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Autonomy-Supportive Teaching Enhances Prosocial and Reduces Antisocial Behavior via Classroom Climate and Psychological Needs: A Multilevel Randomized Control Intervention

Sung Hyeon Cheon,[1] Johnmarshall Reeve,[2] and Herbert W. Marsh[2]
[1]Department of Physical Education, Korea University, Seoul, Republic of Korea; [2]Institute for Positive Psychology and Education, Australian Catholic University, Sydney, NSW, Australia

Autonomy-supportive teaching increases prosocial and decreases antisocial behavior. Previous research showed that these effects occur because autonomy-supportive teaching improves students' need states (a student-level process). However, the present study investigated whether these effects also occur because autonomy-supportive teaching improves the classroom climate (a classroom-level process). Teachers from 80 physical education classrooms were randomly assigned to participate (or not) in an autonomy-supportive teaching intervention, while their 2,227 secondary-grade students reported their need satisfaction and frustration, supportive and hierarchical classroom climates, and prosocial and antisocial behaviors at the beginning, middle, and end of an academic year. A doubly latent, multilevel structural equation model showed that teacher participation in the intervention (experimental condition) increased class-wide need satisfaction, a supportive climate, and prosocial behavior and decreased class-wide need frustration, a hierarchical climate, and antisocial behavior. Together, greater collective need satisfaction and a more supportive climate combined to explain increased prosocial behavior, while lesser need frustration and a less hierarchical climate combined to explain decreased antisocial behavior. These classroom climate effects have been overlooked, yet they are essential to explain why autonomy-supportive teaching improves students' social functioning.

Keywords: autonomy support, prosocial behavior, self-determination theory

The physical education (PE) course offers adolescents an opportunity to develop personal and social skills (Weiss, 2011). The PE course typically succeeds in its mission to develop students' personal skills (e.g., work ethic, motor skills, healthy lifestyle), but its track record of developing social skills is mixed (Opstoel et al., 2020). This hit-and-miss track record occurs because social skill gains likely depend on the quality of the PE teacher's motivating style (Assor et al., 2018; Kaplan & Assor, 2012) or teaching style (Bessa et al., 2020). In the present study, we investigated whether PE students' social functioning (prosocial and antisocial behavior) would improve only selectively—"yes" for students whose teachers participated in an autonomy-supportive teaching intervention, but "no" for students of "practice as usual" teachers.

A Need-Based Explanatory Model

Self-determination theory (SDT) offers a need-based model to explain students' social functioning in terms of prosocial and antisocial behavior (Ryan & Deci, 2017). Prosocial behavior is volitional action to benefit others (Bergin, 2018), such as helping, sharing, and socially including. It is the hallmark of adaptive social functioning (Kavussanu & Al-Yaaribi, 2019). In SDT, the motivational basis for prosocial behavior is basic psychological need satisfaction. When PE students experience satisfactions of autonomy (self-direction and personal endorsement of their activity), competence (feeling effective), and relatedness (acceptance and belonging), prosocial behavior tends to be high (Cheon et al., 2018; Pavey et al., 2011). This facilitating effect occurs because need satisfactions generate a sense of giving to others (e.g., beneficence; Martela & Ryan, 2016), a sense of empathic concern (Fousiani et al., 2016), adoption of social affiliation goals (Delrue et al., 2017; McHoskey, 1999), impulse control (Bernier et al., 2010), and volitional internalization of the social values of others (Roth et al., 2011).

Antisocial behavior is volitional action to harm others (Berger, 2003), such as hitting, verbal abuse, and social exclusion. It is the hallmark of maladaptive social functioning (Kavussanu & Al-Yaaribi, 2019). In SDT, the motivational basis for antisocial behavior is psychological need frustration. When PE students experience frustrations of autonomy (feeling pressured), competence (feeling inadequate), and relatedness (feeling rejected), antisocial behavior tends to be high (Cheon et al., 2018; Cheon, Reeve, & Ntoumanis, 2019; Tian et al., 2018). This exacerbating effect occurs because need frustrations generate a sense of being wronged by others (e.g., anger; Hein et al., 2015), a tendency to objectify others (Delrue et al., 2017), adoption of social dominance goals (McHoskey, 1999), compromised self-regulatory capacities that would otherwise inhibit antisocial impulses (Bindman et al., 2015), and an unwillingness to internalize social recommendations (e.g., defiance; Aelterman et al., 2019).

SDT proposes its dual-process model to explain the interrelations among (a) supportive conditions, need satisfaction, and adaptive functioning on the one hand; and (b) controlling conditions, need frustration, and maladaptive functioning on the other (Bartholomew, Ntoumanis, Ryan, Bosch, et al., 2011; Haerens

Marsh https://orcid.org/0000-0002-1078-9717
Cheon (cheon78@korea.ac.kr, https://orcid.org/0000-0003-4317-3895) and Reeve (johnmarshall.reeve@acu.edu.au, https://orcid.org/0000-0002-6827-293X) are corresponding authors.

et al., 2015). The dual-process model is a need-based mediation model in which supportive environmental conditions enhance the need satisfactions that energize prosocial tendencies, while controlling environmental conditions catalyze the need frustrations that fuel antisocial tendencies. The special contribution of the dual-process model was to give equal theoretical and explanatory power to the unique capacity of need frustration to predict various aspects of maladaptive functioning (e.g., defensiveness, aggression, and ill-being; Vansteenkiste & Ryan, 2013). Several reviews of the PE literature (systematic reviews and meta-analyses) support this dual-process, need-based interpretative model (Stroet et al., 2013; Vasconcellos et al., 2020; White et al., 2021).

The dual-process model explains students' personal and academic functioning well (e.g., effort and well-being). However, social functioning may be different. Prosocial and antisocial behaviors are inherently social. As such, these ways of behaving involve not only motivational dynamics but also social dynamics, especially in the context of PE instruction that involves so much social interaction and group work (e.g., participation on a team).

A Classroom Climate Explanatory Model

Classroom climate is the group consensus that forms among students within a classroom as to what behaviors are acceptable and normative. Once established, that climate then guides the quality of the peer-to-peer interactions that occur in that classroom (Thornberg et al., 2018; Van Ryzin & Roseth, 2018). Classroom climate is a social–ecological, rather than a motivational concept (Hong & Espelage, 2012), and it too affects a broad range of student outcomes (e.g., social competence; Wang et al., 2020). For instance, in a supportive peer-to-peer classroom climate, students tend to behave prosocially (Froiland & Worrell, 2017; Kaplan & Assor, 2012; Van Ryzin & Roseth, 2018). Similarly, in a hierarchical peer-to-peer climate, students tend to behave antisocially (Espelage et al., 2003; Lansford et al., 2010).

A supportive climate emerges from the expectations, values, group dynamics, and communication patterns that reflect egalitarian relationships and sense of a shared community (Gest & Rodkin, 2011; Hodge & Gucciardi, 2015; Ntoumanis et al., 2007; Papaioannou et al., 2004; Van Ryzin & Roseth, 2018). To represent such a climate, we adopted the *peer task-involving climate* from the sports literature that conceptualizes a supportive climate as one that emphasizes accepting and supporting one's classmates, verbally encouraging peers, and working together for improvement and task mastery (Ntoumanis & Vazou, 2005; Vazou et al., 2006). However, we modified this label to downplay its motivational roots (task involvement) in favor of its equally appropriate relationship connotations (supportive). Placing PE students into such a supportive climate is one likely way to increase class-wide prosocial behavior (Cheon, Reeve, & Ntoumanis, 2019; Ntoumanis et al., 2007).

