Cluster Randomized Control Trial to Reduce Peer Victimization: An Autonomy-Supportive Teaching Intervention Changes the Classroom Ethos to Support Defending Bystanders

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Abstract

Peer victimization is a worldwide crisis unresolved by 50 years of research and intervention. We capitalized on recent methodological advances and integrated self-determination theory with a social-ecological perspective. We provided teachers with a professional development experience to establish a highly supportive classroom climate that enabled the emergence of pro-victim student-bystanders during bullying episodes. In our longitudinal cluster randomized control trial, we randomly assigned 24 teachers (15 men, 9 women; 19 middle-, 5 high-school; 32.8 years-old, 6.7 years of experience) in 48 classrooms to the autonomy-supportive teaching workshop (24 classrooms) or the no-intervention control (24 classrooms). Their 1,178 students (age: M = 13.7, SD = 1.5; *range* = 11-18) reported their perceived teacher autonomy support, perceived classmates' autonomy support, adoption of the defender role, and peer victimization at the beginning, middle, and end of an 18-week semester. A doubly-latent-multilevel structural equation model with follow-up mediation tests showed that experimental-group teachers created a substantially more supportive classroom climate, leading student-bystanders to embrace the defender role. This classroom-wide (L2) emergence of pro-victim peer bystanders led to sharply reduced victimization (ES = -.40). Unlike largely unsuccessful past interventions that focused mainly on individual students, our randomized control trial intervention substantially reduced bullying and victimization. Focusing on individual students is likely to be ineffective (even counter-productive) without first changing the normative climate that reinforces bullying. Accordingly, our intervention focused on the classroom teacher. In the classrooms of these teachers, bystanders supported the victims because the classroom climate supported the bystanders.

Keywords: autonomy support; victimization; bystander; self-determination theory; social ecology.

Public Significance Statement

Peer victimization is a harm-inflicting classroom phenomenon, so we investigated how to reduce it. To date, results from school-based interventions to reduce victimization have been collectively judged as "disappointing" (Juvonen & Graham, 2014). Our investigation was new because we focused on group-level social processes, such as the classroom climate and the mobilization of pro-victim peer bystanders. We invited teachers to participate in an autonomy-supportive teaching workshop so that they could create a highly supportive classroom climate. Once teachers learned how to do this, student-bystanders embraced the defender role, and peer victimization declined sharply.

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Victimization refers to receiving a powerful peer's (or peer group's) intentional, repeated, and harm-inflicting acts of aggression and intimidation (Hymel & Swearer, 2015; Menesini & Salmivalli, 2017). Such experiences plague adolescents' interpersonal relationships and school experiences in multiple, far-reaching ways. First, it is widespread, as about 30% of adolescents worldwide experience victimization (Evans et al., 2014) while practically every adolescent observes it as a bystander. Second, it has profound negative implications, including internalizing problems (Christina et al., 2021), physical health problems (Schacter, 2021), and social isolation and psychological illness tendencies (Juvonen et al., 2003; Juvonen & Graham, 2014). Third, victimization can occur multidimensionally, as victims suffer physical attacks (hitting, pushing), verbal attacks (name-calling), or social attacks (social exclusion) (Marsh et al., 2011a). Fourth, efforts to stop it (i.e., interventions) routinely fail (Juvonen & Graham, 2014). Despite educators' 50-year effort to develop bullying-reduction programs, the prevalence of school-based victimization remains high (Harbin et al., 2019) and shows no sign of abating (Li et al., 2020). Furthermore, only a minority of the formally-evaluated intervention studies used appropriate randomized control trials (RCT) designs, and these RCTs resulted in even smaller effects (Gaffney et al., 2019).

However, recent progress has been made on two key fronts. First, intervention research now employs longitudinal and multilevel analyses. These focus on individual-level factors (e.g., attitudes, beliefs, moral disengagement excuses), but they also focus on group- and classroom-level processes, such as the classroom climate, social norms, and the mobilization of peer bystanders (Jungert et al., 2016; Saarento et al., 2015; Salmivalli et al., 2005; Van Ryzin & Roseth, 2018). Second, the research designs of successful interventions

are beginning to be informed by explanatory mechanisms and processes (hypothesized mediators) that reliably reduce victimization (Tolmatcheff et al. 2022). Here, we seek to open up the “black box” of successful antibullying programs (Saarento et al., 2015; Tolmatcheff et al., 2022). The present study represents a response to the field’s recent call to focus on explanatory mechanisms (Gaffney et al., 2021; Menesini & Salmivalli, 2017; Saarento et al., 2015; Tolmatcheff et al., 2022).

Role of the Classroom Climate and Peer Bystanders in De-Escalating Peer Victimization

Classrooms have social climates. These interpersonal climates range from status-centric and hierarchical to closely-knit and egalitarian (Garandeau et al., 2014; Gest & Rodkin, 2011). Interpersonal dynamics that cultivate social comparisons leave students vulnerable to "me vs. you" peer-to-peer interactions that generally fertilize conflict and bullying (Di Stasio et al., 2016; Garandeau et al., 2014). In contrast, closely-knit classrooms cultivate interpersonal support, a sense of community, and the emergence of egalitarian relationships. These connection-based interpersonal dynamics generally purge acts of aggression, intimidation, bullying, and victimization (Assor et al., 2018; Roth et al., 2010; Van Ryzin & Roseth, 2018). By training teachers in cooperative learning (Van Ryzin & Roseth, 2018) or relatedness-supportive (Sparks et al., 2017) teaching practices, it is possible to manipulate the quality of the classroom climate so that it tends to cultivate peer acceptance and more positive, closely-knit peer-to-peer relations.

A social ecology model emphasizes the role of the social climate, including the attitudes, behaviors, and social contributions of the classroom bystanders present during bullying episodes (Hendrickx et al., 2016; Hong & Espelage, 2012). These peer bystanders offer varying degrees of support and encouragement to bullies and victims (Hong & Espelage, 2012; Salmivalli, 2010). By doing so, bystanders likely play an important role in

escalating or de-escalating peer victimization. For instance, bullying covaries with the presence of peer bystanders who reinforce the bully (e.g., by smiling, laughing, and cheering) (Salmivalli et al., 2011). Further, bystanders can act as "assistants" who not only reinforce the bullying but actually join in on it as well (Espelage et al., 2003).

The KiVa intervention shows that changing bystander behavior can reduce peer victimization (Kärnä et al., 2011). However, the concern with any focus on bystanders is that while they are present during 85-88% of bullying episodes, bystanders rarely intervene to support the victim (Hawkins et al., 2001). Bystanders may be reluctant to intervene if they believe that doing so might provoke retaliation (Garandeau et al., 2019; Wu et al., 2016), lead to negative personal consequences (e.g., anxiety, depression, and social isolation; Hinduja & Patchin, 2010), decrease peer liking (Meter & Card, 2015), or even disempower the victim (Healy, 2020; Laninga-Wijnen et al., 2022). Whether intervening bystanders actually suffer in these ways is not yet clear, as research suggests that these repercussions do (Huitsing et al., 2014) and do not (Malamut et al., 2022) occur. Nevertheless, bystanders are a potential ally for the victim (Meter & Card, 2015). When they put themselves into the defender role, student-bystanders provide social and emotional support by advocating for, defending, or intervening on behalf of the (relatively powerless) victim or by informing a teacher (Jungert et al., 2016; Salmivalli et al., 2011).

If left to naturally occurring social processes (i.e., the absence of intervention), student-bystanders tend to side with and reinforce the bully or do not intervene at all (Kärnä et al., 2010). In other words, bystanders do not naturally mobilize into collective action to defend victims. This is the case even when bystanders want to intervene, admire other bystanders who intervene, and believe that victims do not deserve their suffering and instead deserve help, assistance, and comfort. Apparently, just as victims need bystander support, bystanders need classroom climate support (Flaspohler et al., 2009).

