corrections. Only relational victimization showed a statistically reliable interval difference. This pattern is compatible with Social Safety Theory's emphasis on repeated social-threat signals [14, 15], especially when exclusion, ridicule, and reputational processes become embedded in a stabilizing peer network. It also aligns with peer-ecological accounts of bullying, which treat victimization as a group process shaped by classroom norms, bystander attention, and social status dynamics rather than as a purely dyadic event [32–34]. Compatibility, however, is not evidence of causal accumulation.

The RI-CLPM results sharpen that qualification. Within-child increases in verbal victimization were followed by poorer peer relationship quality across both intervals, not only later in the school year. The delayed relational pattern disappeared within children and was replaced by an anomalous positive first-interval coefficient in a poorly fitting model. The most defensible conclusion is therefore that verbal victimization had a comparatively consistent within-child association, whereas the apparent late-year strengthening of relational victimization reflected differences between children rather than a replicated within-child accumulation process.

The null physical-victimization result is also informative. Physical victimization primarily threatens bodily safety, whereas the outcome measured here concerns friendship, help, enjoyment, and belonging within the peer group. A bodily threat need not translate into a generalized downward revision of perceived classmate support over a semester. The simultaneous models further showed that verbal and relational victimization retained independent second-interval associations, supporting the decision to analyse subtypes separately rather than collapse them into a single undifferentiated construct.

The Reverse Pathway

Lower peer relationship quality did not predict greater subsequent victimization, providing no support for the vulnerability account. Higher T1 peer relationship quality did predict higher T2 verbal victimization in both the conventional and within-person models, but the effect did not recur during the second interval.

This pattern is compatible with the possibility that socially visible children attract verbal challenges in status competition [17, 18], yet perceived classmate support is not a direct measure of centrality or status. Suppression and unmeasured child characteristics remain plausible explanations.

The Timing and Visibility of Teacher Response

The clearest teacher-response finding was the first-interval contrast between perceived public intervention and private support. Public intervention predicted poorer subsequent peer relationship quality and amplified the negative verbal-victimization slope, while private support predicted better peer relationship quality and attenuated that slope. The formal cross-interval test confirmed change for public-intervention moderation; the private-support difference was similar in direction but borderline. These results suggest that teacher response is not adequately represented by a single active-versus-passive continuum. Reviews and longitudinal studies likewise show that teacher responses differ in function, target, and classroom meaning, with disciplinary sanctions, group discussion, non-intervention, and victim support showing distinct associations with students' bullying-related roles and peer ecology [35–37].

From a Social Safety Theory perspective, teacher responses may function as social signals about whether the classroom is safe and whether a targeted child remains socially exposed. A public reprimand or public apology can communicate intolerance of bullying, but it may also identify the targeted child before the peer group and extend the social-evaluative episode. Private support can communicate care without adding the same audience exposure. This distinction is consistent with classroom peer-ecology research showing that adult practices and peer networks are intertwined systems. Teachers can influence how peer norms are interpreted, how bystanders respond, and whether aggression is rewarded or discouraged [34, 38, 39]. The simple slopes are consistent with this interpretation. Verbal victimization was associated with poorer later peer relationship quality when public intervention was high or private support was low, but not under the contrasting moderator conditions.

The timing of these associations may reflect the particular transition captured by T1. The teachers had previously taught the classes as subject teachers but began the formal head-teacher role at the start of the study year. Their early responses may therefore have carried more information as students formed expectations about classroom management and support. Later in the year, teacher responses may have become more predictable and less informative, whereas victimization-related reputational processes continued to accumulate. This interpretation is consistent with evidence that intervention effects can depend on peer status and classroom context, rather than operating uniformly across children and groups [39, 40]. It remains inferential because classroom climate and expectation formation were not directly measured.

The evidence should not be interpreted as showing that public discipline is generally ineffective or that private support is universally protective. The two scales differed not only in audience visibility but also in target, punitive content, and emotional support. The models also captured differences between

children's perceptions, not experimentally induced changes in teacher behavior. Visibility is therefore a plausible mechanism and a target for future matched-response experiments, rather than an identified causal process.