A hierarchical classroom climate emerges from the expectations, values, group dynamics, social roles, and communication patterns that reflect a dominance hierarchy and a "me versus you" sense of competition (Garandeau et al., 2014; Hodge & Gucciardi, 2015; Ntoumanis et al., 2007). To represent such a climate, we adopted the *peer ego-involving climate* from the sports literature that conceptualizes a hierarchical climate as one that emphasizes competition, social comparisons, outperforming others, and normative ability hierarchies (Ntoumanis & Vazou, 2005; Vazou et al., 2006). Again, we modified this label to downplay its motivational roots (ego involvement) in favor of its equally appropriate relationship connotations (hierarchical). Placing PE students into such a hierarchical climate is one likely way to increase class-wide antisocial behavior (Cheon, Reeve, & Ntoumanis, 2019; Di Stasio et al., 2016; Ntoumanis et al., 2007).

A supportive social ecology, need satisfaction, and prosocial behavior are all positively interrelated, just as a hierarchical social ecology, need frustration, and antisocial behavior are all positively interrelated (Assor et al., 2018; Cheon et al., 2018; Cheon, Reeve, & Ntoumanis, 2019; Hodge & Gucciardi, 2015; Kaplan & Assor, 2012). These interrelations suggest the exciting possibility that teachers might be able to intervene to improve the prevailing classroom climate in ways that enhance students' social functioning. We suggest that autonomy-supportive teaching provides such an opportunity.

Autonomy-Supportive Teaching Interventions

Autonomy-supportive teaching adopts a student-focused attitude and an understanding tone that enables the skillful enactment of autonomy-satisfying instructional behaviors (e.g., take the students' perspective and present learning activities in need-satisfying ways; Aelterman et al., 2019; Patall et al., 2018). Thus, an autonomy-supportive teaching intervention provides teachers with a professional development opportunity to learn how to improve the quality of their classroom motivating style (i.e., more autonomy-supportive and less controlling; Reeve & Cheon, 2021). Furthermore, when teachers participate in such an intervention, they become significantly more able to promote students' need satisfaction and to diminish students' need frustration (Aelterman et al., 2013; Meng & Wang, 2016; Ntoumanis et al., 2021; Tessier et al., 2010; Tilga et al., 2019).

Several SDT-based, teacher-focused interventional studies have successfully increased students' caring and prosocial behaviors and decreased students' classroom violence, bullying, and antisocial behavior (Assor et al., 2018; Kaplan & Assor, 2012; Roth et al., 2011). Two of these interventional studies explicitly used the dual-process model framework to show that greater autonomy-supportive teaching increases need satisfaction and hence prosocial behavior, while lesser teacher control decreases need frustrations and hence antisocial behavior (Cheon et al., 2018; Cheon, Reeve, Lee, et al., 2019). Another SDT-based intervention showed a similar motivational mediation model in that greater autonomy-supportive teaching increased students' valuing and identified regulation (i.e., internalization, rather than need satisfaction per se) to reduce bullying (Roth et al., 2011). These SDT-based, teacher-focused interventions have featured a wide range of grade levels, including teachers and students in Grades 1–6 (Assor et al., 2018), 7 (Kaplan & Assor, 2012), 7 and 8 (Roth et al., 2011), and 7–12 (Cheon et al., 2018; Cheon, Reeve, Lee, et al., 2019).

These positive findings nevertheless leave unanswered the question of why participation in an autonomy-supportive teaching workshop might help teachers improve the classroom climate. During such a workshop, teachers mostly learn how to enact new autonomy-supportive instructional behaviors and how to transform existing controlling instructional behaviors into autonomy-supportive alternatives (e.g., replace "utter directives" with "explanatory rationales for teacher requests"; Reeve et al., 2022). What teachers first learn, however, is how to take their students' perspective. As teachers do this, they model and value empathic concern. Teachers also learn how to adopt an understanding interpersonal tone. As a result, students begin to feel that they have a teacher who understands them, listens to them, and cares about their feelings and concerns (Kaplan & Assor, 2012; Thornberg et al., 2018; Van Ryzin & Roseth, 2018). When teachers rely more on instructional behaviors such as "invite students to pursue their personal interests" and "present learning activities in need-satisfying ways," students tend to experience greater need satisfaction (Cheon et al., 2018; Cheon, Reeve, Lee, et al., 2019). Similarly, students tend to experience lesser need frustration when teachers replace their existing controlling instructional behaviors with need-satisfying alternatives (e.g., instead of countering and trying to change students' complaining, the autonomy-supportive teacher acknowledges and accepts such negative feelings as a potentially valid reaction to a student concern by listening carefully and nondefensively; Kaplan & Assor, 2012). Teachers also learn how to help students work through the internalization process of taking in and volitionally accepting egalitarian and caring beliefs and behaviors as their own (Assor et al., 2018; Kaplan & Assor, 2012; Roth et al., 2011). Collectively, these autonomy-supportive acts of instruction tend to encourage in-class interactions and peer relationships characterized by greater support (Cheon, Reeve, & Ntoumanis, 2019; Cheon et al., 2022, in press; Gregory et al., 2010).

The limitation of such interventions (in terms of our goals) is that they adopt only the individual student as the unit of analysis. In all of these autonomy-supportive teaching interventions, researchers investigated only individually experienced pathways to greater prosocial (via need satisfaction) and lesser antisocial (via need frustration) behaviors (Assor et al., 2018; Cheon et al., 2018; Kaplan & Assor, 2012; Roth et al., 2011). Collectively, these studies support SDT's motivational mediation model, but their single focus on the individual student is somewhat limiting when trying to explain students' social functioning; many educators consider prosocial and antisocial behaviors to be socially generated and community-regulated behaviors (Hendrickx et al., 2016; Van Ryzin & Roseth, 2018). While need satisfaction does facilitate prosocial behavior, this is likely only a partial explanation because prosocial behavior also rises and falls with changes in the prevailing social climate. To understand how social processes contribute to students' social functioning, there is a need to adopt the classroom (the peer group) as the unit of analysis. This alternative focus allows researchers to investigate the "peer ecology" (Hendrickx et al., 2016; Smith, 2003) or the "classroom climate" (Hodge & Gucciardi, 2015; Ntoumanis et al., 2007) as a group-experienced, socially mediated pathway to greater prosocial and lesser antisocial behavior. Only one SDT-based interventional study to date has adopted this classroom climate approach to improve social functioning. This recent randomized control trial showed that intervention-enabled autonomy-supportive teaching reduced the mid-semester hierarchical classroom climate, which, in turn, reduced end-of-semester antisocial behavior (Cheon et al., 2022). In the present investigation, we continued to focus on this teacher effect on the prevailing classroom climate to show that intervention-enabled autonomy-supportive teaching enhances students' social functioning, in general (i.e., lesser antisocial behavior and greater prosocial behavior).

Hypothesized Model

As shown in Figure 1, our hypothesized model highlights four mediators to explain year-end changes in social functioning. In particular, we predicted that teacher participation in the autonomy-supportive teaching workshop (i.e., experimental condition) would encourage mid-year gains in both collective need satisfaction (Hypothesis 1; H1) and a supportive classroom climate (H2). We then hypothesized that both intervention-enabled mid-year gains would longitudinally increase year-end prosocial behavior (H3 and H4). These hypotheses pertained to the classroom level (L2), and they represented a double-mediation model. Similarly, we proposed two mediators to explain intervention-enabled declines in antisocial behavior. In particular, we predicted that the experimental condition would encourage mid-year declines in both collective need frustration (H5) and a hierarchical classroom climate (H6). We then hypothesized that both intervention-enabled mid-year declines would longitudinally decrease year-end antisocial behavior (H7 and H8). These hypotheses also represented an L2-based double-mediation model. We further hypothesized that students' L1 baseline need satisfactions would contribute positively into their experience of a more supportive classmate (H9), just as their L1 baseline need frustrations would contribute positively into their experience of a more hierarchical classmate (H10).

