Published in final edited form as:
Am J Health Promot. 2013 ; 28(1): 50–58. doi:10.4278/ajhp.120419-QUAN-207.2.

Preventing Negative Behaviors Among Elementary-School Students Through Enhancing Students' Social-Emotional and Character Development

Frank J. Snyder, PhD, MPH,
Division of Prevention and Community Research, Department of Psychiatry, Yale University School of Medicine, New Haven, Connecticut

Alan C. Acock, PhD,
School of Social and Behavioral Health Science, College of Public Health and Human Sciences, Oregon State University, Corvallis, Oregon

Samuel Vuchinich, PhD,
School of Social and Behavioral Health Science, College of Public Health and Human Sciences, Oregon State University, Corvallis, Oregon

Michael W. Beets, PhD, MPH, MEd,
Department of Exercise Science, Arnold School of Public Health, University of South Carolina, Columbia, South Carolina

Isaac J. Washburn, PhD, and
Oregon Social Learning Center, Eugene, Oregon

Brian R. Flay, DPhil
School of Social and Behavioral Health Science, College of Public Health and Human Sciences, Oregon State University, Corvallis, Oregon

Abstract

Purpose—Examine the effects of a comprehensive, school-wide social-emotional and character development program using a positive youth development perspective. Specifically, we examined a mediation mechanism whereby positive academic-related behaviors mediated the intervention effects on substance use, violence, and sexual activity.

Design—Matched-pair, cluster-randomized, controlled design.

Setting—Twenty (10 intervention and 10 control) racially/ethnically diverse schools in Hawaii.

Subjects—Elementary-aged students (N = 1784) from grade 5.

Intervention—The Positive Action program.

Send reprint requests to Frank J. Snyder, PhD, MPH, Division of Prevention and Community Research, Department of Psychiatry, Yale University School of Medicine, 389 Whitney Avenue, New Haven, CT 06517, frank.snyder@yale.edu; or Brian R. Flay, DPhil, School of Social and Behavioral Health Sciences, College of Public Health and Human Sciences, Oregon State University, 457 Waldo Hall, Corvallis, OR 97331, brian.flay@oregonstate.edu.

Manuscript format: research; Research purpose: intervention testing/program evaluation; Study design: randomized trial; Outcome measure: behavioral; Setting: school; Health focus: intellectual health; Strategy: skill building/behavior change; Target population age: youth; Target population circumstances: education/income level, geographic location, race/ethnicity

Measures—Students self-reported their academic behaviors, together with their substance use, violence, and voluntary sexual activity; teachers rated students' academic behaviors, substance use, and violence.

Analysis—Structural equation modeling.

Results—Students attending intervention schools reported significantly better academic behavior (B = .273, SE = .039, p < .001) and significantly less substance use (B = −.970, SE = .292, p < .01, incidence-rate ratio [IRR] = .379), violence (B = −1.410, SE = .296, p < .001, IRR= .244), and sexual activity (B = − 2.415, SE = .608, p < .001, odds ratio = .089); boys reported more negative behaviors than girls. Intervention effects on student-reported substance use, violence, and sexual activity were mediated by positive academic behavior. Teacher reports corroborated these results, with rated academic behavior partially mediating the effects of the intervention on rated negative behaviors.

Conclusion—This study (1) provides evidence that adds insight into one mechanism through which a social-emotional and character development program affects negative outcomes and (2) supports social-emotional and character development and positive youth development perspectives that posit that focusing on youths' assets may reduce negative behaviors.

Keywords

School-Based Prevention; Randomized Trial; Social-Emotional and Character Development; Positive Youth Development; Mediation; Prevention Research

INTRODUCTION

Negative behaviors among youth, such as substance use, violence, and sexual activity, continue to be notable public health concerns in the United States.[1] In an endeavor to reduce these behaviors, the positive youth development (PYD) perspective focuses on the strengths of youth and their positive behaviors.[2,3] The perspective has gained acceptance among researchers, practitioners, and policy makers, and involves viewing youth as resources to be developed.[4] For optimal personal growth, youth require access to environments that enhance their development, such as positive and safe school settings that increase school involvement and motivation to learn academic and life skills.

Recent decades have also seen an increase in social-emotional and character development (SECD),[5] which seeks to foster an improvement in numerous behavioral domains, such as prosocial skills, self-control, and academic achievement, and corresponding reductions in negative behaviors. These programs are often comprehensive (i.e., involve students, teachers, whole schools, families, and communities), attempt to bolster youths' positive behaviors, and have been shown to improve multiple indicators of SECD[6] and reduce negative behaviors when implemented comprehensively and with fidelity.[7,8]

Purpose

We do not fully understand the mechanisms through which PYD or SECD efforts affect youth outcomes, and the content of PYD- and SECD-related programs often overlaps considerably. The present study examines the effects of one example of a program—the Positive Action (PA) program—that reflects both the PYD and SECD perspectives. The present study builds upon recent research[9] that reported the effects of PA on reducing substance use, violent behaviors, and sexual activity among elementary-school students (using data from the same randomized trial). The purpose of the present study is to examine a mechanism through which the PA intervention worked and, specifically, if bolstering positive behavior—which is the primary concentration of many PYD/SECD programs,

including PA—mediated the intervention effects on reducing substance use, violence, and sexual activity. Based on the PYD and SECD perspectives, and the theory underlying the PA program that includes a link between increased positive behavior and reduced negative behavior,[10] we hypothesized that (1) student self-reports and teacher reports on students attending PA intervention schools would reflect significantly more positive academic behaviors (ABs) as compared to those students attending control schools and (2) positive AB would partially or completely mediate the effect of the PA intervention on substance use, violent behaviors, and voluntary sexual activity.

Although previous research has used a mediation analysis to find that SECD-related skills (e.g., I follow school rules, I listen to my parents) mediated the PA program's effects on substance use,[11] the present study is the first to examine a mechanism whereby positive ABs mediate the effect of PA on violence and sexual activity as well as substance use. The program seeks to achieve this by focusing on developing positive behaviors, without instructional time devoted to negative behaviors. For example, although substance use and violence behaviors (harassment, bullying, fighting, etc.) are mentioned, they are used only as example behaviors (sexual activity is never mentioned). To date, scant research has examined mechanisms regarding how PYD/SECD-related interventions, with their focus on development of children's assets, can reduce negative behaviors.[11–14]

Prior PA Studies

Previous research has shown PA to positively influence school quality,[15] school-level outcomes related to academic achievement, absenteeism, and disciplinary measures,[16–18] student-level positive behaviors associated with character,[11,19] and student substance use, violent behavior, and sexual activity.[9,11,20] More specifically, using data from the Hawaii randomized trial described herein, Beets and colleagues[9] showed that a small minority of the participating elementary-aged children engaged in negative behaviors, but those students who received the PA intervention had significantly lower substance use, violent behaviors, and voluntary sexual activity. However, a mediation mechanism has not yet been explored using the Hawaii randomized trial data.