Theoretical Implications

First, the results extend Social Safety Theory to peer relationship quality and perceived teacher responses in Chinese upper-elementary classrooms, but they also illustrate the importance of matching theory to analytical level. A theory of within-person accumulation cannot be confirmed solely by between-child cross-lagged coefficients. The discrepancy between the relational between-child and within-child estimates refines the proposed time-course account and supports recent methodological cautions that conventional cross-lagged paths can mix stable between-person differences with within-person change [28, 41]. Substantively, the findings also connect Social Safety Theory with social-ecological models of bullying, which emphasize that peer victimization is maintained by classroom norms, audience processes, and peer status hierarchies [32, 33, 39].

Second, the findings suggest that the visible–invisible support distinction may be relevant beyond adult dyadic support. Here, the recipient was aware of both response styles; the critical difference was whether classmates could observe the response. Private support is therefore better described as low-audience-visibility support than as classic invisible support. This extension is theoretically important because classroom responses are public signals embedded in a peer audience, not private exchanges between helper and recipient. Future measures should isolate visibility while holding target, content, and emotional tone constant [11, 13].

Third, the results reinforce a multidimensional conception of teacher response. Active intervention can carry different social meanings depending on how the incident is framed before peers and whether the targeted child receives individualized support. This conclusion is consistent with research showing that teacher intervention strategies are heterogeneous and can shape bullying roles, defending, and classroom norms in different ways [35–37]. Research that aggregates these responses into a single effectiveness score may conceal opposing pathways.

Finally, the findings clarify why teacher-response visibility should be studied together with peer ecology. Public responses occur before an audience that can either reinforce or reduce the social meaning of victimization, whereas private support may protect the targeted child without altering the public peer script. This distinction bridges invisible-support theory with participant-role and bystander models of bullying, in which the peer audience is central to whether aggression gains or loses social value [33, 34].

Practical Implications

These findings do not imply that teachers should avoid intervention. They imply that accountability for aggressors can be separated from unnecessary public exposure of the targeted child. When feasible,

teachers can address rule violations firmly while discussing the victimized child's needs privately. This distinction is compatible with anti-bullying work showing that disciplinary and norm-setting responses can be useful when they reduce aggression and support defending, but that intervention effects depend on how responses are implemented and perceived within the classroom [36, 40]. The present findings support attention to how a response is experienced and observed, not a blanket preference for one technique.

Timing may also matter. The public-intervention moderation was concentrated in the first observed interval, while verbal and relational victimization were more strongly associated with poorer peer relationship quality later in the year. Schools may benefit from establishing low-exposure, supportive response routines early while continuing to monitor victimization and peer relationships throughout the year. These recommendations remain provisional because the study was observational.

Limitations and Future Directions

Several limitations qualify these conclusions. First, the study included only 12 classrooms from one school and relied on child reports for victimization, teacher response, and peer relationship quality. CR2 and exact wild-cluster-bootstrap procedures improve small-cluster inference but cannot eliminate uncertainty from so few independent clusters. Perceived teacher response reflects children's construal rather than observed teacher behavior, and shared-reporter variance remains possible despite the common-method diagnostics.

Second, the four victimization subtypes were represented by single items, limiting reliability assessment and measurement-invariance testing for these indicators. The three-wave RI-CLPMs were minimally identified and fitted poorly for verbal and relational victimization, so their coefficients should be treated as sensitivity evidence rather than definitive within-person estimates. The observational models cannot exclude omitted causes, suppression, or reactive response processes.

Third, public intervention and private support differed simultaneously in audience visibility, response target, disciplinary content, and emotional tone. The study therefore cannot isolate visibility as the causal mechanism. The cultural and institutional context may also matter. Public correction and the continuous Chinese head-teacher system may heighten the meaning of visible responses. Replication across schools and cultures, with more waves, multi-informant measurement, social-network indicators, direct observation, and experimentally matched teacher responses, is needed.

Conclusions

Perceived public intervention and private support showed contrasting prospective associations with children's peer relationship quality during the first interval. Public intervention was associated with poorer subsequent peer relationship quality and a stronger negative verbal-victimization slope, whereas private support was associated with better peer relationship quality and an attenuated slope. Later between-child associations were clearest for verbal and relational victimization, while within-child

increases in verbal victimization preceded declines across both intervals. These observational findings support a subtype-, timing-, and response-sensitive account of classroom social safety, but they do not establish causal effects of teacher behavior or audience visibility.