Our hypothesized model investigated student-level and classroom-level effects. Such an explanatory model requires a multilevel analysis, such as a doubly latent, multilevel, structural equation model (DL–ML–SEM; Marsh et al., 2012; Morin et al., 2021). In the center of Figure 1 is a series of three "observed variables" boxes (one box for each wave of data). These horizontal bars represent students' responses to the dependent measures included on the study questionnaire. These data are used as indicators to create latent variables at both the L1 and L2 levels (hence the name "doubly latent"). The L1 latent variables are similar to those created in a traditional SEM analysis using a student unit of analysis. The L2 latent variables are newly added constructs to represent the classroom as the unit of analysis. At the L2 level, student ratings are aggregated to represent the whole class's shared perception of a dependent measure.

Methods

Participants

Teachers were 40 full-time, certified PE teachers (27 men and 13 women) who taught 80 classrooms in one of 40 different schools (30 middle schools and 10 high schools) dispersed throughout South Korea. All teachers were ethnic Korean. On average, teachers were 37.2 years old ($SD = 7.3$; range = 25–53) and had 9.8 years ($SD = 7.0$; range = 2–30) of PE teaching experience. All 40 teacher-participants completed all aspects of the study (retention rate = 100%). Each teacher received the equivalent of US$50 at the end of the study in appreciation of their participation (though they were not previously told of this honorarium). Because we planned to use the classroom (rather than the teacher) as the unit of analysis, we collected data in two classrooms from each teacher (i.e., 40 teachers and 80 classrooms).

In these 80 classrooms, 2,227 ethnic Korean students completed the study questionnaire ($M = 27.8$ students/class) during the first week of classes (Time 1 [T1], March). By the end of the first semester (Time 2 [T2], July), 2,042 of the original participants completed the questionnaire for a second time (91.8%), while 183 did not. By the end of the academic year (Time 3 [T3], December), 1,967 students completed the questionnaire for a third time, while 75 did not. Overall, the student retention rate over the three waves of data collection was 88.4%. Missing values on the study questionnaire were rare (< .1%). The 2,227 student-participants were, on average, 14.7 years old ($SD = 1.7$, range = 13–18) and

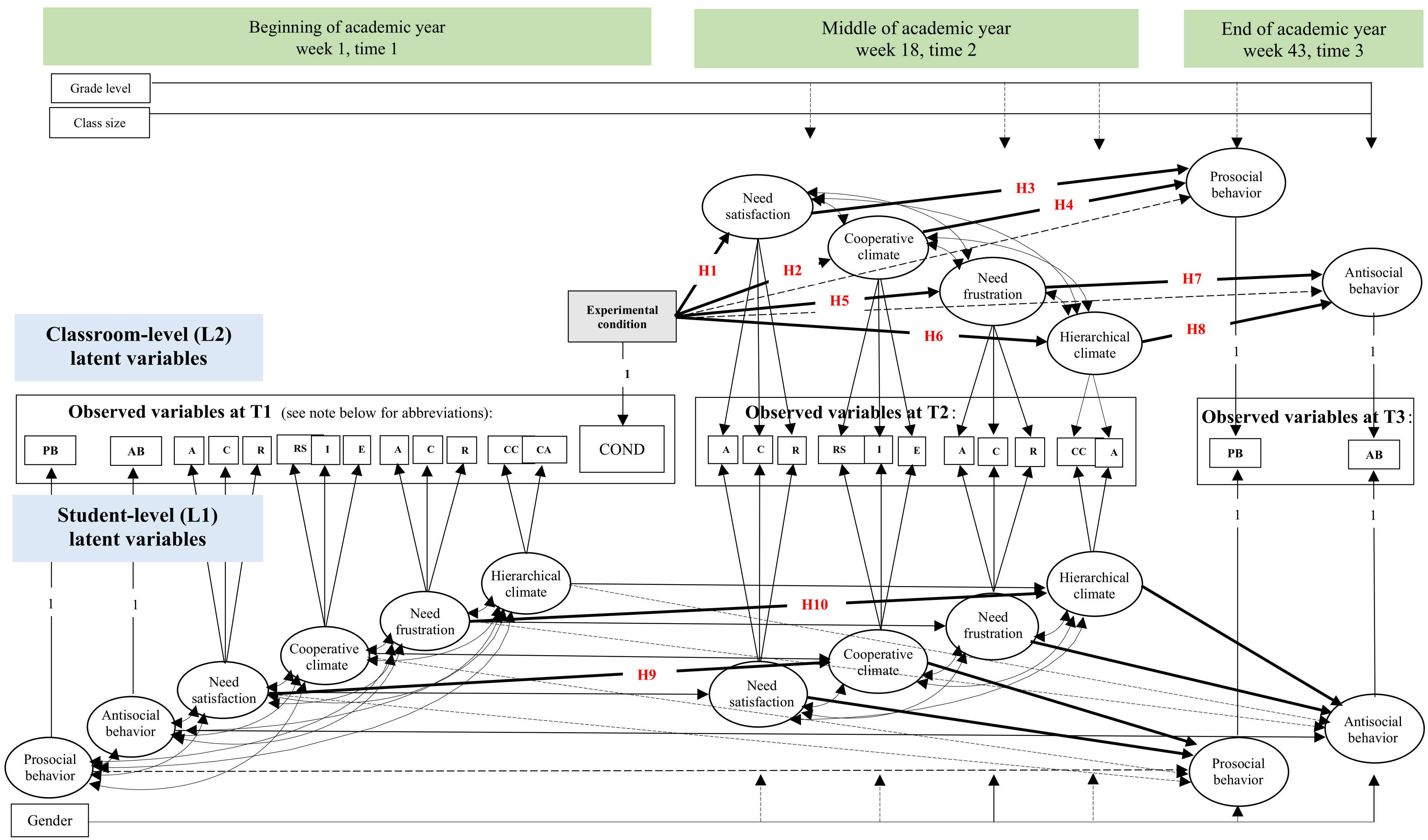

Figure 1 — Hypothesized model. *Note*. Boldfaced lines represent hypothesized paths, thin solid lines represent autoregressive effects and statistical controls, and dashed lines represent statistical controls for longitudinal effects. PB = prosocial behavior; AB = antisocial behavior; A = autonomy; C = competence; R = relatedness; RS = relatedness support; I = improvement; E = effort; CC = conflict; A = competition/ability; COND = experimental condition.

included 1,084 (48.7%) women and 1,143 (51.3%) men; 1,646 (73.9%) middle and 581 (26.1%) high schoolers; and 1,157 (52.0%) in the experimental and 1,070 (48.0%) in the control conditions. As to the a priori adequacy of our sample size, multilevel analyses require a sample of 50 L2 units that include at least 10–15 participants per unit (per classroom; Morin et al., 2021). The present sample met those requirements (80 classrooms and 27.8 students/class), suggesting adequate statistical power for multilevel analyses.