We acknowledge that the evidence as to whether defending produces a bullying-reduction effect is mixed (Gaffney et al., 2021; Malamut et al., 2022; Saarento et al., 2015). We suspect that the inconsistent track record for successful defending behaviors might arise from its inherent inconsistency with an often-prevailing pro-bully classroom ethos. Recognizing this, we created—through our intervention—a prevailing pro-victim and interpersonally supportive classroom ethos. In such a climate, defending behavior can be expected to be effective and safe, because one's classmates and fellow bystanders back and support, rather than isolate and put at risk, the defending bystander.

Role of the Autonomy-Supportive Teacher in Promoting Internalization and a Supportive Classroom Climate

One way to generate a supportive classroom climate is to insert a highly autonomy-supportive teacher (Cheon et al., 2022a, 2022b; Reeve & Cheon, 2021). According to self-determination theory (SDT; Ryan & Deci, 2017), autonomy-supportive teaching involves adopting a student-focused attitude, an understanding tone, and the skillful enactment of psychological need-satisfying instructional behaviors, such as taking the students' perspective and supporting students' interests and preferences during instruction (Reeve & Cheon, 2021). Figure 1 portrays autonomy-supportive teaching in practice (based on Reeve et al., 2022). As shown in Figure 1A's upper-case lettering, autonomy-supportive teachers take the students' perspective, support interest (intrinsic motivation), and support valuing (internalization). Supporting interest is important, but the acts of instruction that best support students' acceptance and internalization of a supportive classroom climate are perspective-taking and supporting valuing. When they make a request or espouse a value, autonomy-supportive teachers consider the request or value from the students' point-of-view, explain the benefits to students, acknowledge students' resistance, use invitational language, and display patience to give students time to work through the internalization process. Prior RCT interventions

showed that after teachers completed an autonomy-supportive teaching workshop, they enacted each of the instructional behaviors listed in Figure 1A to a much greater degree than did comparable no-workshop teachers, as scored by objective external classroom raters (*ES* ≅ 2; Cheon et al., 2018, 2019). For illustrative purposes, Figure 1B provides an example of what workshop participants learn to say and do to support their students' internalization of a specific teacher request—namely, "use respectful language".

Internalization is the process of taking in and transforming other people's values, beliefs, and ways of behaving such that those values, beliefs, and behaviors become personally meaningful guideposts in one's own life (Ryan & Deci, 2017; Vansteenkiste et al., 2018). For example, autonomy-supportive teaching can facilitate students' willingness to accept (internalize) the teacher's requests and regulations (Jang, 2008; Patall et al., 2013; Reeve et al., 2002; Savard et al., 2013). Once internalized, internal guides such as "be considerate" and "show mutual respect" become the relational building blocks needed to cultivate a classroom climate that can prevent victimization.

The first demonstration of this internalization-facilitating process showed that middle-school teachers who take their students' perspective and provide explanatory rationales for their requests tended to have students with internalized values such as being more considerate toward their classmates, which correlated with infrequent bullying (Roth et al., 2010). A second study taught middle-school teachers how to engage in whole-class "autonomy-supportive dialogues" (using empathy, perspective-taking, and communicating relevance) to help students' value caring and de-value violence (Kaplan & Assor, 2012). A third investigation taught late elementary-school teachers how to blend empathic perspective taking with classroom-wide rules against violence, which reduced classroom violence two years later (Assor et al., 2018). This promising early work led to the belief that autonomy-supportive teaching could be experimentally manipulated through intensive professional development

workshops with teachers. Subsequently, a series of intervention-based randomized control trials showed that teacher participation in an SDT-informed, workshop-based professional development experience tends to produce the following outcomes: (1) teachers become more autonomy-supportive toward students during instruction (according to rater-observations and student-reports), (2) the classroom climate becomes more supportive and less conflictual (according to student-reports), and (3) teachers and students both experience many benefits, such as teachers' greater teaching efficacy (teacher-reports) and students' greater classroom engagement (rater-observations and student-reports) (Cheon et al., 2018, 2022a, 2022b; Reeve et al., 2004).

When they adopt an autonomy-supportive style, teachers play a key role in reducing classroom victimization. Correlational findings show that autonomy-supportive high-school (Gregory et al., 2010) and middle-school (Roth et al., 2010) teachers tend to have classrooms high in student safety and low in bullying and victimization. Intervention studies show that autonomy-supportive trained elementary- (Assor et al., 2018), middle- (Kaplan & Assor, 2012), and high- (Cheon et al., 2018) school teachers tend to have classrooms high in caring and prosocial behavior and low in antisocial behavior and violence. We suggest that these effects occur because autonomy-supportive teachers influence the interpersonal climates and peer ecologies that emerge in their classrooms. For instance, middle-school autonomy-supportive teachers who rely on a responsive-empathic-fair communication style and disciplinary practices tend to foster a classroom climate rich in interpersonal support and low in interpersonal conflict (Cheon et al., 2019). Trained autonomy-supportive teachers also reduce elementary-grade students' tendencies to make "me vs. you" social comparisons (Gilbert et al., 2022). When it occurs, this "class relational climate" (e.g., "We care about each other"; Thornberg et al., 2016, p. 529) likely dilutes social comparisons tendencies to

instead introduce a "we" counterforce that is likely more associated with low levels bullying and victimization.

Hypothesized Model

The hypothesized model appears in Figure 2. Peer victimization is inherently a group-based phenomenon (Salmivalli et al., 1996; Sutton & Smith, 1999). Thus, we focused on a classroom (L2) level of analysis (the upper half of Fig. 2). The experimental manipulation was teacher participation (or not) in the autonomy-supportive teaching workshop (the shaded grey box). We hypothesized that our beginning-of-semester manipulation at T1 (Time 1):

- Would increase class-wide adoption of the defender role at T2 (H1, Hypothesis 1); and
- This intervention-enabled increase in class-wide adoption of the defender role at T2 would then lead to a decrease in class-wide victimization at T3, a mediation effect (H2, Hypothesis 2).

Our model highlights the causal benefits of autonomy-supportive teaching. However, it places the proximal explanatory power for reduced victimization on the collective attitudes and behaviors of the peer bystanders (via victim defense). The hypothesized model posits a mediation effect (manipulation → T2 bystander-victim-defense → T3 reduced victimization). Hence, we performed follow-up mediation analyses (at the classroom, or L2, level). Figure 2 further includes student-level, or L1, processes (see the lower half of Fig. 2) and numerous thin-faced lines to represent the statistical controls and autoregressive effects necessary for a longitudinal data analysis. Our use of sound theory and robust statistical methodology (doubly-latent-multilevel structural equation modeling) to address the substantively important issue of peer victimization represents a substantive-methodological synergy (Marsh & Hau, 2007).

Method

Participants

To be eligible for the study, a teacher needed to be an experienced, full-time teacher in Korea. Teacher-participants were 24 full-time certified physical education (PE) teachers (15 men, 9 women) who taught in one of 24 different schools (19 middle- and 5 high-schools) dispersed throughout Seoul, South Korea (i.e., a multi-site intervention trial). We collected data in two classrooms from each teacher (i.e., 24 teachers, 48 classrooms) to increase the number of classrooms, and we evaluated the effects of classrooms nested within teachers. On average, teachers were 32.8 years old (*SD* = 5.2; *range* = 26-41) and had 6.7 years (*SD* = 4.0; *range* = 2-14) of PE teaching experience. All 24 teacher-participants completed all study aspects (retention rate = 100%). In these 48 classrooms were 1,178 middle-class ethnic Koreans (Age: *M* = 13.7, *SD* = 1.5; *range* = 11-18), including: 599 (50.9%) females, 577 (48.9%) males, and 2 non-binary (< 1%); 957 (81.2%) middle and 221 (18.8%) high schoolers; and 581 (49.3%) in the experimental and 597 (50.7%) in the control condition.