METHODS

Description of the PA Program and the Hawaii Trial

The PA program (http://www.positiveaction.net) is a comprehensive, school-wide PYD/SECD program designed to positively influence multiple behavioral domains such as student academic achievement and substance use. First developed in 1977 and revised since then, the program is grounded in a broad theory of self-concept,[21–23] and is consistent with integrative, ecological theories of health behavior such as the theory of triadic influence.[24,25] The program posits a theoretical link between positive and negative behaviors, whereby a focus on positive actions leads to a cycle of positive outcomes and, therefore, a reduction in negative behaviors.[10]

The full PA program consists of K-12 classroom curricula, of which the elementary curriculum was used in this trial; a school-wide climate development component, including teacher/staff training by the developer, a PA coordinator's (principal's) manual, school counselor's program, and PA coordinator/committee guide; and family- and community-involvement programs. The family-involvement program is available in various levels and is designed for parents to use at home to promote the core elements of the classroom curriculum; it reinforces school-wide positive actions. This trial did not include the more intensive family component or the community development component.

The sequenced elementary curriculum consists of 140 lessons per grade per academic year, offered in 15- to 20-minute lessons by classroom teachers. Lessons cover six major units on topics related to self-concept (i.e., the relationship of thoughts, feelings, and actions), physical and intellectual actions (e.g., nutrition, physical activity, learning skills, decision-making skills, creative thinking), social/emotional actions for managing oneself responsibly (e.g., self-control, time management), getting along with others (e.g., empathy, altruism, respect, conflict resolution), being honest with yourself and others (e.g., self-honesty, integrity, self-appraisal), and continuous self-improvement (e.g., goal setting, problem solving, persistence). The classroom curricula utilize an interactive approach, whereby interaction between teacher and student is encouraged through the use of structured discussions and activities, and interaction between students is encouraged through, for example, structured or semistructured small group activities, including games, role plays, and practice of skills.

The school-climate kit coordinates school-wide implementation and consists of materials to encourage and reinforce the six units of PA, and directs the use of materials such as posters, music, tokens, and certificates. It also includes information on planning and conducting assemblies, creating a PA newsletter, and establishing a PA committee that typically includes a school-level PA coordinator, a lead teacher from each grade, a parent representative, and a student representative. Additionally, a counselor's program, implemented by school counselors, focuses on developing positive actions with students at higher risk and their classrooms, families, and the school as a whole.

Prior to the beginning of each academic year, teachers, administrators, and support staff (e.g., counselors) attended PA program training sessions conducted by the program developer. The training sessions lasted approximately 3 to 4 hours in the initial year, and 1 to 2 hours the following years. Booster sessions, conducted by a project coordinator and lasting approximately 30 to 50 minutes, were provided an average of once per academic year for each school and intended to increase implementation fidelity.

Several measures of fidelity of implementation were collected during the PA Hawaii trial and are described in more detail elsewhere.[18,26] Results showed that there was some variability in implementation between intervention schools, with slight gains across years. Although implementation was good for each indicator, results showed that PA intervention schools could have implemented the program with greater fidelity. Additionally, control schools reported devoting instructional time for SECD-related activities and implemented more SECD-related programs (other than PA) than intervention schools.

Design

The PA Hawaii trial was a matched-pair, cluster-randomized, controlled trial, conducted in Hawaii elementary schools during the 2002–2003 through 2005–2006 school years, and is described in detail elsewhere.[9,18] The state is one large school district with diverse ethnic groups and a recognized need for improvement (i.e., low standardized test scores and a high percentage of students receiving free or reduced-price lunch). The trial took place in 20 public elementary (K-fifth or K-sixth) schools (10 matched pairs) on three Hawaiian islands, and students began the intervention in the first or second grade and received the program for 4 to 5 years. To ensure comparability of the intervention and control schools with respect to baseline measures, archival school report card data were used to stratify schools into strata ranked on an index risk score based on demographic variables.[27–29] Schools were randomly selected from within strata and randomly assigned to intervention or control conditions before recruitment. Intervention schools were offered the complete PA program free of charge and control schools were offered a monetary incentive during the randomized trial and the PA program upon completion of the trial. At baseline, intervention and control

schools were similar on matching indicators (Table 1). The Hawaii School Board and the institutional review boards (IRBs) at the University of Illinois and Oregon State University approved the trial methods.

Sample

Because of school board and IRB requirements, students must have entered grade 5 to become eligible to answer questions related to substance use, violent behaviors, and voluntary sexual activity; thus, data from the final wave of the longitudinal study were utilized in the present research. The trial used a cluster-focused intent-to-treat approach,[30] whereby data were collected from all schools assigned to conditions and we surveyed students who entered study schools during the trial and did not follow those who left. After students entered grade 5 they were asked to procure active parental consent and give verbal assent to respond to 11 items querying about substance use (five items), violent behavior (five items), and sexual activity (one item). Among treatment and control schools, nearly 1800 students (50% female) gained permission to participate, a consent rate of over 85%. The final sample of students' self-identified ethnicity was primarily Hawaiian or part Hawaiian (26.1%) or they reported multiple ethnic backgrounds (22.6%). The others self-identified as white non-Hispanic (8.6%), African American (1.6%), Native American (1.7%), other Pacific Islander (4.7%), Japanese (4.6%), other Asian (20.6%), other (7.8%), and unknown (1.6%).

Differential selection bias was assessed to compare students whose parents provided active consent and students who did not receive consent, with no significant ($p \geq .05$) differences observed between the two groups.[9] To determine whether students who dropped out of the study were different at baseline from those who remained in the study after baseline, demographic characteristics (e.g., ethnicity and gender) were analyzed for intervention and control groups separately. Further, intervention- and control-group students who dropped out of the study after baseline were compared. Additionally, at year 5, control-group students were assessed to examine whether those control-group students who were surveyed at each the 5 years were significantly different from those control-group students who entered the study after baseline. No significant differences were found for these analyses.[9]

Measures

Academic Behavior

Student Self-Reports: In grade 5, AB was measured by five experimenter-developed items to assess student involvement in school and motivation to learn. Grade 5 students were asked how much of the time they (1) work hard in school, (2) set goals, (3) manage time wisely, (4) try to be their best, and (5) solve problems well, and to respond on a scale of 1 to 4 (1 = none of the time, 2 = some of the time, 3 = most of the time, 4 = all of the time). The α was .725. In a principal component (PC) analysis, all five items loaded over .660 on the first PC and this component explained 48.4% of the variance in the set of items. These five items relating to AB were chosen for the reported analysis because they were answered by both students and teachers.