Procedure

The Korea University Research Ethics Committee approved the research protocol. After recruiting teachers to participate in a study on classroom instructional strategies, we randomly assigned each teacher to either the experimental (intervention; $n = 21$ teachers and 42 classrooms) or control (no intervention; $n = 19$ teachers and 38 classrooms) conditions. We collected three waves of data in which students completed the same three-page questionnaire at the beginning (T1; Week 1; baseline) of the first semester of the academic year, at the end of the first semester (T2; Week 18), and at the end of the academic year (end of the second semester, T3; Week 43). Because it was the first week of classes, we did not expect experimental condition to affect students' T1 (baseline) scores, as teachers and students had little experience together. Instead, students' baseline scores represented their early-course expectancies based on their past experiences in the PE course in terms of need satisfactions and frustrations, supportive and hierarchical classroom climates, prevalence of prosocial and antisocial behaviors, and their teacher's reputation and first-week signals toward autonomy-supportive and controlling teaching. In our investigation, we were interested in how experimental conditions affected students' change from baseline scores at T2 and T3. At each timepoint, we administered the survey at the beginning of the class period. The questionnaire began with a consent form. Then, students completed the questionnaire in reference to their experience in the PE class. We assured students that their responses would be confidential and used only for the research study.

The delivery of the three part, 8-hr autonomy-supportive teaching workshop followed the contents, activities, and procedures of previously published interventions (Cheon et al., 2018; Cheon, Reeve, Lee, & Ntoumanis, 2019; Cheon, Reeve, & Ntoumanis, 2019). A detailed, step-by-step, "how to" description of and timeline for the workshop appear in Supplementary Material S1 (available online). Briefly, Part 1 was a 3-hr morning presentation one week before the school year began. It featured a media-rich PowerPoint presentation on the benefits, empirical evidence, and PE-specific examples of seven recommended autonomy-supportive instructional behaviors—namely, take the students' perspective, invite students to pursue their personal interests, present learning activities in need-satisfying ways, provide explanatory rationales for teacher requests, acknowledge negative feelings, rely on invitational language, and display patience. Part 2 was a same-day, 3-hr afternoon workshop that focused on the practical "how to" of the recommended autonomy-supportive instructional behaviors. Each act of instruction was described and modeled (via a series of brief, professionally produced video clips) and then practiced, refined, and discussed until teachers felt sufficiently skilled to try it out in their own classrooms. Finally, Part 3 took place one month into the first semester. It featured a peer-to-peer group discussion about teachers' early-semester experiences with autonomy-supportive teaching.

Measures

We longitudinally assessed eight dependent measures—two motivating styles (perceived autonomy-supportive teaching and perceived controlling teaching), two need states (need satisfaction and need frustration), two classroom climates (supportive and hierarchical), and two social functioning outcomes (prosocial behavior and antisocial behavior). For each original English-language questionnaire, we had available a previously back-translated Korean version (Cheon & Song, 2011; Jang et al., 2016). Each measure used the same 7-point response scale (1 = *strongly disagree* to 7 = *strongly agree*). For each measure, we calculated the interitem (α) and intraclass correlation coefficients (ICC1 and ICC2) across all three waves of data. The alpha coefficient (α) reports the internal consistency of the scale's items, the ICC1 statistic reports the extent of agreement (shared perception) among students in the same class on that dependent measure (i.e., proportion of the variance attributable to classroom membership), and the ICC2 statistic reports the reliability of the aggregated classroom-average mean score.

Perceived Autonomy-Supportive and Controlling Teaching

We assessed perceived autonomy-supportive teaching with the six-item Learning Climate Questionnaire (Black & Deci, 2000; e.g., "I feel understood by my PE teacher"). Students' reports were internally consistent across the three waves of data collection (αs at T1, T2, and T3 were .92, .95, and .95, respectively), and showed a rising within-class consensus (ICC1s = .154, .218, and .254) and a high reliability of that consensus (ICC2s = .835, .886, and .905). We assessed perceived controlling teaching with the four-item Controlling Teacher Questionnaire (Jang et al., 2009; e.g., "My PE teacher uses forceful language"). Students' reports were internally consistent (αs = .80, .83, and .84, respectively), and showed a high within-class consensus (ICC1s = .166, .197, and .181) and a high reliability of that consensus (ICC2s = .847, .872, and .860).

Need Satisfaction and Need Frustration

We assessed need satisfaction with three separate scales. For autonomy satisfaction, we used the five-item Perceived Autonomy Scale (Standage et al., 2006; "In this PE class, I can decide which activities I want to do"); for competence satisfaction, we used the four-item Perceived Competence Scale from the Intrinsic Motivation Inventory (McAuley et al., 1989; "After working with PE activities, I feel pretty competent"); and for relatedness satisfaction, we used the five-item Basic Need Satisfaction in Sport Scale (Ng et al., 2011; "In this PE class, I feel close to my classmates"). Students' reports on the overall 14-item need satisfaction questionnaire were internally consistent (αs = .94, .96, and .96), and showed a rising within-class consensus (ICC1s = .092, .126, and .176) and a reasonably high reliability of that consensus (ICC2s = .738, .800, and .856). We assessed need frustration with the 12-item Psychological Need Thwarting Scale (Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani, 2011), which includes 3 four-item subscales to assess autonomy frustration (e.g., "In this PE class, I feel under pressure to agree to do the activities that I am provided"), competence frustration (e.g., "In this PE class, there are situations where I am made to feel inadequate"), and relatedness frustration (e.g., "In this PE class, I feel other people dislike me"). Students' reports on the overall 12-item need frustration questionnaire were internally consistent (αs = .94, .96, and .97), and showed a rising within-class consensus (ICC1s = .086, .166, and .211) and a reasonably high reliability of that consensus (ICC2s = .723, .850, and .882).

Supportive and Hierarchical Classroom Climates

We assessed classroom climate with the 21-item, five-scale Peer Motivational Climate in Youth Sport Questionnaire (Ntoumanis & Vazou, 2005). The supportive climate measure included the three-item relatedness support scale (e.g., "In this PE class, most students make their classmates feel accepted"), the four-item improvement scale (e.g., "In this PE class, most students help each other improve"), and the five-item effort scale (e.g., "In this PE class, most students encourage their classmates to try their hardest"). Students' reports on the overall 12-item supportive climate questionnaire were internally consistent (αs = .95, .97, and .97), and showed a reasonably high within-class consensus (ICC1s = .130, .144, and .171) and a high reliability of that consensus (ICC2s = .805, .824, and .852). The hierarchical climate measure included the five-item competition/ability scale (e.g., "In this PE class, most students looked pleased when they do better than their classmates") and the four-item conflict scale (e.g., "In this PE class, most students criticize their classmates when they make mistakes"). Students' reports on the overall nine-item hierarchical climate questionnaire were internally consistent (αs = .90, .92, and .92), and showed a high within-class consensus (ICC1s = .151, .159, and .165) and a high reliability of that consensus (ICC2s = .832, .841, and .846).

Prosocial and Antisocial Behaviors

We assessed prosocial behavior with the four-item prosocial scale from the prosocial and antisocial behavior in PE scale (Cheon et al., 2017; e.g., "In this PE class, my classmates are helpful") because it was developed specifically for the PE classroom setting and used "my classmates" as its sentence stem referent. Students' reports were internally consistent (αs = .94, .96, and .96), and showed a rising within-class consensus (ICC1s = .092, .110, and .152) and a reasonably high reliability of that consensus (ICC2s = .739, .775, and .833). We assessed antisocial behavior with the five-item Modified Aggression Scale (Hein et al., 2015), though we changed the sentence stem from "I" to "my classmates" (e.g., "In this PE class, my classmates threatened to physically hurt or harm other students"). Students' reports were internally consistent (αs = .86, .92, and .92), and showed a rising within-class consensus (ICC1s = .058, .145, and .193) and a reasonably high reliability of that consensus (ICC2s = .631, .826, and .869).