Regarding statistical power, our sample of 48 classrooms (L2 units) with an average class size of 24.6 students/class (L1 units) generally met the multilevel analysis guidelines of at least 50 L2 units with at least 10-15 participants per L2 unit (Lüdtke et al., 2011; Morin et al., 2021). We also determined sample size using a power analysis for a 2-group (experimental, control) repeated measures regression-based analysis, using G*Power (Faul et al., 2017). In the conduct of the study, we therefore aimed for a minimal sample size of *N* = 44 classrooms (clusters) to detect a large effect size (f^2 = .25; based on Cheon et al., 2018, 2019) while using conventional statistics (α = .05, two-tailed, power = .95).

Transparency and Openness

This study was not preregistered. However, data sets and the Mplus syntax used to analyze these datasets are available on the Open Science Framework (OSF) project site: https://osf.io/wnv3g/?view_only=6bfcc9a7b81f43988dd6419bc43e672a. Also available at this OSF project site are the questionnaires used in the study, the CONSORT 2010 Checklist for a cluster randomized control trial, and the step-by-step "how to" procedures for the autonomy-supportive teaching workshop, including activities and links to videoclips.

Procedure, Research Design, and Autonomy-Supportive Teaching Workshop

The first author's University Research Ethics Committee approved the research protocol. The research design was a cluster randomized control trial with longitudinally assessed dependent measures. Figure 3 provides a schematic overview and timeline for our study. It shows how we recruited PE teachers in early February 2019 to participate in a study on "classroom instructional strategies", asked teachers to complete a consent form, used a computer-generated program to randomly assign teachers (and classrooms) to conditions, and collected three waves of student-reported data. Teachers in the experimental condition (12 teachers, 24 classrooms) participated in a 3-part, 8-hour AST workshop. All of these teachers participated together in the workshop's same-day Part 1 and Part 2 in the week prior to the beginning of the academic year's first semester (3rd week in February 2019). Five weeks later, these same teachers completed Part 3 by participating in one of three learning communities (3-5 teachers, based on geographical proximity). We present the step-by-step procedures for the implementation of the AST workshop within the OSF project site. Teachers in the control condition (12 teachers, 24 classrooms) participated in a waitlist control group in which they relied on their "practice as usual" teaching style during the spring semester. These teachers then received the full AST workshop in the following fall semester.

As for the student-participants, we collected three waves of data over the course of the first semester of the school year. Students completed the same 3-page questionnaire at the beginning (T1; week 1), middle (T2; week 10), and end (T3; week 18) of the semester. The questionnaire began with a consent form, and we used passive parental consent ("opt out"), at the request of the schools (students' consent/participation rate > 98%). We assured students that their responses would be confidential and used only for research purposes. We administered the survey at the beginning of the class period, and students completed the 10-minute questionnaire about that particular class.

Measures

We present the full questionnaire on the OSF project site. Each measure used the same 7-point response scale (1 = *strongly disagree*, 7 = *strongly agree*). For each measure, we calculated the inter-item (α) and inter-rater (*ICC1*, *ICC2*) reliability statistics across all three waves of data. The *ICC1* statistic reports the proportion of the variance in the dependent measure attributable to classroom (L2) membership, while the *ICC2* statistic reports the reliability of that aggregated *ICC1* group score. As a rule of thumb, *ICC1* and *ICC2* values greater than .10 and .70, respectively, generally indicate that a high proportion of the total variance in a measure occurred at the L2 level (Morin et al., 2021).

Autonomy Support

We used two versions of the 6-item Learning Climate Questionnaire to assess perceived autonomy support (LCQ; Black & Deci, 2000). The teacher version used "My teacher" as its referent (e.g., "My PE teacher tries to understand how I see things before suggesting a new way to do things."), while the peer version used "My classmates" as its referent (e.g., "My PE classmates listen to how I would like to do things."). For perceived autonomy-supportive teaching, students' reports were internally consistent (αs at T1, T2, and T3 were .91, .94, and .94, respectively), showed high within-class consensus (*ICC1*s = .240,

.234, and .275), and a high reliability of that consensus (*ICC2*s = .886, .882, and .903). For perceived autonomy-supportive peer climate, students' reports were also internally consistent (αs = .88, .92, and .95) and showed high within-class consensus (*ICC1*s = .165, .181, and .234) with high reliability (*ICC2*s = .830, .845, and .882).

Bystander Defender Role

We assessed the defender role with the 4-item Defending Behaviors scale from the Bystander Behavior Scale (BBS; Jungert et al., 2016; "I do something to help if I see a kid being called nasty names, threatened, hit or pushed by other students."). Students' reports were internally consistent (αs = .90, .94, and .95) and showed a high and rising within-class consensus (*ICC1*s = .130, .193, and .253) with high reliability (*ICC2*s = .786, .854, and .893).

Victimization

We assessed peer victimization with the three scales of the Adolescent Peer Relations Instrument (APRI; Marsh et al., 2011). The APRI asked students to report how much their classmates verbally, physically, and socially bully them. For the 6-item victimization-verbal scale (e.g., "In this PE class, I was called names I didn't like."), students' reports were internally consistent (αs = .90, .93, and .95) and showed high within-class consensus (*ICC1*s = .141, .171, and .183) with high reliability (*ICC2*s = .802, .836, and .847). For the 6-item victimization-physical scale (e.g., "In this PE class, I was pushed or shoved."), students' reports were internally consistent (αs = .93, .96, and .97) and showed high within-class consensus (*ICC1*s = .137, .181, and .191) with high reliability (*ICC2*s = .796, .845, and .853). For the 6-item victimization-social scale (e.g., "In this PE class, a student got their friends to turn against me."), students' reports were internally consistent (αs = .93, .96, and .97) and showed high within-class consensus (*ICC1*s = .141, .179, and .185) with high reliability (*ICC2*s = .802, .843, and .848).

Data Analyses

We conducted two sets of analyses. One set tested the overall hypothesized model (as well as its underlying measurement model). A second set tested for an intervention effect on four dependent measures: perceived autonomy-supportive teaching, perceived autonomy-supportive peer climate, bystander defender role, and peer victimization.

Test of the Hypothesized Model. The data had a three-level structure with students (Level 1, N = 1,178) nested within classrooms (Level 2, k = 48) and classrooms nested within teachers (Level 3, k = 24). We used a doubly-latent-multilevel structural equation model (DL-ML-SEM, recall Figure 2) to test the overall hypothesized model and to evaluate the individual hypotheses embedded within it (Marsh et al., 2012; Morin et al., 2021). In doing so, we used Mplus 8.3 (Muthén & Muthén, 2019) with the maximum likelihood-robust estimator (MLR) and full information maximum likelihood (FIML) estimation procedures for handling missing data. In the DL-ML-SEM analysis, we used students' responses to create latent variables at both the student (L1) and classroom (L2) levels (see Fig. 2). Each L2 latent variable represents the group consensus on that measure; this score has a clear meaning as a gauge of the prevailing classroom climate. Each L1 latent variable is a residual score representing within-class student-to-student differences in their perceptions of that group consensus. We accommodated the nesting of classrooms within teachers using Mplus's complex design procedure (i.e., type = twolevel complex). To evaluate model fit, we used the following goodness-of-fit statistics: Root-mean-square error of approximation (*RMSEA*), standardized root-mean-square residual (*SRMR*), comparative fit index (*CFI*), and Tucker-Lewis index (*TLI*). For *RMSEA* and *SRMR*, adequate and excellent fit are reflected by values lower than .08 and .06; for *CFI* and *TLI*, adequate and excellent fit are reflected by values greater than .90 and .95 (Marsh et al., 2005).