Teacher Reports of Student Behavior: Teachers were asked to rate how well each of the five aforementioned items described the student and to respond on a scale of 1 to 3 (1 = not at all, 2 = moderately well, 3 = very well). All of the items loaded at least .766 on the first PC, and this component explained 64.8% of the variance in the item set (α = .863).

Negative Behaviors

Student Self-Reports: Fifth-grade respondents answered survey questions adapted from Monitoring the Future[31] and the Aban Aya Youth Project.[28] Questions were asked regarding lifetime substance use (five items [α = .856]: smoked a cigarette, drank alcohol, gotten drunk on alcohol, used an illegal drug like marijuana or cocaine, gotten high on drugs), violent behaviors (five items [α = .794]: carried a knife or razor to use to hurt someone, threatened to cut or stab someone, cut or stabbed someone on purpose to hurt them, carried a gun, shot at someone), and one item querying voluntary sexual activity (i.e., voluntary sex with someone of the opposite gender). Students were asked to respond on a scale of 0 to 2 (0 = no, never; 1 = yes, once; and 2 = yes, more than once). A PC analysis revealed that the substance use and violent behavior items loaded at least .741 and .646, respectively, on their first PC, and the component explained 73.7% and 59.9% of the variance in the item sets, respectively. Because of the small occurrence of the affirmative ratings, each of the 11 items was dichotomized (0 = no, never; 1 = ever) and, for the substance use and violent behavior indicators, items were summed to generate a count variable (0–5) reflecting how many of the five behaviors the student had ever performed. Research has shown that self-reports of substance use and violent behavior can provide valid measures of student behavior.[32–36] Additionally, research indicates that the prevalence of grade 5 student self-reported negative behaviors was similar to rates reported in other studies.[28]

Teacher Reports of Student Behavior: Teachers of grade 5 students were asked to rate how well each of three substance use–related items (α = .803; smokes or may smoke cigarettes or uses other forms of tobacco, drinks or may drink alcohol, uses drugs like marijuana or cocaine) and four violent behavior–related items (α = .804; gets into a lot of fights, physically hurts others, threatens others, destroys things belonging to others) described the student and to respond on a scale of 1 to 3 (1 = not at all, 2 = moderately well, 3 = very well). A PC analysis showed that the substance use and violent behavior items loaded at least .789 and .626, respectively, on their first PC, and the component explained 75.1% and 63.1% of the variance in the item sets, respectively. As with the student items, the affirmative ratings of two and three items were combined and each item was dichotomized (0 = does not describe child at all, or 1 = describes child well) and, in turn, the items were summed to generate a count of substance use (0–3) and observed violent behavior (0–4).

Analytic Strategy

To test for mediation, we used a framework described by Baron and Kenny,[37] MacKinnon,[38] and MacKinnon et al.[39,40] Figure 1 displays a simple model (Model 1) relating an independent variable (X) to a dependent variable (Y) and a traditional mediation model (Model 2) where the mediator (M) mediates the effect of X on Y. Model 1 estimates the bivariate effect (*c*) without the mediator included in the model.

Model 2 simultaneously estimates the direct effect (c') of X on Y (with the mediator in the model) and the indirect effect (*ab*), which comprises the effect of X on M (*a*) and the effect of M on Y (*b*).[38] Mediation can be classified into one of three categories: (1) *complete mediation*, when the pathway from intervention X to outcome Y is significantly mediated by M, with no significant direct effect from X to Y remaining; (2) *partial mediation*, when the pathway from X to Y is significantly mediated by M, with a significant, but reduced, direct effect remaining from X to Y; and (3) *nonsignificant mediation*, when mediation was tested for and found to be nonsignificant.[37,40] In the present study, we hypothesized that both the student and teacher models would demonstrate partial or complete mediation.

Using structural equation modeling (SEM; performed with M*plus* v5.1), a conceptual model (Figure 2) was specified based on the hypothesis that the latent construct, AB, mediated the effect of the PA intervention on the observed negative-outcome variables. Student and teacher data were utilized independently to fit two separate conceptual models (*n.b.*, the sexual activity variable is not included in the teacher model). Because of the age of the students and seriousness of the outcomes, the distributions of responses were skewed for the count outcomes (student-reported: substance use $x = .30$, SD = .91, skewness = 3.8, violent behaviors $x = .22$, SD = .78, skewness = 4.4; teacher-reported: substance use $x = .28$, SD = .74, skewness = 2.7, violent behaviors $x = .89$, SD=1.30, skewness = 1.2), with the majority of students and teachers (range = 85.1%–97.8% across behaviors) reporting zero. Accordingly, the variance of the outcome scales was larger than the mean, and we accounted for this overdispersion by estimating a negative binomial model for the count outcomes.

A full-information maximum likelihood estimator was used for model estimates. Standard error computation was adjusted with the Huber-White procedure[41,42] to account for the non-independence of students and teachers within schools. Low intraclass correlations (ICCs; student median = .05; teacher median = .03) and a small number of clusters (i.e., 20) did not allow a multilevel SEM to converge.[43–47] Further, our approach is justified in that the between-cluster component of the model can be eliminated when small ICCs are observed; thus, the present study focused on within-cluster individual differences.[46]

In our models, the AB construct represents a continuous latent variable and, as mentioned previously, the student model was specified using count outcome variables (i.e., substance use and violent behavior) and the dichotomized sexual activity variable; the teacher model included only the count outcomes as teacher data on student sexual activity were not collected. To test for differences among boys and girls, a binary gender variable was included in the models (boys = 1, girls = 0). Further, in both student and teacher models, we tested an interaction term (intervention × gender) to explore whether the treatment effect differed between boys and girls. Results showed a nonsignificant interaction term; therefore, the term was removed for parsimony.