Are These Measures Distinct?

To evaluate the extent to which the 56 individual items assessed 13 distinct constructs, we conducted a confirmatory factor analysis. A 13-factor solution fit the 56-item data set reasonably well, $\chi^2(1,406) = 7,690.72$, $p < .001$, root mean square error of approximation (RMSEA) = .045, standardized root mean square residual (SRMR) = .040, comparative fit index (CFI) = .941, Tucker–Lewis index (TLI) = .936. Each individual item loaded significantly and substantially on its representative factor, $p < .001$. In Supplementary Material S2 (available online), we present the factor loading for all 56 individual items on its target factor, as well as the intercorrelation matrix among the 13 factors.

Data Analyses

Preliminary analyses showed that skewness and kurtosis values were all <|1.0| among class-average scores, suggesting little deviation from normal. Table 1 shows the descriptive statistics for all eight dependent measures broken down by experimental condition and time of assessment; these data were used in the test of the eight multilevel growth models. Table 2 shows the descriptive statistics and intercorrelations among all L1 (upper part of the table) and L2 (lower part of the table) variables; these data were used in the test of the hypothesized model.

DL–ML–SEM Analysis

The data had a three-level longitudinal structure with the data from 2,227 students (three waves of repeated measures) nested within classrooms ($k = 80$) and nested within teachers ($k = 40$). To analyze these multilevel data, we used a DL–ML–SEM analysis (Marsh et al., 2012; Morin et al., 2021), using Mplus 8.3 (Muthén & Muthén, 2019) with the maximum likelihood robust estimator and the full information maximum likelihood estimation procedure to handle missing data. To evaluate model fit, we used the following goodness-of-fit statistics: RMSEA, SRMR, CFI, and TLI. For RMSEA and SRMR, adequate and excellent fits are reflected by values lower than .08 and .06; for CFI and TLI, adequate and excellent fit are reflected by values higher than .90 and .95 (e.g., Marsh et al., 2005).

In a DL–ML–SEM analysis, students' questionnaire responses are used to create latent variables at both the student (L1) and classroom (L2) levels. Effects at the L1 and L2 levels can be studied as distinct effects, because a DL–ML–SEM analysis disaggregates the L1 and L2 components of students' ratings to control for unreliability in the aggregation of the L2 ratings and to control for the sampling error from the 30 or so different students in each class. Different interpretations of the L2 scores apply to questionnaire items with an individual referent (e.g., "I feel that I do PE activities because I want to") versus a classroom referent (e.g., "During this PE class, most students make their classmates feel valued"). For constructs assessed with an individual referent (i.e., need satisfaction and need frustration), students' L1 ratings are aggregated at the L2 level to provide a "social context" variable (Marsh et al., 2011). For constructs assessed with a classroom referent (i.e., perceived autonomy-supportive and controlling teaching, supportive and hierarchical classroom climates, and antisocial behavior), students' L1 ratings are aggregated at the L2 level to extract the "shared agreement" among the 30 or so students in the class. These L2 latent variables provide a "classroom climate" interpretation (Marsh et al., 2011). These L2 scores have a clear meaning (a gauge of the prevailing classroom climate), while the L1 component reflects interindividual differences in perceptions of the L2 group reality (the residual L1 variable).

In a DL–ML–SEM analysis, it is important (for interpretative considerations) to establish multilevel measurement isomorphism with the measurement model underlying the hypothesized model (Morin et al., 2021). The measurement model included 27 indicators to create 10 L1 latent variables and five L2 latent variables (see Figure 1). Isomorphism means metric invariance, or the equality of the factor loadings across the L1 and L2 levels. To test for isomorphism, the factor loadings of the indicators (of the latent variables) are all fixed to their L1 and T1 values. 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 measurement isomorphism is verified (Marsh et al., 2011).

Table 1 Descriptive Statistics for the Eight Dependent Measures Broken Down by Experimental Condition and Time of Assessment

	Control condition ($k = 38$ classrooms)			Experimental condition ($k = 42$ classrooms)			Experimental condition effect on T1–T3 slope					
	T1	T2	T3	T1	T2	T3						
Dependent measure	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*B*	*SE B*	β	*t*	*p*	R^2
Manipulation checks												
Perceived autonomy-supportive teaching	5.23 (0.38)	5.27 (0.37)	5.24 (0.4)	5.20 (0.38)	6.02 (0.38)	6.07 (0.37)	0.69	0.10	0.76	6.94	.001	.63
Perceived controlling teaching	3.43 (0.57)	3.34 (0.52)	3.23 (0.47)	2.99 (0.35)	2.46 (0.48)	2.43 (0.53)	–0.73	0.10	–0.73	6.77	.001	.64
Hypothesized mediators												
Need satisfaction	4.91 (0.33)	5.06 (0.31)	5.08 (0.41)	4.82 (0.34)	5.69 (0.26)	5.82 (0.22)	0.61	0.07	0.80	8.19	.001	.68
Need frustration	2.35 (0.34)	2.35 (0.37)	2.42 (0.43)	2.28 (0.29)	1.68 (0.26)	1.62 (0.21)	–0.69	0.07	–0.85	9.84	.001	.78
Supportive classroom climate	5.12 (0.39)	5.23 (0.36)	5.25 (0.38)	5.04 (0.34)	5.81 (0.33)	5.93 (0.3)	0.50	0.08	0.75	5.84	.001	.60
Hierarchical classroom climate	3.37 (0.49)	3.32 (0.46)	3.22 (0.4)	3.18 (0.43)	2.68 (0.47)	2.53 (0.46)	–0.53	0.09	–0.68	5.57	.001	.53
Social functioning outcomes												
Prosocial behavior	5.32 (0.39)	5.41 (0.36)	5.36 (0.41)	5.25 (0.35)	5.96 (0.31)	6.04 (0.29)	0.51	0.07	0.71	6.67	.001	.52
Antisocial behavior	2.18 (0.33)	2.26 (0.38)	2.33 (0.42)	2.11 (0.23)	1.63 (0.27)	1.55 (0.2)	–0.57	0.07	–0.77	7.53	.001	.68

Note. Mean scores have been adjusted for the three covariates of gender composition, grade level, and class size. T1 = Time 1 (beginning of academic year); T2 = Time 2 (middle of academic year); T3 = Time 3 (end of academic year); *B* = unstandardized beta; *SE* = standard error; β = standardized beta; R^2 = proportion of variance in the dependent measure's T3 growth accounted for by experimental condition.

