



HHS Public Access

Author manuscript

Cognit Ther Res. Author manuscript; available in PMC 2017 October 01.

Published in final edited form as:

Cognit Ther Res. 2016 October ; 40(5): 705–716. doi:10.1007/s10608-016-9780-2.

Mediators and Moderators of a School-Based Cognitive-Behavioral Depression Prevention Program

Mylien T. Duong,

University of Washington

Brynn M. Kelly,

IWK Health Centre

Wren L. Haaland,

Seattle Children's Research Institute

Brandon Matsumiya,

Seattle Children's Research Institute

Stanley J. Huey Jr., and

University of Southern California

Carolyn A. McCarty

University of Washington and Seattle Children's Research Institute

Abstract

This study tested potential moderators and mediators of an indicated depression prevention program for middle school students, Positive Thoughts and Actions (PTA). Participants were 120 students randomly assigned to PTA, or a brief, individually administered supportive intervention (Individual Support Program, or ISP). Youths completed measures of depressive symptoms at baseline, post-intervention, and 12-month follow-up. Hierarchical regression was used to test three moderators—ethnic minority status, gender, and baseline depressive symptoms—and three mediators representing functional outcomes targeted by PTA—parent-child communication, attitude towards school, and health behavior. Ethnic minority status did not moderate PTA effects at post-intervention but did moderate PTA effects at 12-month follow-up. At 12 months, PTA appeared to be more effective for White participants than ethnic minority youth. Follow-up analyses suggested this moderation effect was due to the tendency of ethnic minority youth, especially those with fewer symptoms at baseline, to drop out by 12 months. Neither gender nor baseline depressive symptoms moderated the effects of PTA. Although PTA improved health behavior and attitudes toward school, there was no evidence that any of these functional outcomes measured mediated the impact of PTA on depressive symptoms. Future directions are discussed.

Correspondence regarding this submission should be addressed to Mylien T. Duong, University of Washington, Department of Psychiatry and Behavioral Sciences, 6200 NE 74th St, Building 29, Suite 110, Seattle, WA, 98115; myliend@uw.edu.

Compliance with Ethical Standards

Disclosure of potential conflicts of interest: The authors declare that they have no conflict of interest.

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

Keywords

depression; prevention; intervention; mediator; moderator

Recent meta-analyses suggest that prevention programs do indeed reduce or slow the escalation of depressive symptoms (Horowitz & Garber, 2006; Merry & Stasiak, 2012; Stice, Shaw, Bohon, Marti, & Rohde, 2009). In previous reports, we described the post-intervention and 12-month follow-up outcomes (references removed for blinding) for Positive Thoughts and Actions (PTA), a manualized and developmentally tailored school-based depression prevention program for middle school students. PTA is designed to address key factors that influence and perpetuate depressive symptoms, including diminished health behaviors, academic stress, and interpersonal problems (Brittian et al., 2013; de Bruyn & Cillessen, 2006; Dweck, 2006). Relative to a brief, individually administered supportive control group (Individual Support Program, or ISP), middle school students assigned to PTA showed significant improvements on child-reported depressive symptoms from pre- to post-intervention, Cohen's $d = .34$. Gains were maintained at 12-month follow-up, $d = .21$ (reference removed for blinding).

The literature documenting the efficacy of depression prevention is sizeable, yet our understanding of factors that mediate and moderate program impact is limited. Analyses of moderators can identify individuals who are most likely to benefit from intervention, as well as those for whom alternative approaches need to be developed. Mediation analyses provide a manipulation check of the intended effects, identify aspects that need to be strengthened, and pinpoint active components in the service of maximizing program impact and cost-effectiveness (MacKinnon & Dwyer, 1993). Finally, tests of mediators and moderators are crucial in theory refinement and development of more effective programs (Kazdin & Weisz, 1998; Lochman, 2001). The present study aims to extend the literature on moderators and mediators of depression prevention programs. In this project, we examined three moderators: ethnic minority status, gender, and baseline depressive symptoms. We also examined three mediators that represent functional outcomes targeted by PTA, including parent-child communication, attitude towards school, and health behavior.