We implemented a two-stage process to examine mediation. First, we calculated the bivariate effect (c) of the PA intervention on the outcomes without the AB mediator present. Second, we included the AB mediator in the model to calculate direct (c') and indirect effects (ab). The indirect effects were computed by calculating the product of the unstandardized regression coefficients (i.e., $a \times b$), and we used the delta method[38] to calculate the corresponding standard errors. In turn, for all of our outcomes, we exponentiated unstandardized estimates[48] to produce more interpretable results.

RESULTS

A small minority of students reported engaging in negative behaviors related to substance use, violent behaviors and voluntary sexual activity at any time in the past.[9] For instance, among students attending control schools, a minority of students reported having ever smoked a cigarette (7.6%), drunk alcohol (18.8%), threatened to cut or stab someone (7.4%), carried a gun (10.7%), or engaged in voluntary sexual activity (6.9%). Among students receiving the program, results showed smaller percentages of students having ever smoked a cigarette (4.0%), drunk alcohol (10.1%), threatened to cut or stab someone (2.8%), carried a gun (4.5%), or engaged in voluntary sexual activity (1.2%). Teacher reports supported these results.[9]

Table 2 displays the estimated effects of the PA intervention on the negative behavioral outcomes (i.e., bivariate effect) and the results of the measurement and SEMs estimated (i.e.,

direct and indirect effects) for student self-report and teacher reports of student behavior. Examination of the fit statistics suggested that the measurement model fit the data well (student: comparative fit index [CFI] = .99, Tucker-Lewis index [TLI] = .99, root mean square error of approximation [RMSEA] = .016; teacher: CFI = .99, TLI = .98, RMSEA = .052). Fit indices for the overall structure of the mediation models were unavailable, as there is no model estimated variance for count variables.[49]

Effects of PA on AB Mediator

The PA intervention had a significant direct effect on AB in both the student and teacher models (student: B= .273, SE = .039, $p < .001$; teacher: $B = .125$, SE = .045, $p < .01$). Boys performed significantly lower on AB compared to girls (student: $B = -.117$, SE = .024, $p < .001$; teacher: $B = -.239$, SE = .025, $p < .001$).

Effects of PA on Negative Behaviors

Substance Use—The student model without the AB mediator (i.e., bivariate effect) indicated that the PA intervention was associated with decreasing the expected count of student self-report substance use by 62.1% ($B = -.970$, SE = .292, $p < .01$, incidence-rate ratio [IRR] = .379), holding all other factors constant. After inclusion of the mediator, the direct effect of AB on substance use showed that a one-unit increase in AB was associated with decreasing the expected count of substance use by 88.5% ($B = -2.161$, SE = .473, $p < .001$, IRR = .115), holding all other factors constant. There was a significant indirect effect mediated by AB ($B = -.590$, SE = .154, $p < .001$, IRR = .554); thus, the expected count of youth engaging in substance use was reduced by 44.6% because of the indirect effect of PA as mediated by AB. After controlling for the indirect effect of AB, the direct effect of the PA intervention on substance use was nonsignificant, demonstrating complete mediation. Teacher reports of student behavior corroborated these results, although the teacher model demonstrated only partial mediation.

Violent Behaviors—Without taking the AB mediator into account, the student model demonstrated that being in the PA intervention was associated with decreasing the expected count of violent behaviors by 75.6% ($B = -1.410$, SE = .296, $p < .001$, IRR = .244), holding all other factors constant. With the inclusion of the mediator, the direct effect of AB on violent behavior showed that a one-unit increase in AB was associated with decreasing the expected count of violent behavior by 86.6% ($B = -2.013$, SE = .620, $p < .001$, IRR = .134), holding all other factors constant. There was a significant indirect effect mediated by AB; thus, the expected count of youth engaging in violent behavior was reduced by 42.3% ($B = -.550$, SE = .187, $p < .01$, IRR = .557) because of the indirect effect. After controlling for the indirect effect of AB, the direct effect of the intervention on violent behavior was reduced but still significant ($B = -.856$, SE = .362, $p < .05$, IRR = .425) and, therefore, demonstrated partial mediation. Teacher reports of student violent behavior substantiated these results.

Voluntary Sexual Activity—Given that the prevalence of sexual activity among elementary-aged students was low (6.9% control; 1.2% intervention), the student model without the AB mediator indicated that being in the PA intervention was associated with a decrease in the odds of reporting voluntary sexual activity by 91.1% ($B = -2.415$, SE = .608, $p < .001$, odds ratio [OR] = .089), holding all other factors constant. After controlling for the mediated effect of AB, the OR reflects an 85.2% ($B = -1.908$, SE = .667, $p < .01$, OR = .148) reduction in the odds of reporting voluntary sexual activity among youth in the PA intervention, with a significant direct effect remaining, demonstrating partial mediation. The odds of a student reporting voluntary sexual activity were reduced by 92.1% ($B = -2.536$, SE = .714, $p < .001$, OR = .079) because of the effect as mediated by AB. There was a

significant indirect effect mediated by AB ($B = -.692$, SE = .219, $p < .01$, OR = .500); thus, the odds of students engaging in voluntary sexual activity were reduced by half because of the indirect effect of PA as mediated by AB.

Gender Differences in Negative Behaviors

Student and teacher bivariate-effect models demonstrated that boys had significantly higher substance use (student: $B = .481$, SE = .202, $p < .05$, IRR = 1.618; teacher: $B = .390$, SE = .124, $p < .01$, IRR = 1.477) and violent behavior (student: $B = .962$, SE = .245, $p < .001$, IRR = 2.617; teacher: $B = .521$, SE = .095, $p < .001$, IRR = 1.684) than girls. Boys also had greater odds of reporting voluntary sexual activity ($B = .728$, SE = .245, $p < .01$, OR = 2.071) than girls. These effects were mediated by AB.

DISCUSSION

Results from this matched-pair, cluster-randomized, controlled trial are consistent with previous research demonstrating that students attending PA intervention schools reported significantly more positive behaviors[11,19] and less substance use, violent behaviors, and voluntary sexual activity[9,11,20] than students in control schools. Overall, similar to previous research, boys reported more negative behaviors than girls. We have built upon previous work[9] by utilizing the PYD and SECD perspectives to examine a mechanism regarding how the PA program can reduce negative behaviors. The present study provides empirical support for the theory that underlies the PA program,[10] whereby a link exists between positive and negative behaviors.[50,51] Students who received the PA intervention reported significantly better ABs related to student involvement in school and motivation to learn. Further, positive AB was associated with a reduction in student self-report and teacher report of negative behaviors. Specifically, we found that student and teacher SEM models indicated that the positive effect of the PA intervention on substance use, violent behaviors, and voluntary sexual activity was partially or completely mediated by ABs. The present study is strengthened by the fact that student and teacher data corroborated each other. This research adds to the limited amount of research examining mechanisms through which PYD/SECD-related programs work[11–14] and represents the first effort to assess how the PA intervention reduces substance use, violence, and sexual activity by bolstering ABs.