Table 2 Intercorrelations and Descriptive Statistics for All Student-Level (L1) Latent Variables

L1 variable	1	2	3	4	5	6	7	8	9	10	11	12	13
T1 baseline													
1. Need satisfaction	—												
2. Supportive climate	.74	—											
3. Need frustration	−.52	−.45	—										
4. Hierarchical climate	−.34	−.5	.53	—									
5. Prosocial behavior	.68	.85	−.45	−.45	—								
6. Antisocial behavior	−.27	−.3	.67	.48	−.3	—							
T2 mediators													
7. Need satisfaction	.49	.36	−.25	−.16	.33	−.13	—						
8. Supportive climate	.43	.45	−.24	−.22	.39	−.15	.8	—					
9. Need frustration	−.19	−.16	.36	.19	−.16	.24	−.42	−.39	—				
10. Hierarchical climate	−.19	−.24	.31	.44	−.22	.26	−.34	−.44	.54	—			
T3 outcomes													
11. Prosocial behavior	.33	.36	−.19	−.18	.34	−.12	.45	.52	−.21	−.24	—		
12. Antisocial behavior	−.12	−.13	.24	.19	−.12	.23	−.19	−.19	.40	.32	−.32	—	
Statistical controls													
13. Gender	.15	.06	−.01	.11	.07	.1	.03	−.01	.04	.03	−.01	.07	—
Descriptive statistics													
M	4.86	5.08	2.41	3.23	5.17	2.27	5.35	5.52	2.02	2.97	5.61	2.04	0.51
SD	0.96	0.91	1.02	1.11	1.01	0.87	1.04	1.04	1.02	1.26	1.07	0.96	0.5

L2 variable	1	2	3	4	5	6	7	8	9
T1 baseline									
1. Experimental condition	—								
T2 mediators									
2. Need satisfaction	.80	—							
3. Supportive climate	.81	.99	—						
4. Need frustration	−.77	−.91	−.91	—					
5. Hierarchical climate	−.73	−.86	−.86	.83	—				
T3 outcomes									
6. Prosocial behavior	.82	.96	.96	−.88	−.84	—			
7. Antisocial behavior	−.86	−.94	−.94	.90	.85	−.96	—		
Statistical controls									
8. Grade level (0 = middle and 1 = high)	−.02	−.1	−.1	.05	−.05	−.17	.22	—	
9. Class size	−.06	−.05	−.05	.07	.06	−.17	.21	.16	—
Descriptive statistics									
M	0.53	5.36	5.45	2.01	2.97	5.62	2.03	0.25	27.8
SD	0.50	0.41	0.42	0.45	0.55	0.47	0.49	0.43	4.1

Note. L1 variable: $N = 2{,}227$ students. Any correlation $r > .05$ is statistically significant ($p < .05$). L2 variable: $N = 80$ classrooms. Any correlation $r > .22$ is statistically significant ($p < .05$).

Tests of the Intervention Effect

For all eight dependent measures, we conducted a growth model (within the DL–ML–SEM framework) that regressed the latent variable dependent measure on the slope of the T1, T2, and T3 scores (weighted as 0, 1, and 2). Experimental condition (control = 0 and experimental = 1) was the critical independent variable, gender (male = 0 and female = 1) was an L1 covariate, and grade level (middle school = 0 and high school = 1) and class size ($M = 27.8$ students/class, $SD = 4.1$) were covariates. For these analyses, we were simply interested in evaluating for a significant effect of experimental condition on the T1–T3 linear growth (longitudinal change) in each L2 dependent measure—essentially a Condition × Time interaction effect in which growth occurred in the experimental condition but not in the control condition.

Mediation Analyses

The hypothesized model shown in Figure 1 is a mediation model, so we tested for mediation effects. The typical procedure to test for such mediation effects is to use resampling methods to generate bias-corrected confidence intervals (CIs), but this conventional bootstrapping method cannot be applied to multilevel modeling because the assumption of independence of observations is violated when using nested data (Preacher & Selig, 2012). Accordingly, we utilized a Monte Carlo approach to resampling that allowed us to construct the appropriate CIs. To conduct these mediation tests, we used the web-based utility (http://quantpsy.org) to generate and run R code for simulating the sampling distribution of each indirect effect (20,000 values). If the 95% CI does not include zero, the indirect effect is significant ($p < .05$).

Results

Tests of the Eight Growth Models

As reported on the right side of Table 1, the multilevel (DL–ML–SEM) linear growth model analyses showed that, over the course of the academic year, the L2 T1–T3 growth reported by students of teachers in the experimental group exceeded the L2 T1–T3 growth reported by students of teachers in the control group across all eight dependent measures: *perceived autonomy-supportive teaching* (ΔMs = + 0.87 vs. + 0.01), $B = 0.69$, $p < .001$; *perceived controlling teaching* (ΔMs = –0.56 vs. –0.20), $B = -0.73$, $p < .001$; *need satisfaction* (ΔMs = + 1.00 vs. + 0.17), $B = 0.61$, $p < .001$; *need frustration* (ΔMs = –0.66 vs. + 0.07), $B = -0.69$, $p < .001$; *supportive climate* (ΔMs = + 0.89 vs. + 0.13), $B = 0.50$, $p < .001$; *hierarchical climate* (ΔMs = –0.65 vs. –0.15), $B = -0.53$, $p < .001$; *prosocial behavior* (ΔMs = + 0.79 vs. + 0.04), $B = 0.51$, $p < .001$; and *antisocial behavior* (ΔMs = –0.56 vs. + 0.15), $B = -0.57$, $p < .001$.

Test of the Hypothesized Model

The measurement model underlying the hypothesized model fit the data reasonably well, $\chi^2(632) = 3{,}291.58$, $p < .001$, RMSEA = .043, SRMR = .041, CFI = .941, and TLI = .929. 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 little or no decrement in the fit indices, $\chi^2(646) = 3{,}361.00$, $p < .001$, RMSEA = .043, SRMR = .042, CFI = .940, TLI = .929, thereby establishing measurement isomorphism across both levels (L1 and L2) and waves (T1, T2, and T3).

While the measurement model fit the data well, an inspection of the L2 correlation matrix showed that groups of students could not distinguish between collective need satisfaction and a supportive climate (L2: $r = .99$; see lower part of Table 2), or between collective need frustration and a hierarchical climate (L2: $r = .83$; see lower part of Table 2). Because of these overlaps, we made the decision to create the higher-order latent variable, "bright-side processes," by equally weighting its two indicators (L2 need satisfaction and L2 supportive climate). Similarly, we created the higher-order latent variable, "dark-side processes," by equally weighting its two indicators (L2 need frustration and L2 hierarchical climate; see upper part of Figure 2). Students were able to distinguish between these constructs at the L1 level, so we kept the L1 latent variables as originally modeled (see lower part of Figure 2). After creating the two L2 higher-order latent variables, the hypothesized model fit the data reasonably well, $\chi^2(662) = 3{,}400.64$, $p < .001$, RMSEA = .043, SRMR = .055, CFI = .939, and TLI = .931. The unstandardized beta weights for the individual paths, autoregressive effects, baseline controls, and three statistical controls (i.e., gender composition, grade level, and class size) are shown in Figure 2.

Condition Effects

Experimental condition significantly predicted the higher-order L2 bright-side mediator: *T2 bright-side processes* ($B = 0.57$, standard error [*SE*] $B = 0.09$, $\beta = 0.86$, $t = 6.31$, $p < .001$), controlling for grade level and class size. Experimental condition also significantly predicted the higher-order L2 dark-side mediator: *T2 dark-side processes* ($B = -0.52$, *SE* $B = 0.06$, $\beta = -0.82$, $t = 8.10$, $p < .001$), controlling for grade level and class size.

Mediator Effects

In the prediction of *T3 prosocial behavior*, T2 bright-side processes were an individually significant predictor ($B = 0.92$, *SE* $B = 0.14$, $\beta = 0.86$, $t = 6.31$, $p < .001$), controlling for experimental condition, grade level, and class size. In the mediation analysis, the CI for the indirect effect of experimental condition on T3 prosocial behavior via T2 bright-side processes did not include zero (.343 and .748), thereby confirming mediation.