Moderators

Race/ethnicity

Whether a depression prevention program is efficacious for ethnically diverse populations is of tremendous practical importance. Despite compelling arguments for the wide-scale dissemination of evidence-based practices, questions regarding their relevance to culturally diverse youth remain (Hall, 2001; Miranda et al., 2005; Sue, Zane, Hall, & Berger, 2009). These concerns are particularly acute given demographic shifts in the United States (Passel & Cohn, 2008) and evidence of ethnic disparities in mental health utilization and service retention (Chen & Rizzo, 2010; Dobalian & Rivers, 2008). Building a knowledge base about the efficacy of depression prevention programs for diverse ethnic groups is an essential step in maximizing the public health application of interventions.

National data indicate that African American, Asian American, and Latino/a adolescents endorse depressive symptoms at elevated rates, when compared to European American teens (Siegel, Aneshensel, Taub, Cantwell, & Driscoll, 1998; Turner, Taylor, & Gundy, 2004). Increased depression in ethnic minority groups is frequently thought to reflect experiences of discrimination, low socioeconomic status, acculturative stress, and a greater number of life stressors (Liu & Lau, 2013; Plant & Sachs-Ericsson, 2004). There is reason to believe that depression prevention may be more effective for ethnic minority youth given that prevention programs typically produce larger effects for participants at higher risk (Horowitz & Garber, 2006; Stice et al., 2009). On the other hand, ethnic minority groups have historically been under-represented in psychological research, intervention development, and efficacy trials (Cundiff, 2012). One could imagine, then, that current programs, built upon decades of prior etiologial and intervention research, may be less responsive to the needs of ethnic minority populations (Kindt, Kleinjan, Janssens, & Scholte, 2014; Liu & Lau, 2013).

The research evidence on the moderating role of race/ethnicity in depression prevention is scarce. Indeed, we are only aware of a handful that studies that specifically examined this question. Marchand, Ng, Rohde, and Stice (2010) found that a brief, indicated cognitive-behavioral depression prevention program had similar effects for Asian American, Latino, and European American adolescents. A trial conducted in the Netherlands found no differences between native Dutch students and ethnic minorities in response to a universal program (Kindt et al., 2014). A meta-analysis of depression prevention found complex, quadratic relationships between sample ethnic composition and program efficacy (Stice et al., 2009). Effect sizes were similar and significant for samples < 55% White and samples from 55 to 83% White, but were smaller and nonsignificant for samples containing > 83% White participants. Another meta-analysis did not find differences in the efficacy of programs delivered in varying world regions (i.e., North America, Australia, Europe, and Asia) (Cowen, 2014). Given the scarce and conflicting data, we formed no *a priori* hypotheses and conducted exploratory analyses examining ethnicity as a moderator of PTA effects.

Gender

The second moderator we examined was student gender. Beginning in adolescence, girls experience depressive symptoms at greater rates than do boys (Hankin et al., 1998; Lewinsohn et al., 1994). Girls may thus be more motivated to engage with prevention programs. In addition, there may be a “floor effect” for boys that prevents the detection of program impact.

The data on the differential impact of depression programs by gender is mixed. Some interventions show larger benefits for girls (Gillham, Hamilton, Freres, Patton, & Gallop, 2006; Peterson, Leffert, Graham, Alwin, & Ding, 1997); others for boys (Clarke, Hawkins, Murphy, & Sheeber, 1993; Seligman, Schulman, DeRubeis, & Hollon, 1999) and still others show no differential effects by gender (Brière, Rohde, Shaw, & Stice, 2014; Horowitz, Garber, Ciesla, Young, & Mufson, 2007; Jaycox, Reivich, Gillham, & Seligman, 1994; Stice, Rohde, Gau, & Wade, 2010). In a meta-analysis, Merry and Stasiak (2012) showed that, for both boys and girls, depression prevention programs were effective at post-

intervention. For boys, there was continued evidence of benefit at the 3- to 9-month follow-up, but not at 12 months. For girls, differences between intervention and control groups were not significant at 3- to 9-month follow-up nor at 12 months. This meta-analysis would suggest that, although program effects may be similar across genders immediately following intervention, maintenance of gains are more difficult to achieve for female participants.