With the expected outcome of influencing many behaviors arises the complexity of evaluating the overall impact of the PA program. The current study examined one mediation mechanism through which the PA program affected negative behaviors. This is a possible limitation in that other variables (e.g., higher teacher involvement in the intervention schools or improved school safety) could account for some of the program's effects; however, our objective was to look specifically at academic-related behaviors. Future research should examine other possible mediation and moderating factors that lead to the PA program's effects. This may provide a more detailed understanding of the mechanism(s) through which the PA program positively influences health-related outcomes. Further, doing so would allow researchers and practitioners to gain a more thorough understanding of how PYD/SECD-related programming affects outcomes. In turn, practitioners might gain insight regarding what program components are most crucial in PYD/SECD-related interventions and how these components relate to one another.

The current findings should be viewed in the context of some other limitations. Because of the IRB requirements for the PA Hawaii trial, students had to have entered grade 5 to be eligible to answer questions related to the present study's outcomes; thus, this mediation analysis was not longitudinal, and care should be taken when making causal inferences. Despite this limitation, our analysis is supported by theory that suggests increasing positive behavior may decrease negative behavior.[10] Further, the hypothesized direction of the PA

program's effects is based on the fact that the program was designed to increase positive behaviors, without any focus on negative behaviors. Future research could provide increased evidence through longitudinal analysis. Also, the examination of the PA intervention's impact on voluntary sexual activity could be enhanced with the inclusion of more than a single item querying about sexual activity. Additionally, the study's generalizability is limited to elementary-aged students. Various cultural and communal values and factors exist in different geographic areas, and future work could examine mediation pathways in dissimilar contexts. As for any similar study, results are only generalizable to students attending schools willing to conduct such a school-wide, comprehensive program. Lastly, social desirability bias is a possible limitation that all prevention studies of this type have.

In sum, the present research demonstrated that the PA intervention was associated with a reduction in negative behaviors without including detailed instructional time devoted to substance use and violent behavior, and with no mention of sexual activity. Overall, the PYD and SECD perspectives were supported. The PA program effects on negative behaviors were partially or completely mediated by positive academic-related behaviors.

Acknowledgments

We would like to thank Niloofar Bavarian and Kendra Lewis for helpful comments on previous drafts of this paper. This article is based on a portion of a dissertation submitted by the first author to Oregon State University with funding provided by the National Institute on Drug Abuse (R01-DA13474). Additionally, the National Institute on Drug Abuse (DA018760 and T32 DA01946) provided financial support for the completion of the work on this manuscript. The authors would like to thankfully recognize the support and involvement of the Hawaii school district and the principals, administrators, teachers, staff, and students and their families at the participating schools.

References

1. Centers for Disease Control and Prevention. [Accessed January 10, 2012] 2009 national youth risk behavior survey overview. Available at: http://www.cdc.gov/HealthyYouth/yrbs/index.htm.
2. Snyder, FJ.; Flay, BR. Positive youth development. In: Brown, P.; Corrigan, MW.; Higgins-D'Alessandro, A., editors. The Handbook of Prosocial Education. Lanham, Md: Rowman & Littlefield Publishing Group; 2012. p. 415-443.
3. Lerner, JV.; Phelps, E.; Forman, Y.; Bowers, EP. Positive youth development. In: Lerner, RM.; Steinberg, L., editors. Handbook of Adolescent Psychology. 3rd ed.. Vol. Vol 1. Hoboken, NJ: John Wiley & Sons, Inc; 2009. p. 524-558.
4. Lerner, RM.; Brentano, C.; Dowling, EM.; Anderson, PM. Positive youth development: thriving as the basis of personhood and civil society. In: Lerner, RM.; Taylor, CS.; Von Eye, A., editors. Pathways to Positive Development Among Diverse Youth. San Francisco, Calif: Jossey-Bass; 2002. p. 11-33.
5. Elias MJ. Social-emotional and character development and academics as a dual focus of educational policy. Educ Policy. 2009; 23:831–846.
6. Durlak JA, Weissberg RP, Dymnicki AB, et al. The impact of enhancing students' social and emotional learning: a meta-analysis of school-based universal interventions. Child Dev. 2011; 82:405–432. [PubMed: 21291449]
7. Berkowitz MW, Bier MC. Research-based character education. Ann Am Acad Pol Soc Sci. 2004; 591:72.
8. Berkowitz MW, Bier MC. What works in character education. J Res Character Educ. 2007; 5:29–48.
9. Beets MW, Flay BR, Vuchinich S, et al. Use of a social and character development program to prevent substance use, violent behaviors, and sexual activity among elementary-school students in Hawaii. Am J Public Health. 2009; 99:1438–1445. [PubMed: 19542037]
10. Flay, BR.; Allred, CG. The Positive Action Program: improving academics, behavior and character by teaching comprehensive skills for successful learning and living. In: Lovat, T.; Toomey, R.,

editors. International Handbook on Values Education and Student Well-Being. Dordrecht, Netherlands: Springer; 2010. p. 471-501.