To facilitate interpretations, we identified all solutions by fixing the factor loading of the first indicator of each latent variable to a constant value. However, instead of fixing the value to 1.0, we fixed it to the standardized factor loading in the scalar invariance solution. This results in a model in which factor loadings are invariant over time and level. However, although the factor variance is 1.0 at T1 (i.e., residual + explained variance), the total variance is allowed to vary across waves. In this way, all responses are standardized relative to a common metric (that facilitates comparing parameter estimates in different waves), resulting in an unstandardized solution similar to a standardized solution. This is important because the variance in key outcome variables naturally increases over time, particularly at the L2 classroom level (i.e., there are big differences between experimental and control classrooms as a function of the intervention). In these quasi-standardized estimates, path coefficients are standardized in relation to a common metric based on total (L1 and L2) variance at T1. However, we also report Mplus's standardized estimates in which L2 effects are standardized in relation to L2 variances. To illustrate how we did this, we provide the Mplus syntax file within the OSF project site.

In a DL-ML-SEM analysis, it is important (for interpretative considerations) to establish multilevel measurement invariance (i.e., metric invariance; Morin et al., 2021). The measurement model included 18 indicators to create 5 latent variables (the ovals in Figure 2). If the measurement model that constrains these indicators to be invariant across both level and time shows little or no decrement in fit (according to the goodness-of-fit statistics) compared to the measurement model in which the indicators are free to vary, then multilevel and multiwave measurement invariance is supported (Marsh et al., 2012).

In the test of the hypothesized model, we entered the experimental condition as an uncentered L2 T1 predictor (0, 1), gender as a grand mean-centered L1 covariate, and grade level and class size as two grand mean-centered L2 covariates. In addition, we conducted

mediation tests for the hypothesized mediator (L2 T2 bystander-victim-defense) by testing for indirect effects within Mplus and, further, by using Preacher and Selig's (2012) bootstrapping procedure to construct 95% confidence intervals for the indirect effect (20,000 values).

Test of Intervention Effect on the Four Dependent Measures. We tested whether teachers implemented the intervention as intended in a pair of manipulation checks. In these DL-ML-SEM analyses, we tested the capacity of the intervention to increase two measures of a supportive classroom climate: *perceived autonomy-supportive teaching* and *perceived autonomy-supportive peer climate*. In these analyses, we used the six items from the respective version of the LCQ to create the latent (dependent) variables. Similarly, we tested whether teachers in the experimental condition produced the hypothesized effects on greater *bystander-victim-defense role* and lesser *peer victimization*. In these DL-ML-SEM analyses, we used the four items from the BDS to create the latent variable for the bystander-victim-defense dependent measure and we used the three scales from the APRI to create the latent variable for the peer victimization dependent measure. We used a growth analysis in all four analyses to test for an increase from T1 to T3 (slope: T1 = 0, T2 = 1, T3 = 2). We entered gender as a L1 covariate and grade level and class size as L2 covariates. In all four analyses, the critical test was for a condition *x* time interaction to confirm that the T1 to T3 increase (or decrease for peer victimization) in the L2 score was greater for teachers in the experimental condition than for teachers in the control condition. We provide the Mplus syntax for these analyses within the OSF project site.

Results

Test of the Intervention Effect on the Four Dependent Measures

We first tested whether teachers in the experimental condition implemented the intervention as intended. For *perceived autonomy-supportive teaching*, the data fit the overall

model reasonably well, $X^2(343) = 1{,}192.01$, $p < .001$, *RMSEA* = .046, *SRMR* = .033, *CFI* = .926, and *TLI* = .919. As illustrated in Figure 4A and as reported in Table 1, the key condition × time interaction was significant, $B = .15$, $SE = .03$, $p < .001$, L2 $R^2 = .50$ (estimated $M\,\Delta$ from T1 to T3: $+1.05_{Exp}$ vs. $+0.27_{Con}$). For *perceived autonomy-supportive peer climate*, the data fit the overall model reasonably well, $X^2(343) = 1{,}292.67$, $p < .001$, *RMSEA* = .049, *SRMR* = .031, *CFI* = .925, and *TLI* = .917. As illustrated in Figure 4B and as reported in Table 1, the key condition × time interaction was significant, $B = .20$, $SE = .04$, $p < .001$, L2 $R^2 = .62$ (estimated $M\,\Delta$ from T1 to T3: $+0.98_{Exp}$ vs. $+0.23_{Con}$).

We next tested whether teacher participation in the intervention produced the hypothesized effects on the two outcomes. For *bystander-victim-defense*, the data fit the overall model well, $X^2(151) = 542.37$, $p < .001$, *RMSEA* = .047, *SRMR* = .029, *CFI* = .961, and *TLI* = .953. As illustrated in Figure 4C and as reported in Table 1, the key condition × time interaction was significant, $B = .22$, $SE = .03$, $p < .001$, L2 $R^2 = .76$ (estimated $M\,\Delta$ from T1 to T3: $+1.19_{Exp}$ vs. $+0.03_{Con}$). For *peer victimization*, the data fit the overall model well, $X^2(82) = 319.44$, $p < .001$, *RMSEA* = .050, *SRMR* = .019, *CFI* = .974, and *TLI* = .965. As illustrated in Figure 4D and as reported in Table 1, the key condition × time interaction was significant, $B = -.25$, $SE = .04$, $p < .001$, L2 $R^2 = .64$ (estimated $M\,\Delta$ from T1 to T3: -0.41_{Exp} vs. $+0.39_{Con}$).

Test of the Hypothesized Model

Measurement Invariance. The measurement model (depicted in Figure 2) fit the data well, $X^2(228) = 665.81$, $p < .001$, *RMSEA* = .040, *SRMR* = .023, *CFI* = .976, and *TLI* = .968. Factor loadings for indicators of the latent constructs were all substantial and statistically significant ($p < .001$). After constraining the indicators to be invariant across both level and time, the invariant measurement model continued to fit the data well and showed no decrement in the fit indices, $X^2(249) = 661.24$, $p < .001$, *RMSEA* = .037, *SRMR* = .022, *CFI* =

.977, *TLI* = .972. This established measurement invariance across both levels (L1 and L2) and waves (T1, T2, and T3).

Hypothesized Model Test. The hypothesized model fit the data well, $\chi^2(304) = 733.57$, $p < .001$, *RMSEA* = .035, *SRMR* = .022, *CFI* = .977, and *TLI* = .971. The quasi-standardized beta weights (with standard errors) for the structural paths, autoregressive effects, and statistical controls appear in Figure 5. Table 2 displays the estimated correlations among all latent variables and statistical controls included in the hypothesized model at both the L2 (upper part of the table) and the L1 (lower part of the table) levels.

L2 Classroom-Level Effects. The overarching question was whether experimental-group classes experienced less victimization than control-group classes, controlling for pretest (T1) measures of victimization, bystander-victim-defense, year in school, and class size. Because the intervention was at the classroom level, the critical results are at the classroom level (upper part of Figure 5). Consistent with hypothesis 1 and as reported in Table 3, the intervention's total effect on T3 victimization was negative and highly significant (*B* = -.40, *SE* = .08, $p < .001$). Compared to control-group classes, experimental-group classes experienced substantially less peer victimization at T3.