In the prediction of *T3 antisocial behavior*, T2 dark-side processes were an individually significant predictor ($B = 0.96$, *SE* $B = 0.15$, $\beta = 0.76$, $t = 6.39$, $p < .001$), controlling for experimental condition, grade level, and class size. In the mediation analysis, the CI for the indirect effect of experimental condition on T3 antisocial behavior via T2 dark-side processes did not include zero (–.325 and –.722), thereby confirming mediation.

L1 Student-Level Effects

T1 need satisfaction predicted T2 supportive climate ($\beta = 0.20$, $p < .001$). In the prediction of T3 prosocial behavior, T2 supportive climate was an individually significant predictor ($B = 0.44$, *SE* $B = 0.06$, $\beta = 0.40$, $t = 6.16$, $p < .001$) while T2 need satisfaction was not ($B = 0.06$, *SE* $B = 0.06$, $\beta = 0.06$, $t = 1.08$, $p = .279$), controlling for T1 need satisfaction, T1 supportive climate, and gender.

T1 need frustration predicted T2 hierarchical climate ($\beta = 0.10$, $p = .030$). In the prediction of T3 antisocial behavior, both T2 need frustration ($B = 0.32$, *SE* $B = 0.05$, $\beta = 0.31$, $t = 6.29$, $p < .001$) and T2 hierarchical climate ($B = 0.11$, *SE* $B = 0.05$, $\beta = 0.10$, $t = 2.13$, $p = .030$) were individually significant predictors, controlling for T1 need frustration, T1 hierarchical climate, and gender.

Discussion

The capacity of the PE course to improve students' social functioning occurs only sometimes (Opstoel et al., 2020). For students in the control group classrooms, the year-long trend in social functioning showed no improvement. In these classrooms, prosocial behavior remained unchanged over the academic year (*M*s = 5.32, 5.41, and 5.36; see Table 1), while antisocial behavior trended higher—not lower (*M*s = 2.18, 2.26, and 2.33). These classrooms represent the typical (no intervention) PE course, at least in the context of these schools and curriculum. However, the picture was dramatically different for students in the experimental group classrooms. As shown in Table 1, in these PE classrooms, prosocial behavior longitudinally increased (*M*s = 5.25, 5.96, and 6.04) while antisocial behavior longitudinally decreased (*M*s = 2.11, 1.63, and 1.55). The conclusion is that the PE course can fulfill its "improve social skills" mission *if a highly autonomy-supportive teacher leads it*. This raises the question of how these autonomy-supportive teachers were able to produce this positive educational effect.

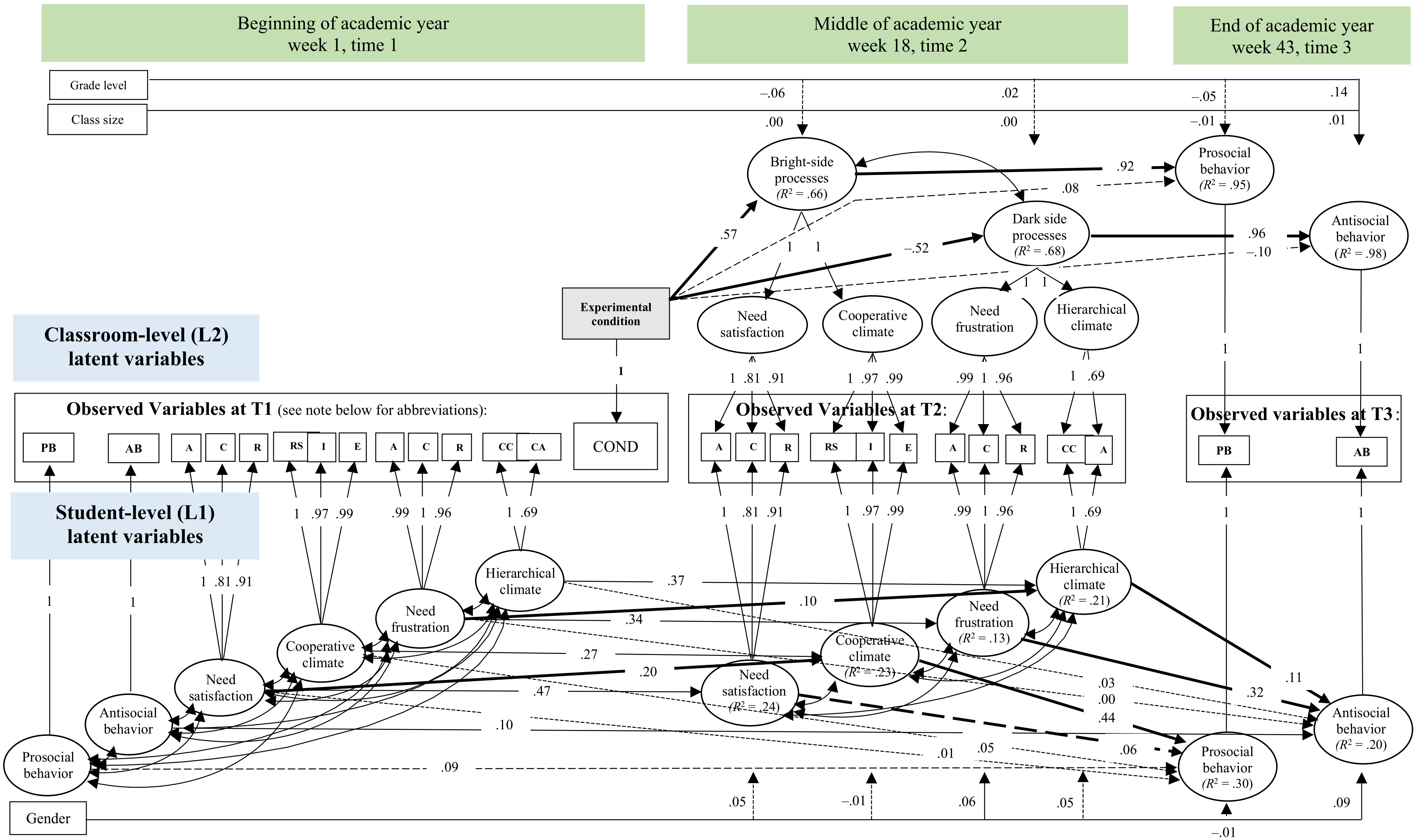

Figure 2 — Results of the test of the hypothesized model. *Note*. Solid lines represent significant paths, $p < .05$; dashed lines represent nonsignificant paths. Numbers that overlay the solid and dashed lines are standardized beta weights. PB = prosocial behavior; AB = antisocial behavior; A = autonomy; C = competence; R = relatedness; RS = relatedness support; I = improvement; E = effort; CC = conflict; A = competition/ability; COND = experimental condition.

Explaining Gains in Prosocial Behavior

Teachers who participated in the autonomy-supportive teaching workshop (compared to teachers in the control group) produced two crucial class-wide effects that cultivated high levels of year-end prosocial behavior: students' collective need satisfaction and a highly supportive peer-to-peer classroom climate. Previous intervention-based RCTs showed that greater autonomy-supportive teaching enhances need satisfaction (Ntoumanis et al., 2021; Reeve & Cheon, 2021), but these investigations overlooked that greater autonomy-supportive teaching also enhances the quality of the classroom peer ecology. This second effect has likely been overlooked simply because researchers were not looking for it—because they did not utilize a classroom level of analysis.