11. Lewis KM, Bavarian N, Snyder FJ, et al. Direct and mediated effects of a social-emotional and character development program on adolescent substance use. Int J Emotional Educ. 2012; 4:56–78.
12. Bierman KL, Nix RL, Greenberg MT, et al. Executive functions and school readiness intervention: Impact, moderation, and mediation in the Head Start REDI program. Dev Psychopathol. 2008; 20:821–843. [PubMed: 18606033]
13. Liu LC, Flay BR. Aban Aya Investigators. Evaluating mediation in longitudinal multivariate data: mediation effects for the Aban Aya Youth Project drug prevention program. Prev Sci. 2009; 10:197–207. [PubMed: 19288196]
14. Riggs NR, Greenberg MT, Kusché CA, Pentz MA. The mediational role of neurocognition in the behavioral outcomes of a social-emotional prevention program in elementary school students: Effects of the PATHS curriculum. Prev Sci. 2006; 7:91–102. [PubMed: 16572300]
15. Snyder FJ, Vuchinich S, Acock A, et al. Improving elementary school quality through the use of a social-emotional and character development program: a matched-pair, cluster-randomized, controlled trial in Hawai‘i. J Sch Health. 2012; 82:11–20. [PubMed: 22142170]
16. Flay BR, Allred CG. Long-term effects of the Positive Action program. Am J Health Behav. 2003; 27:S6. [PubMed: 12751643]
17. Flay BR, Allred CG, Ordway N. Effects of the Positive Action program on achievement and discipline: two matched-control comparisons. Prev Sci. 2001; 2:71–89. [PubMed: 11523754]
18. Snyder F, Flay B, Vuchinich S, et al. Impact of a social-emotional and character development program on school-level indicators of academic achievement, absenteeism, and disciplinary outcomes: a matched-pair, cluster-randomized, controlled trial. J Res Educ Eff. 2010; 3:26–55. [PubMed: 20414477]
19. Washburn IJ, Acock A, Vuchinich S, et al. Effects of a social-emotional and character development program on the trajectory of behaviors associated with social-emotional and character development: findings from three randomized trials. Prev Sci. 2011; 12:314–323. [PubMed: 21720782]
20. Li K-K, Washburn I, Dubois DL, et al. Effects of the Positive Action programme on problem behaviors in elementary school students: a matched-pair randomised control trial in Chicago. Psychol Health. 2011; 26:179–204.
21. DuBois, DL.; Flay, BR.; Fagen, MC. Self-esteem enhancement theory: an emerging framework for promoting health across the life-span. In: DiClemente, RJ.; Kegler, MC.; Crosby, RA., editors. Emerging Theories in Health Promotion Practice and Research. 2nd ed.. San Francisco, Calif: Jossey-Bass; 2009. p. 97-130.
22. Purkey, WW. Self-Concept and School Achievement. Englewood Cliffs, NJ: Prentice-Hall; 1970.
23. Purkey, WW.; Novak, J. Inviting School Success: A Self-Concept Approach to Teaching and Learning. Belmont, Calif: Wadsworth; 1970.
24. Flay BR, Petraitis J. The theory of triadic influence: a new theory of health behavior with implications for preventive interventions. Adv Med Sociol. 1994; 4:19–44.
25. Flay, BR.; Snyder, FJ.; Petraitis, J. The theory of triadic influence. In: DiClemente, RJ.; Crosby, RA.; Kegler, MC., editors. Emerging Theories in Health Promotion Practice and Research. 2nd ed.. San Francisco, Calif: Jossey-Bass; 2009. p. 451-510.
26. Beets MW, Flay BR, Vuchinich S, et al. School climate and teachers’ beliefs and attitudes associated with implementation of the Positive Action program: a diffusion of innovations model. Prev Sci. 2008; 9:264–275. [PubMed: 18780182]
27. Dent CW, Sussman S, Flay BR. The use of archival data to select and assign schools in a drug prevention trial. Eval Rev. 1993; 17:159–181.
28. Flay BR, Graumlich S, Segawa E, et al. Effects of 2 prevention programs on high-risk behaviors among African American youth: a randomized trial. Arch Pediatr Adolesc Med. 2004; 158:377–384. [PubMed: 15066879]

29. Graham JW, Flay BR, Johnson CA, et al. Group comparability: a multiattribute utility measurement approach to the use of random assignment with small numbers of aggregate units. Eval Rev. 1984; 8:247–260.
30. Vuchinich S, Flay BR, Aber L, Bickman L. Person mobility in the design and analysis of cluster-randomized cohort prevention trials. Prev Sci. 2012; 13:300–313. [PubMed: 22249907]
31. Johnston, LD.; O'Malley, PM.; Bachman, JG.; Schulenber, JE. Monitoring the Future National Results on Adolescent Drug Use: Overview of Key Findings, 2008. Bethesda, Md: National Institute on Drug Abuse; 2009.
32. Hawkins JD, Catalano RF, Kosterman R, et al. Preventing adolescent health-risk behaviors by strengthening protection during childhood. Arch Pediatr Adolesc Med. 1999; 153:226–234. [PubMed: 10086398]
33. Herrenkohl TI, Kosterman R, Mason WA, Hawkins JD. Youth trajectories of proximal characteristics of intimate partner violence. Violence Vict. 2007; 22:259–274. [PubMed: 17619633]
34. Mason WA, Kosterman R, Hawkins JD, et al. Predicting depression, social phobia, and violence in early adulthood from childhood behavior problems. J Am Acad Child Adolesc Psychiatry. 2004; 43:307–315. [PubMed: 15076264]
35. Pechacek TF, Murray DM, Luepker RV, et al. Measurement of adolescent smoking behavior: rationale and methods. J Behav Med. 1984; 7:123–140. [PubMed: 6716469]
36. Single E, Kandel DB, Johnson BD. The reliability and validity of drug use responses in a large scale longitudinal survey. J Drug Issues. 1975; 5:426–443.
37. Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. J Pers Soc Psychol. 1986; 51:1173–1182. [PubMed: 3806354]
38. MacKinnon, DP. Introduction to Statistical Mediation Analysis. New York, NY: Lawrence Erlbaum Associates; 2008.
39. MacKinnon DP, Krull JL, Lockwood CM. Equivalence of the mediation, confounding and suppression effect. Prev Sci. 2000; 1:173–181. [PubMed: 11523746]
40. MacKinnon DP, Lockwood CM, Hoffman JM, et al. A comparison of methods to test mediation and other intervening variable effects. Psychol Methods. 2002; 7:83–104. [PubMed: 11928892]
41. Raudenbush, SW.; Bryk, AS. Hierarchical Linear Models: Applications and Data Analysis Methods. Vol. Vol 2. Thousand Oaks, Calif: Sage Publications; 2002.
42. Snijders, TAB.; Bosker, RJ. Multilevel Analysis: An Introduction to Basic and Advanced Multilevel Modeling. Thousand Oaks, Calif: Sage Publications Ltd; 1999.
43. Hox JJ, Maas CJM. The accuracy of multilevel structural equation modeling with pseudobalanced groups and small samples. Struct Equation Model. 2001; 8:157–174.
44. Marsh HW, Lüdtke O, Robitzsch A, et al. Doubly-latent models of school contextual effects: Integrating multilevel and structural equation approaches to control measurement and sampling error. Multivariate Behav Res. 2009; 44:764–802.
45. Muthén BO. Multilevel covariance structure analysis. Sociol Methods Res. 1994; 22:376–398.
46. Preacher KJ, Zyphur MJ, Zhang Z. A general multilevel SEM framework for assessing multilevel mediation. Psychol Methods. 2010; 15:209–233. [PubMed: 20822249]
47. Zhang Z, Zyphur MJ, Preacher KJ. Testing multilevel mediation using hierarchical linear models. Organ Res Methods. 2009; 2009:1–25.
48. Long, JS.; Freese, J. Regression models for categorical dependent variables using Stata. College Station, Tex: Stata Press; 2006.
49. Agresti, A. Categorical Data Analysis. Hoboken, NJ: Wiley & Sons Inc; 2002.
50. Flay BR. Positive youth development requires comprehensive health promotion programs. Am J Health Behav. 2002; 26:407–424. [PubMed: 12437016]
51. Jessor, R.; Jessor, SL. Problem Behavior and Psychosocial Development. New York, NY: Academic Press; 1977.