Consistent with hypothesis 2 and as shown in Table 3, the effect of the experimental manipulation on T3 victimization was mediated through T2 bystander-victim-defense, as the experimental intervention had a positive effect on bystander-victim-defense at T2 (*B* = .27, *SE* = .05, $p < .001$). Bystander-victim-defense at T2 mediated the effect of experimental condition on T3 victimization (indirect mediated effect = -.23, *SE* = .11, $p = .034$). Thus, the total (indirect + direct) effect of experimental condition on T3 victimization was highly statistically significant (*B*s of -.17 + -.23 = -.40, *SE* = .08, $p < .001$). Hence the substantial effect of the experimental manipulation on reduced victimization was primarily mediated via bystander-victim-defense at T2.

The intervention also had statistically significant direct and indirect effects on bystander-victim-defense at T3, as shown in Table 3. Much of this second intervention effect was mediated via bystander-victim-defense at T2 (B = .18, SE = .08, p = .017). However, the direct effect of the intervention was also significant and even larger (B = .26, SE = .06, p < .001). Thus, the intervention continued to have additional, new effects in the second half of the semester beyond those already experienced at the middle of the semester. This type of "sleeper effect" is rare in educational research, where it is typical to find that intervention effects fade rather than increase over time in follow-up tests.

L1 Student-Level Effects. T2 bystander-victim-defense was an individually significant predictor of both T3 victimization (B = -.13, p = .029) and T3 bystander-victim-defense (B = .34, p < .001). These results show that the predictive power of T2 bystander-victim-defense at the L1 level largely paralleled those observed at the L2 level (H2).

Discussion

The overarching contribution of our study was to demonstrate that our intervention had a statistically significant, substantial effect (ES = -.40) on victimization. It is essential to view this finding in relation to the largely disappointing results of anti-bullying research over the last 50 years, particularly the relatively few studies based on randomized control trials evaluated with appropriate multilevel statistical models. Given the remarkable success of our intervention in comparison to current and past research, it is relevant to (1) ask why classroom victimization declined, (2) identify a possible explanatory phenomenon (bystander defense), (3) suggest how teachers might constructively influence this classroom phenomenon, and (4) emphasize the need for appropriate design, measurement, and statistical analysis in the evaluation of RCT interventions (i.e., a substantive-methodological synergy).

Bystander and Teacher Influences on Reduced Victimization

Peer influence is one of the strongest predictors of school-related bullying perpetration (Assor et al., 2018; Cook et al., 2010). Recognizing this, we focused on a peer-based bystander role associated with the escalation vs. diminishment of victimization—namely, defender (Rodkin & Hodges, 2003; Salmivalli, 2010). Greater class-wide adoption of the defender role reduced victimization. We conclude that a cohesive, critical mass of pro-victim bystanders represents an effective antidote to victimization (Polanin et al., 2021).

Educators have long been aware that teachers contribute to the classroom's social ecology. For instance, when teachers understand, value, and are responsive to their students' concerns, classroom norms that favor interpersonal respect and cooperation and disfavor interpersonal conflict tend to emerge, maintain, and accelerate (Assor et al., 2018; Gregory et al., 2010; Kaplan & Assor, 2012; Roth et al., 2010). We conclude that enhanced autonomy-supportive teaching creates the aforementioned cohesive, critical mass of pro-victim (and anti-bully) bystanders.

Why Did this Intervention Reduce Victimization When So Many Previous Interventions Failed to Do So?

Early in the semester, intervention-enabled autonomy-supportive teachers cultivated a highly supportive, egalitarian, and caring classroom climate (see Figures 4A and 4B). Therefore, these classrooms' peer-to-peer interactions and relationships began as interpersonally close and supportive. In such a climate, we believe that victimization was largely prevented before it had a chance to root itself as part of the classroom dynamic. In contrast, any after-the-fact mid- or late-semester instructional effort to reverse an already high level of victimization (i.e., remediation) is much more difficult. Thus, our intervention focused on improving a malleable antecedent of victimization (i.e., supportive bystanders),

rather than on trying to reduce the relatively more difficult-to-change outcome of victimization.

We suggest three more specific reasons why our intervention was so successful. First, it is now clear that the mobilization of bystanders is a key social process to a successful victimization intervention (Kärnä et al., 2011). Second, victimization interventions are most effective when students believe both their teacher and peers disapprove of victimization (Saarento et al., 2015). Third, when teachers create an autonomy-supportive classroom climate, student-bystanders gain the support and backing they need to adopt the defender role—and do so without putting themselves at risk of a "backfire" effect from the bully (retaliation) or their peers (rejection). In contrast, interventions that focus primarily on changing the behaviors of individual students (bullies, victims, or bystanders) without first changing the typically pro-bully social norms and classroom climates are likely to be unsuccessful. They might even be counter-productive (e.g., Wu et al., 2016).

These findings open up two new avenues for future research. First, we recommend a cautious approach to educational efforts to teach students defending behaviors (e.g., modeling, coaching, role-playing, etc.). Without first improving the classroom climate, defending behavior may be minimally effective and may even put the defender at risk of social and emotional harm. Thus, the first step in future victimization reduction interventions needs to be the cultivation of a highly supportive, closely-knit classroom climate. Accordingly, we suggest the following principle: Just as the victim needs bystander support, the bystander needs classroom climate support (Flaspohler et al., 2009). Second, we suggest that greater autonomy-supportive teaching contributes positively to the full range of prosocial bystander roles. This includes not only victim defense (as in the present study) but also not reinforcing the bully, not ridiculing the victim, or not doing anything (Marsh et al., 2022).

Perhaps some of these additional bystander roles are as effective as the defender role when enacted in a supportive classroom climate.

Limitations and Directions for Future Research

We note five concerns as potential limitations. First, we assessed all dependent measures via self-report. However, we note that the target of the intervention was the teacher, whereas the intervention's evaluation was based on students' responses. Second, it may be useful to assess bystander roles with questionnaire items using a peer-based or group-based "My classmates defend…" referent in addition to an individually-based "I defend…" referent (e.g., Marsh et al., 2011). Third, the generalizability of these findings needs to be evaluated with different age groups, classrooms other than PE classes, and different countries. Fourth, even when interventions successfully reduce class-wide victimization, heterogeneous effects can occur such that, in some classrooms, a few students might continue to suffer victimization—the recently-discovered *healthy context paradox* (Garandeau & Salmivalli, 2019). This phenomenon reinforces the need to be cognizant of multilevel effects of L2 bullying-reduction interventions. Finally, more research is needed on the antecedent characteristics of victims, bullies, and bystanders that can inform interventions. However, we caution that strategies aimed at individual students should only be undertaken in combination with classroom interventions that first transform the traditional pro-bullying classroom climate into a pro-victim climate. Hence, multilevel models are needed to disentangle effects that occur at the individual student, classroom, and school levels.

Conclusion

Teachers participated in a theory-based and carefully-designed autonomy-supportive teaching workshop that integrated self-determination theory with a social-ecological perspective. As a result, these teachers successfully created a classroom climate in which peers adopted the defender role, which sharply reduced peer victimization. The intervention

worked because bystanders supported victims while the classroom climate supported the bystanders.

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Table 1

Effects of the Experimental Manipulation on the Linear Growth of the Four Dependent Measures

	Quasi-Standardized Effects				Standardized Effects			
Effects	*Effect*	*SE*	*t*-value	*p*	*Effect*	*SE*	*t*-value	*p*
T3 Perceived Autonomy-Supportive Teaching								
Slope Effect [a]	.15	.03	4.45	.000	.69	.12	5.96	.000
T3 Perceived Autonomy-Supportive Peers								
Slope Effect [a]	.20	.04	5.39	.000	.79	.08	9.25	.000
T3 Bystander-victim-defense								
Slope Effect [a]	.22	.03	8.49	.000	.82	.07	12.29	.000
T3 Peer Victimization								
Slope Effect [a]	-.25	.04	6.66	.000	-.77	.07	11.53	.000

Note: Quasi-standardized effects are in relation to T1 standard deviations at the individual student level (L1), whereas standardized effects are based on classroom level (L2) standard deviations.