Over the course of an 18-week semester (T1–T2), these two positive effects from greater autonomy-supportive teaching were both very strong (in terms of effect size) and of equal magnitude; *r*s = 80 and .81; see lower part of Table 2. We suspect one reason these effects were so large is that they are somewhat synergistic. For instance, students' baseline L1 need satisfaction predicted growth in their T2 perception of more supportive peers. Similarly, van der Kapp-Deeder et al. (2015) showed that an experience of need satisfaction can lead that individual to treat others in a more supportive way, an individual effect that helps explain the emergence of a more supportive interpersonal climate or peer ecology. However, we also suggest that greater autonomy-supportive teaching (i.e., experimental condition) produces its own direct, positive effect on an L2 supportive classroom climate. As teachers in the experimental group learned how to take their students' perspective, understand their concerns, and help them internalize egalitarian and caring beliefs and behaviors, the peer ecology in that classroom became more supportive. This approach to instruction allowed students to feel accepted and valued (relatedness support), to encourage their classmates' progress (improvement), and to express pleasure when classmates exerted themselves (effort). As a consensus formed around these supportive norms and expectations, prosocial behavior flourished. In the end—over the course of the full academic year (T1–T3)—perceived autonomy-supportive teaching, collective need satisfaction, a supportive classroom climate, and prosocial behavior all merged together at the classroom (L2) level into a collection of bright-side processes and outcomes. By learning how to become more autonomy supportive, PE teachers in the experimental condition gained a new capacity to contribute directly, positively, and causally into this highly desirable collection of bright-side processes and outcomes.

Explaining Declines in Antisocial Behavior

Teachers who participated in the autonomy-supportive teaching workshop (compared to teachers in the control group) produced two crucial class-wide effects that reduced year-end antisocial behavior: students' lesser collective need frustration and a lesser hierarchical peer-to-peer classroom climate. Previous intervention-based RCTs showed that greater autonomy-supportive teaching decreases both need frustration (Cheon et al., 2018; Tilga et al., 2019) and classroom violence (Assor et al., 2018; Kaplan & Assor, 2012; Roth et al., 2011). However, these previous RCTs have not investigated the hierarchical-competitive nature of the emerging classroom climate, and they have not utilized a classroom-level of analysis. (For a recent exception, see Cheon et al., 2022.) Our findings, therefore, extend this earlier research by showing that greater autonomy-supportive teaching largely prevents the formation of a hierarchical, status-centric interpersonal climate.

From T1 to T2, the capacity of greater autonomy-supportive teaching to reduce both collective need frustration and a hierarchical climate was strong and of roughly equal magnitude (*r*s = −77 and −.73; see lower part of Table 2). These two effects are also likely somewhat synergistic. For instance, students' baseline L1 need frustration predicted growth in their T2 perception of more hierarchical-competitive peers. That said, we also suggest that greater autonomy-supportive teaching produces its own direct, diminishing effect on an L2 hierarchical classroom climate. Autonomy-supportive teachers produce this diminishing effect by taking their students' perspective, avoiding pressuring students, providing rationales to explain their behavior change requests, and making decisions and allocating resources in ways that students believed to be fair, responsive, and inclusive. This professional development transition toward greater autonomy-supportive teaching diminished students' inclinations to strive to prove superiority over their classmates (competition/ability) and to work against their classmates' (conflict). As a consensus formed around the absence of these hierarchical norms and expectations, antisocial behavior declined. In the end (T3), perceived teacher control, collective need frustration, a hierarchical classroom climate, and antisocial behavior all merged together at the classroom (L2) level into a collection of dark-side processes and outcomes. By learning how to become less controlling and more autonomy supportive, PE teachers in the experimental condition gained a new capacity to contribute directly, positively, and causally into the reduction of this undesirable collection of dark-side processes and outcomes.

The Difficulty of Reducing Antisocial Behavior

School-based interventions to reduce antisocial behavior routinely fail, and they often generate worrisome side effects as well (Gazeley, 2010), even among investigations that employ a methodologically rigorous randomized control trial research design (Obsuth et al., 2017). These interventions routinely target some aspect of students' disruptive behavior and then apply a behavior modification strategy (e.g., school expulsion) to reduce it. In contrast, the intervention utilized in the present study—like those employed previously by others (Assor et al., 2018; Kaplan & Assor, 2012; Roth et al., 2011)—produced strong and positive results. This raises the question of why SDT-based interventions are able to successfully reduce antisocial behavior.

The primary reason can be traced to the tried-and-true axiom: "Prevention works better than remediation." Early in the academic year, teachers who participated in the autonomy-supportive teaching workshop cultivated a highly supportive, egalitarian, and caring climate and prevented a hierarchical, me versus you competitive climate. In such a classroom ethos, antisocial behavior had little opportunity to take root. In other words, the present intervention removed a critical *antecedent* of antisocial behavior (i.e., prevention). In contrast, any after-the-fact behavior modification effort to reverse an already high level of antisocial behavior (i.e., remediation) is a much more daunting undertaking.

Future Research Opportunities

We note three opportunities for future research. First, while our hypothesized model was SDT based, our measure of classroom climate was achievement goal theory based. The five scales of the Peer Motivational Climate in Youth Sport Questionnaire nicely capture the active ingredients in classroom climate (i.e., interpersonal support and hierarchical status concerns).

Nevertheless, future research could develop SDT-based measures of the peer climate as autonomy supportive (e.g., “My classmates listen to how I would like to do things”) or controlling (e.g., “My classmates pressure me to do things only their way”).

Second, our hypothesized model treated need satisfaction and classroom climate as co-occurring (simultaneous) mediators. However, it is likely that a change in the need states contributes to a later change in the classroom climate. Such a reconceptualized explanatory model would likely require a future research study that collects four (not three) waves of data to test the following double-mediation model: experimental condition → needs → climate → social functioning.

Third, different intervention strategies are both possible and potentially fruitful. For instance, our intervention helped teachers become more autonomy supportive, but an alternative intervention could help PE teachers become more structured as well (e.g., see Edmunds et al., 2008; Franco & Coteron, 2017; Meng & Wang, 2016; Tessier et al., 2010). Through greater structure, PE teachers could promote high prosocial and low antisocial expectations (e.g., use respectful language) and help their students develop the greater skill needed to meet these expectations (e.g., teach students how to speak respectfully to each other). To optimize this alternative, the intervention could help PE teachers provide such structure in an autonomy-supportive way (e.g., while communicating prosocial expectations, take the students’ perspective, acknowledge negative feelings, and provide explanatory rationales for those expectations). Another approach to intervention would be to focus on students, rather than on teachers. Such an intervention could help students learn how to better contribute to a supportive classroom climate and how to better relate to their classmates in prosocial ways.

Limitations

We note two concerns as potential limitations. First, we assessed all dependent measures via self-report. The investigation could be made methodologically stronger by including objectively scored dependent measures. For instance, prosocial and antisocial behaviors could be scored by trained classroom observers or by the classroom teacher. Second, the generalizability of the findings is unclear. These findings emerged for middle- and high-school students enrolled in various Korean PE courses. Future research is necessary to determine the extent to which these findings might apply to different grade levels (e.g., elementary school), different nations, and different contexts (e.g., sports).

Conclusions

Overall, we sought to explain how and why manipulated autonomy-supportive teaching might increase prosocial and decrease antisocial behavior. By adopting a classroom-level unit of analysis, we showed that greater autonomy-supportive teaching (a) encouraged collective need satisfaction and a more supportive classroom climate that then together facilitated prosocial behavior and (b) reduced collective need frustration and a hierarchical classroom climate that then together diminished antisocial behavior.

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