Abbreviations

CASSS: Child and Adolescent Social Support Scale; CFA: Confirmatory factor analysis; CFI: Comparative fit index; CLPM: Cross-lagged panel model; CMB: Common method bias; CR2: Bias-reduced linearization cluster-robust variance estimator; DBVS-S: Delaware Bullying Victimization Scale–Student; FDR: False discovery rate; ICC: Intraclass correlation coefficient; PTRS: Perceived Teacher Response Scale; RI-CLPM: Random-intercept cross-lagged panel model; RMSEA: Root mean square error of approximation; SD: Standard deviation; SE: Standard error; TLI: Tucker-Lewis index.

Declarations

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Authors' contributions

Aibin Tang conceptualized the study and designed the research. Qiran Wang performed the statistical analyses and drafted the manuscript. Both authors revised the manuscript critically for important intellectual content. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets generated and analysed during the current study are not publicly available due to privacy restrictions concerning the minor participants but are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

This study was performed in accordance with the ethical standards of the institutional research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. The study protocol was approved by the Ethics Committee of Zhejiang International Studies University (Approval No. 2024/23) on 5 March 2024. All participants were minors; written informed consent was therefore obtained from the parents or legal guardians of all participating students, and the students provided assent prior to participation. Participation was voluntary and could be discontinued at any time without penalty. Written permission to conduct the study was also obtained from the participating school.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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Figures

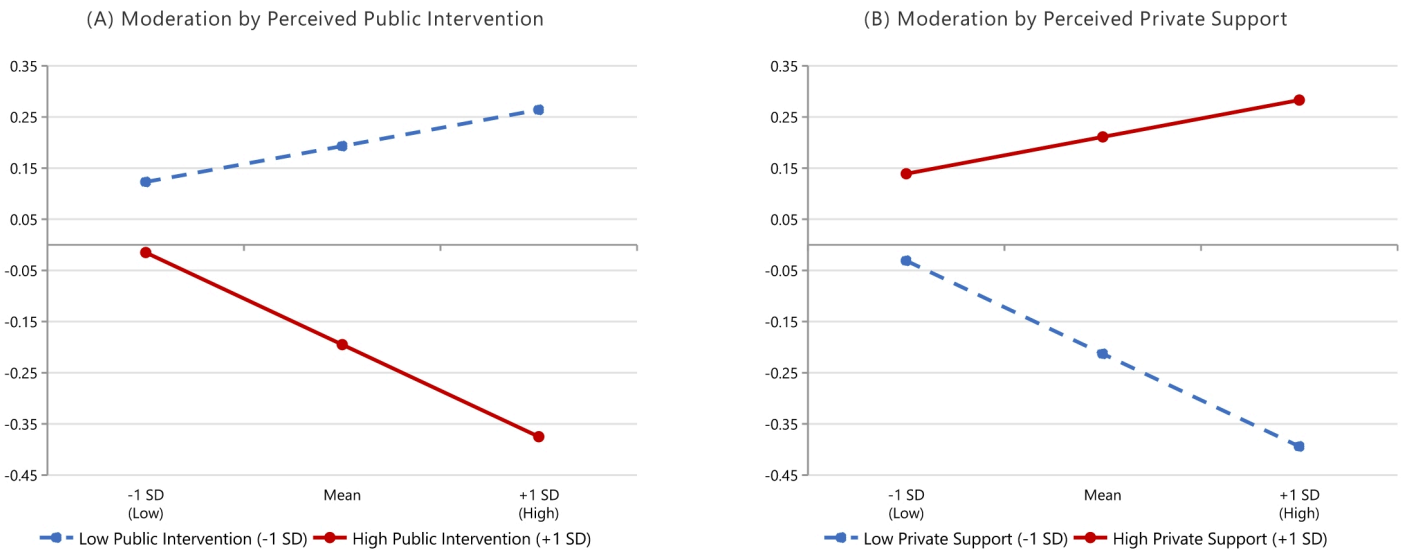


Figure 1

Simple slopes of verbal victimization predicting peer relationship quality at low and high levels of perceived public intervention (Panel A) and private support (Panel B).