[a] In a growth analysis, the slope effect represents the condition *x* time interaction such that scores in the experimental group classrooms increased or decreased over time (T1 to T3) while scores in the control group classrooms remained largely unchanged from T1 to T3.

Table 2

Estimated Intercorrelations for All L1 and L2 Latent Variables and Statistical Controls

Classroom-Level (L2)

Variable	1.	2.	3.	4.	5.	6.	7.	8.
Time 1 Baseline								
1. Experimental Condition	-	.06	.38	.81	.89	-.66	-.05	-.08
2. Bystander-Victim-Defense		-	-.35	.06	.06	-.41	.06	-.55
3. Victimization			-	.51	.34	.04	.20	.07
Time 2 Mediator								
4. Bystander-Victim-Defense				-	.89	-.65	.11	-.02
Time 3 Outcomes								
5. Bystander-Victim-Defense					-	-.78	.01	.06
6. Victimization						-	.01	.30
Statistical Controls								
7. Grade Level							-	.00
8. Class Size								-

k = 48 classrooms. Any correlation $r > .30$ is statistically significant ($p < .05$).

Student-Level (L1)

Variable	1.	2.	3.	4.	5.	6.
Time 1 Baseline						
1. Bystander-Victim-Defense	-	-.10	.47	.43	-.11	-.06
2. Victimization		-	-.11	-.07	.28	.07
Time 2 Mediator						
3. Bystander-Victim-Defense			-	.48	-.16	.08
Time 3 Outcomes						
4. Bystander-Victim-Defense				-	-.17	.04
5. Victimization					-	.08
Statistical Control						
6. Gender						-

N = 1,178 students. Any correlation $r > .06$ is statistically significant ($p < .05$).

Table 3

Direct, Indirect (Mediated), and Total Effects of the Experimental Manipulation on Victimization at Time 3 (T3) and Bystander-Victim-Defense (BVD) at T2 and T3

	Quasi-Standardized Effects				Standardized Effects			
Effects	*Effect*	*SE*	*t*-value	*p*	*Effect*	*SE*	*t*-value	*p*
Experimental Manipulation to T2 Bystander-victim-defense (BVD)								
Total Effects	.27	.05	5.18	.000	.71	.10	6.96	.000
Direct (manipulation)	.27	.05	5.18	.000	.71	.10	6.96	.000
Effects from Experimental Manipulation to T3 Victimization								
Total Effects	-.40	.08	5.10	.000	-.75	.09	7.99	.000
Indirect (via BVD-T2)	-.23[a]	.11	2.11	.034	-.43	.18	2.36	.018
Direct (manipulation)	-.17	.09	1.86	.062	-.32	.17	1.85	.064
Effects from Experimental Manipulation to T3 Bystander-victim-defense (BVD)								
Total Effects	.44	.06	7.85	.000	.90	.08	11.34	.000
Indirect (via BVD-T2)	.18[b]	.08	2.39	.017	.37	.14	2.70	.007
Direct (manipulation)	.26	.06	4.35	.000	.53	.14	3.91	.000

Note: Quasi-standardized effects are in relation to T1 standard deviations at the individual student level, whereas standardized effects are based on classroom standard deviations.

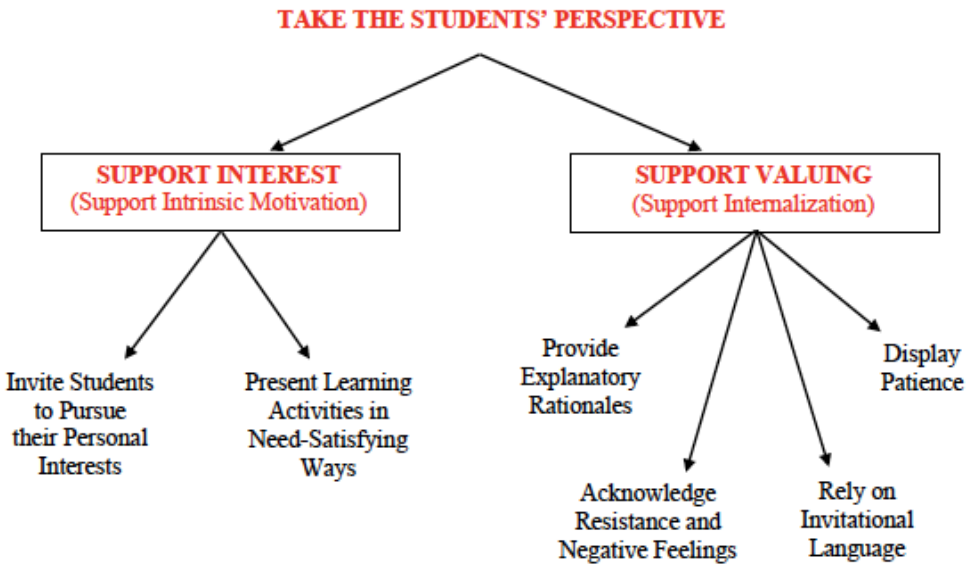
[a] The 95% *CI* for this indirect effect, using the bootstrapping technique, is (-.002, -.482).

[b] The 95% *CI* for this indirect effect, using the bootstrapping technique, is (.039, .354).

Figure 1

Overview of Autonomy-Supportive Teaching Practices and Purposes (A) with an Example of Its Classroom Practice to Support Students' Internalization of a Teacher Request (B)

A



B

Classroom Example of How to Support Internalization

Teacher recommends a way of behaving: "***Use respectful language***" and while doing so:

- Takes the students' perspective: "Do all the insults and put-downs you hear bother you?" Are they OK?—How do you feel about that?
- Provides explanatory rationales: "By using respectful language, we can create a classroom environment of acceptance, safety, and friendship. Friendship—Isn't that worth a special effort?"
- Acknowledges & accepts resistance: "Yes, you are right. I realize that I'm asking you to do what few of your classmates currently do."
- Uses invitational language: "You might consider…"; "Maybe you can try…"
- Displays patience: "For those struggling to talk this way, let's take some time to work on it and decide if it's worth the effort."