SO WHAT? Implications for Health Promotion Practioners and Researchers

What is already known on this topic?

Recent research has shown that appropriately designed and implemented social-emotional and character development programs can be effective in reducing substance use, violence, and sexual activity. However, the field lacks studies examining how these types of programs reduce negative behaviors.

What does this article add?

This study suggests that a social-emotional and character development program is associated with academic-related behaviors that mediate the positive program effects on substance use, violence, and sexual activity.

What are the implications for health promotion practice or research?

Focusing on youths' assets using a comprehensive, school-wide program is one possible approach the may reduce negative behaviors among elementary-aged students.

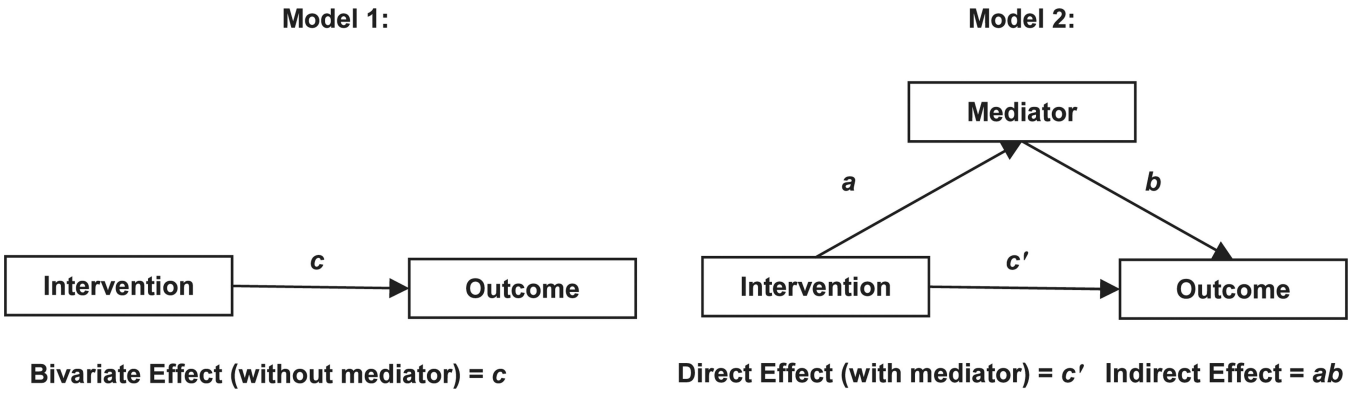

Figure 1.
Terminology for the Mediation Model
Adapted from MacKinnon.[38]

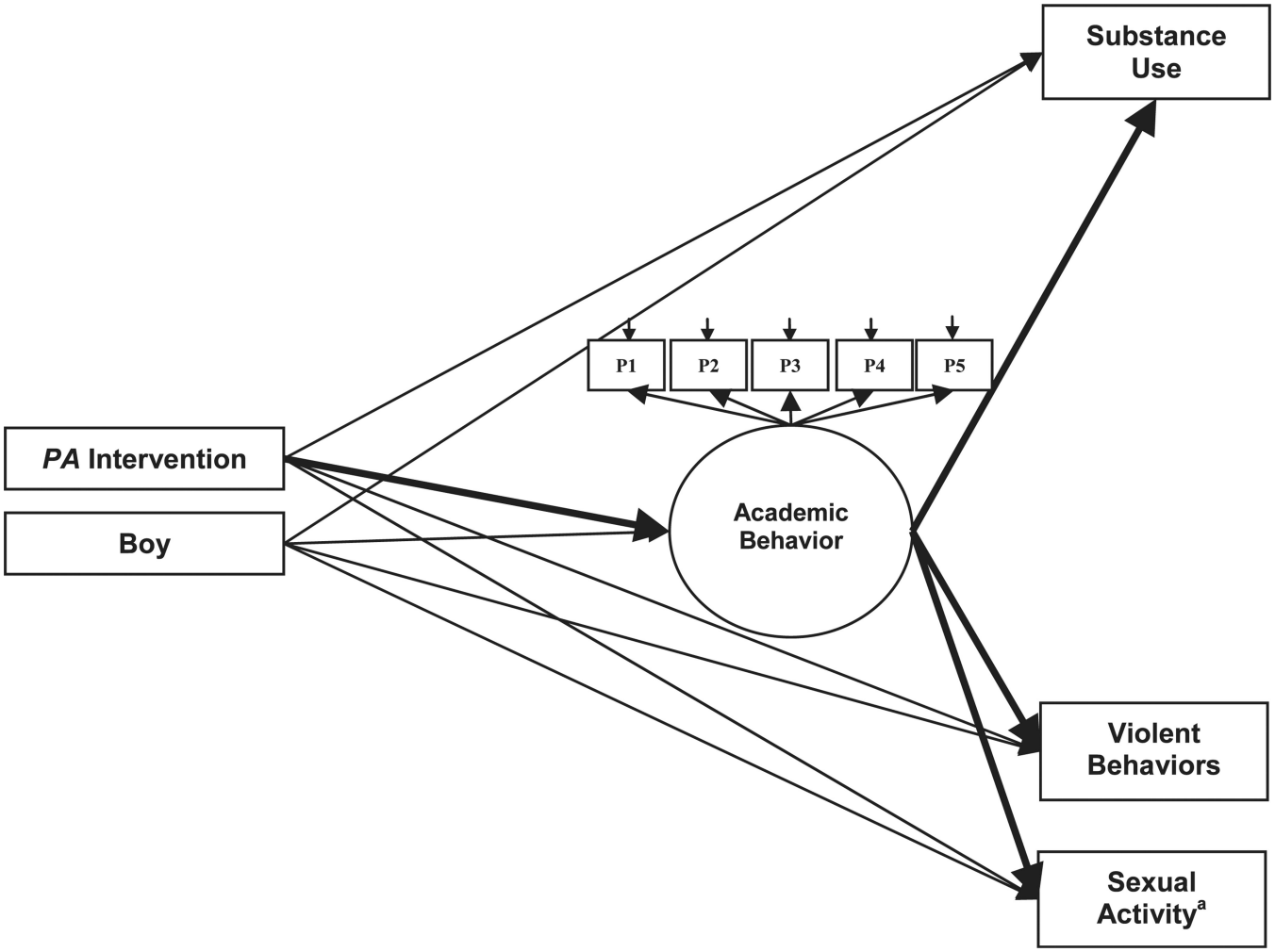

Figure 2.