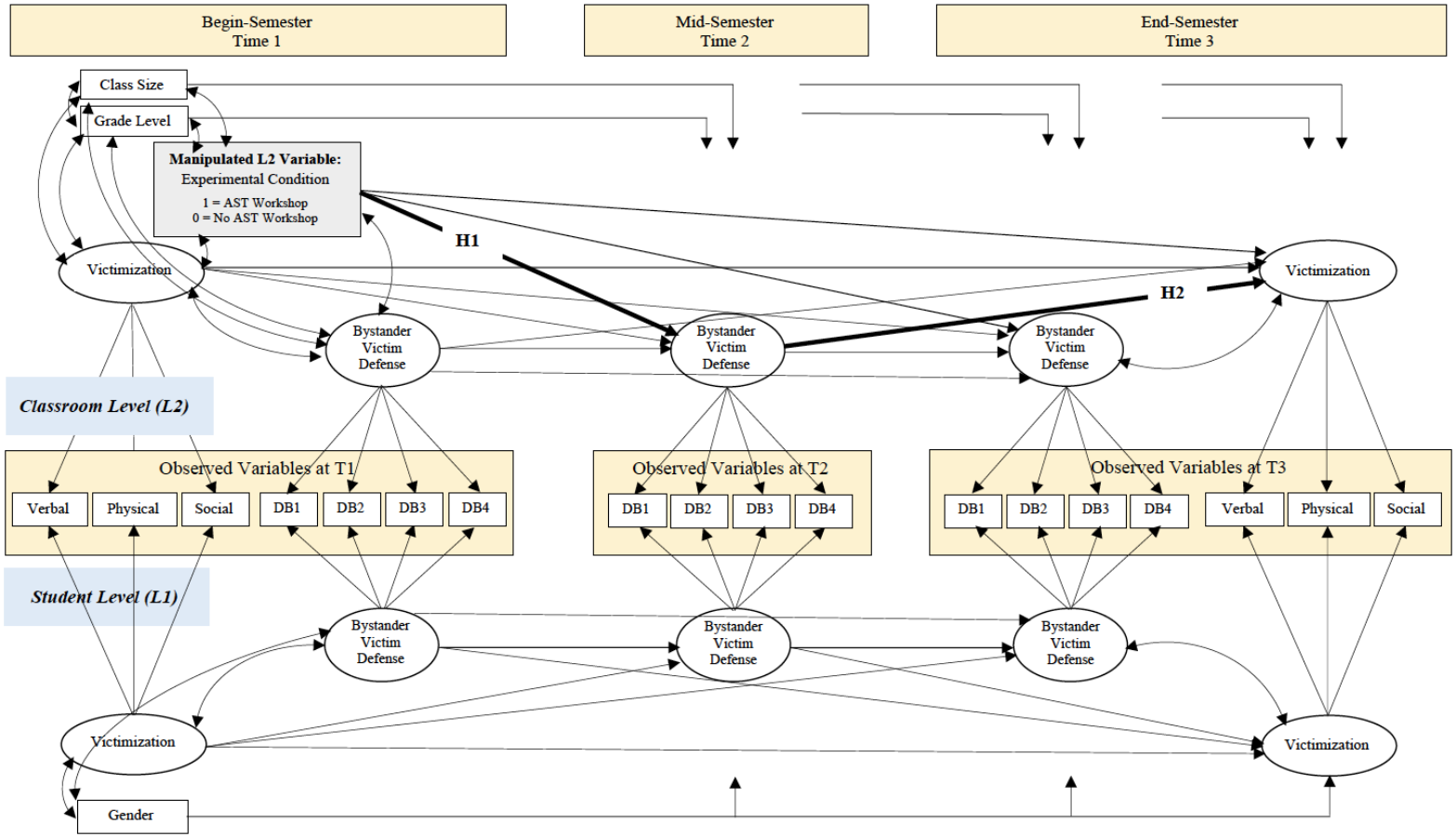


Figure 2. *DL-ML-SEM Hypothesized Model*.
Note. Thick boldfaced lines represent hypothesized paths, while thin-faced lines represent autoregressive effects, statistical controls, or indicators of a latent construct. Rectangles represent indicators, while ovals represent latent variables. H = Hypothesis.

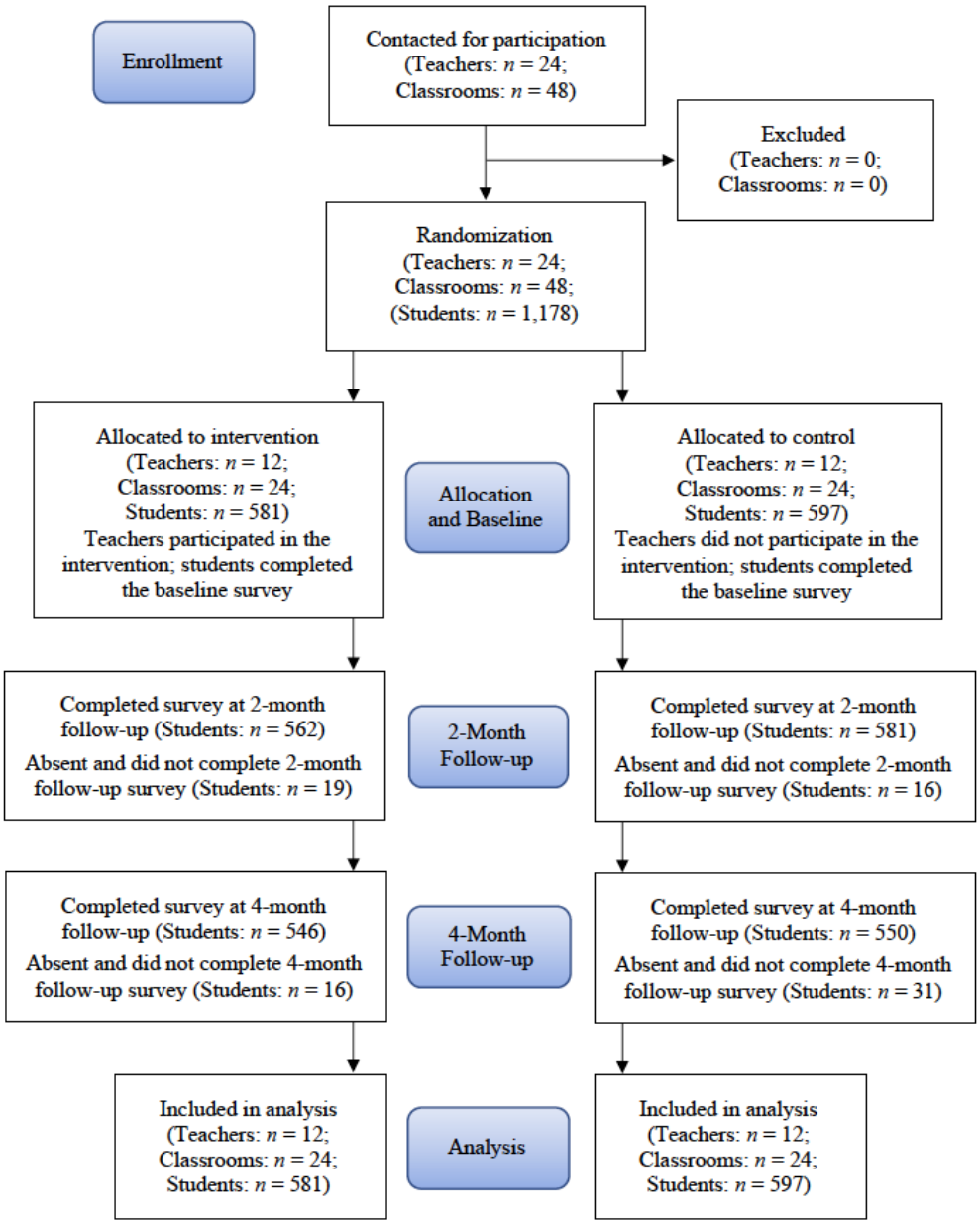


Figure 3. Intervention flowchart (CONSORT).

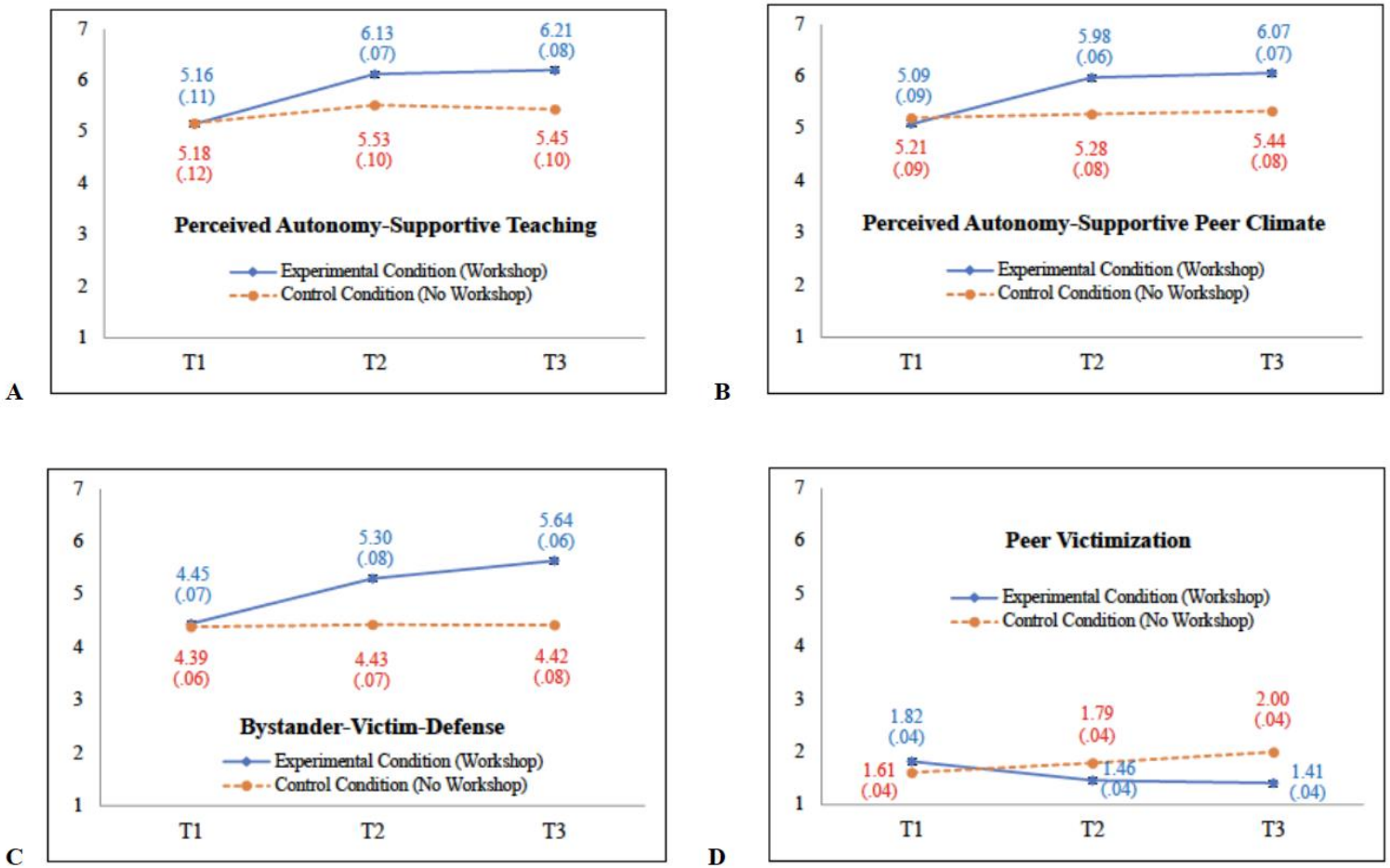


Figure 4. *Students of Teachers in the Experimental Condition Reported a Greater Increased Perceived Autonomy-Supportive Teaching (Panel A), Perceived Autonomy-Supportive Peer Climate (Panel B), and the Bystander-Victim-Defense Role (Panel C) and Decreased Peer Victimization (Panel D) than Did Students of Teachers in the Control Condition (i.e., Four Condition x Time Interaction Effects). Note.* The numbers in the figure are class-average means with standard errors of those means in parentheses.

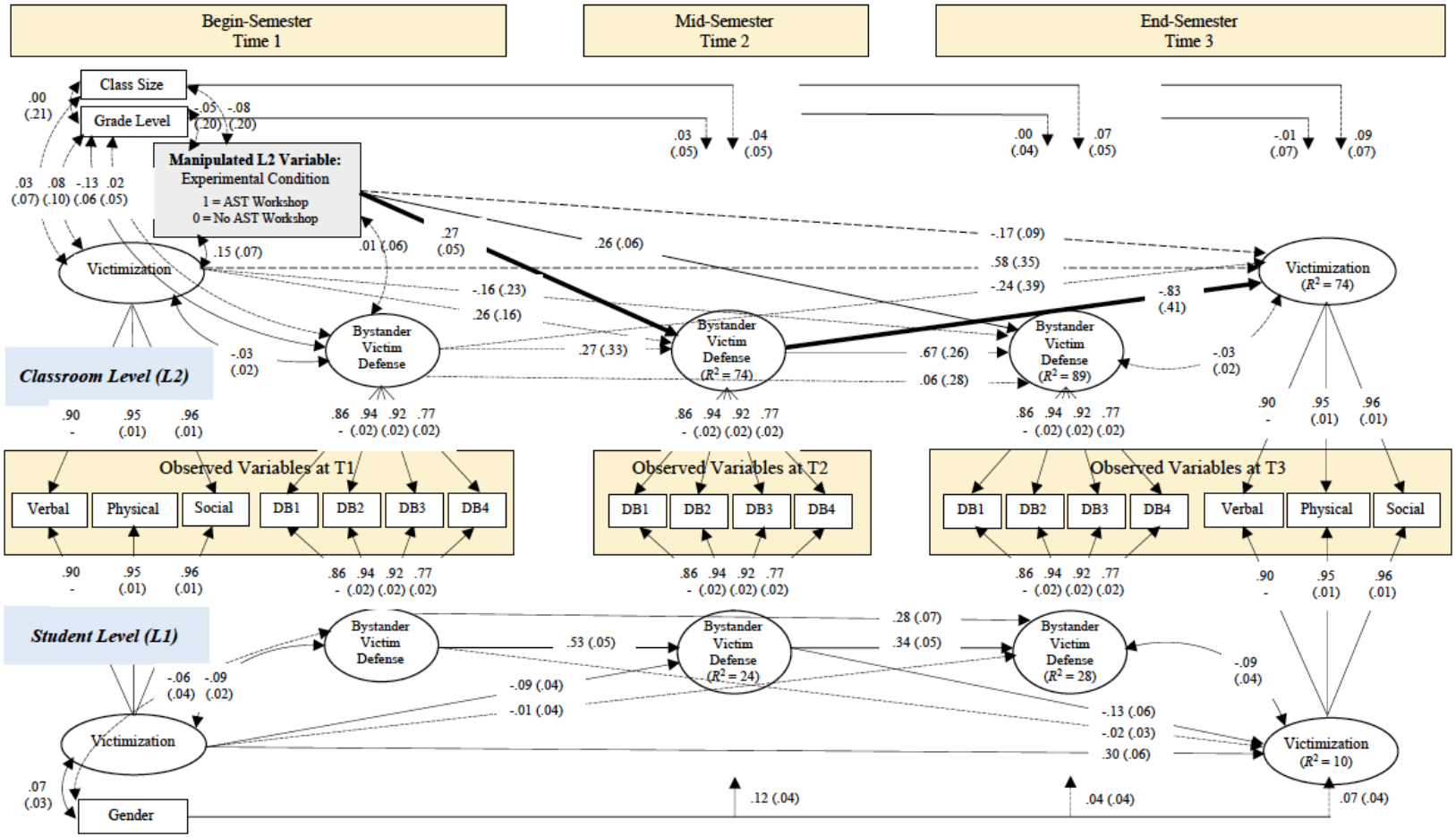


Figure 5. *Unstandardized Beta Weights (with Standard Errors in Parentheses) from the Test of the DL-ML-SEM Hypothesized Model.*
Overall model fit: $X^2(304) = 733.57$, $p < .001$, *RMSEA* = .035, *SRMR* = .022, *CFI* = .977, and *TLI* = .971.
Note. Solid lines depict significant paths ($p < .05$), while dashed lines depict non-significant paths.
The numbers overlaying the lines represent unstandardized beta weights. DB = defending behavior.