A Mediation Model of the Effects of Positive Action on Substance Use, Violent Behaviors, and Sexual Activity

Bolded lines indicate mediation pathways; PA, Positive Action. A condition × gender effect was nonsignificant and was not included in the model in the interest of parsimony.

[a] Teacher data regarding student sexual activity were not collected; thus, sexual activity is included only in the student model.

Table 1

Characteristics of Study Schools at Baseline*

	2002 (Baseline)				
	Control		Positive Action		
	Mean	SD	Mean	SD	$p^{\dagger}$
Enrollment	478.80	207.06	609.40	330.07	0.303
Racial/ethnic distribution, %					
African-American	1.79	3.20	1.66	2.03	0.915
Chinese	2.05	3.66	1.88	2.75	0.908
Filipino	11.61	14.20	15.83	9.75	0.449
Hawaiian	5.61	5.98	5.74	4.16	0.956
Hispanic	2.45	2.35	3.28	3.11	0.510
Indochinese	2.02	5.62	0.34	0.69	0.361
Japanese	4.26	3.57	6.50	6.16	0.333
Korean	1.19	2.12	1.71	3.50	0.692
Native American	0.44	0.37	0.47	0.47	0.876
Part Hawaiian	31.86	28.37	28.81	21.61	0.790
Portuguese	1.41	1.94	1.99	1.77	0.494
Samoan	3.11	4.83	5.23	8.78	0.512
White	17.52	18.05	13.05	10.81	0.510
Other	14.69	14.01	13.48	8.61	0.879
Stability, %	90.82	2.36	91.71	3.18	0.487
Free/reduced lunch, %	54.32	26.40	59.78	22.95	0.628
Limited English proficiency, %	11.83	15.30	15.58	14.10	0.576
Special education, %	10.56	5.41	9.76	2.99	0.687

*Adapted from Snyder et al., 2010.[18]

†2-tailed *t*-test; 18 *df*.

Table 2

Summary of the Effects of Positive Action (PA) on Academic Behavior (AB), Substance Use (SU), Violent Behaviors (VB), and Sexual Activity (SA)[†]

	Student Self-Report N = 1784	Teacher Report of Student Behavior N = 1351
AB factor loadings, estimate (SE)		
P1: Work hard at school	1.000 (0.000)	1.000 (0.000)
P2: Set goals for yourself	1.242 (0.119)	0.927 (0.093)
P3: Use or manage your time wisely	1.163 (0.075)	1.056 (0.067)
P4: Try to be your best	1.052 (0.079)	0.991 (0.095)
P5: Solve problems well	1.119 (0.099)	0.808 (0.047)
AB, $B^{\ddagger}$ (SE[§])		
Direct effects		
PA intervention → AB	0.273 **** (0.039)	0.125 *** (0.045)
Boy → AB	−0.117 **** (0.024)	−0.239 **** (0.025)
SU, $B^{\ddagger}$ (SE[§]), IRR[‖]		
Bivariate effect without mediator		
PA intervention → SU	−0.970 *** (0.292), 0.379	−1.055 *** (0.340), 0.348
Boy → SU	0.481 ** (0.202), 1.618	0.390 *** (0.124), 1.477
Direct effects with mediator		
PA intervention → SU	−0.364 (0.324), 0.695	−0.954 *** (0.345), 0.385
Boy → SU	0.334 * (0.199), 1.397	0.107 (0.138), 1.113
AB → SU	−2.161 **** (0.473), 0.115	−1.290 **** (0.249), 0.275
Indirect effect		
PA → AB → SU	−0.590 **** (0.154), 0.554	−0.161 ** (0.066), 0.851
VB, $B^{\ddagger}$ (SE[§]), IRR[‖]		
Bivariate effect without mediator		
PA intervention → VB	−1.410 **** (0.296), 0.244	−0.810 **** (0.147), 0.445
Boy → VB	0.962 **** (0.245), 2.617	0.521 **** (0.095), 1.684
Direct effects with mediator		
PA intervention → VB	−0.856 ** (0.362), 0.425	−0.711 **** (0.165), 0.491
Boy → VB	0.867 **** (0.248), 2.380	0.172 ** (0.078), 1.188
AB → VB	−2.013 **** (0.620), 0.134	−1.390 **** (0.241), 0.249
Indirect effect		
PA → AB → VB	−0.550 *** (0.187), 0.577	−0.174 ** (0.069), 0.840
SA, $B^{\ddagger}$ (SE[§]), OR[#]		
Bivariate effect without mediator[¶]		
PA intervention → SA	−2.415 **** (0.608), 0.089	
Boy → SA	0.728 *** (0.245), 2.071	

	Student Self-Report N = 1784	Teacher Report of Student Behavior N = 1351
Direct effects with mediator		
PA intervention → SA	−1.908*** (0.667), 0.148	
Boy → SA	0.541** (0.229), 1.718	
AB → SA	−2.536**** (0.714), 0.079	
Indirect effect		
PA → AB → SA	−0.692*** (0.219), 0.500	

† AB measurement model fit indices: student: CFI = 0.99, TLI = 0.99, RMSEA = 0.016; teacher: CFI = 0.99, TLI = 0 .98, RMSEA = 0.052. IRR indicates incidence-rate ratio; OR, odds ratio; CFI, comparative fit index; TLI, Tucker-Lewis index; and RMSEA, root mean square error of approximation.

‡ Unstandardized *B* estimate based on negative-binomial model.

§ Standard error of the indirect effect estimated using the delta method.

// Incidence-rate ratio for count outcomes.

OR for dichotomous sexual activity variable.

¶ Bivariate effect of the intervention on the outcome included the gender variable, without inclusion of the mediator in the model.

* $p < 0.10$ (2-tailed).

** $p < 0.05$ (2-tailed).

*** $p < 0.01$ (2-tailed).

**** $p < 0.001$ (2-tailed).