Much of the research on gender-specific risk factors has focused on increased interpersonal stressors among girls. Girls may experience more interpersonal stressors generally (Crawford, Cohen, Midlarsky, & Brook, 2001; Hankin, Mermelstein, & Roesch, 2007; Schraedley, Gotlib, & Hayward, 1999; Shih, Eberhart, Hammen, & Brennan, 2006; Telzer & Fuligni, 2013). In addition, interpersonal stressors may have a more pernicious impact on the depressive symptoms of girls than boys (Brendgen et al., 2013). Girls tend to be more interpersonally oriented than boys, a difference that intensifies in adolescence (Nolen-Hoeksema, 2001; Zahn-Waxler, 2000). Consistent with evidence that interpersonal relationships play a role in the development and maintenance of depressive symptoms, PTA curricula include an explicit focus on interpersonal relationships, both with family and peers. Parent-child communication is targeted in adolescent groups, as well as in parent workshops and home visits. In addition, a relationship module focuses on interpersonal skills. Although gender differences in the experience of, and reactivity to, interpersonal stressors have been implicated in gender differences in the development of depression, there is no reason to expect that boys and girls with already-elevated depressive symptoms may respond differently to intervention components. We thus hypothesize that our indicated depression prevention program would be equally effective for both boys and girls.

Initial level of depressive symptoms

The final moderator considered in this study was students' initial level of depressive symptoms. Other researchers have posited that participants with higher initial levels of depressive symptoms would be more motivated to engage with the intervention (Stice et al., 2009). Conversely, a floor effect may impede the ability to detect improvement in those with low initial levels of depressive symptoms (Stice et al., 2009).

Indeed, the evidence is fairly consistent in suggesting that higher-risk samples benefit more from prevention programs. Three meta-analyses have shown that, compared to universal programs (where all students receive the intervention), effect sizes are larger for indicated (where participants have been selected because of elevated symptoms) and selected programs (where participants have known risk factors for the development of depression) (Horowitz & Garber, 2006; Merry & Stasiak, 2012; Stice et al., 2009). It is unclear whether this reasoning would generalize to findings within an indicated sample such as ours, however. Indeed, analysis of moderators of another indicated trial (Gau, Stice, Rohde, & Seeley, 2012) did not find evidence that initial symptoms moderated intervention impact. Nevertheless, we explored baseline depressive symptoms as a potential moderator.

Mediators

Examining mediators allows for testing of theoretical mechanisms and can guide further program refinement (Kazdin & Nock, 2003), but scholars have not found strong evidence of

intervention mechanisms. Even in the context of effective interventions, researchers have not found support for the mediating role of targeted cognitive-behavioral skills, including negative automatic thoughts (Pössel, Baldus, Horn, Groen, & Hautzinger, 2005) or size of social networks (Pössel et al., 2005). What is more puzzling is that depression prevention programs do affect related outcomes, albeit with small effect sizes. Such programs significantly reduce anxiety ($d = .13$), improve self-esteem ($d = .25$), increase positive attributional style ($d = .08$), reduce internalizing symptoms ($d = .16$), and improve coping ($d = .13$) (Cowen, 2014). Even when interventions impact hypothesized mediators at the main effect level, tests of mediation typically do not support changes in the mediator variable as the pathway towards reduction in depression symptoms. For instance, Stice et al. (2010) found that their program reduced depressive symptoms, and also impacted hypothesized mediators, including negative cognitions and pleasant activities. In only 8% of the participants, however, did the change in the mediator precede change in depressive symptoms.

Given the lack of evidence for the mediating role of cognitive-behavioral skills, we focused instead on the potential mediating role of functional outcomes. Consistent with PTA's focus, we examined functioning in school, health, and relationships as potential mediators of PTA effects on depressive symptoms. In PTA, cognitive behavioral skills are explicitly applied to stressors within each of these areas. For example, students set personal goals in these domains, applied the psychoeducation provided in sessions to meet these goals, and conducted between-session homework focused on meeting their goals. Our inclusion of these functional domains derives from the extensive literature linking them to the development of depressive symptoms, which we now review.

Interpersonal functioning

Interpersonal problems increase the risk of depressive symptoms (Nolan, Flynn, & Garber, 2003; Pelkonen, Marttunen, & Aro, 2003; Schwartz, Gorman, Duong, & Nakamoto, 2008). Moreover, depressed individuals may exhibit interpersonal dependency, self-focused attention, or ruminative thinking that elicits withdrawal from significant others and increases the likelihood of interpersonal rejection (Fröjd et al., 2008; Galambos, Leadbeater, & Barker, 2004). As described above, PTA taught adolescents interpersonal skills, applicable to interactions with both family members and peers. In addition, we involved parents through the inclusion of two home visits with parents and students together, and two parent workshops conducted in the evenings at the school. Topics addressed during parent sessions included setting personal goals for students and parents, adolescent development, teaching parents cognitive and behavioral skills, and communication skills.

School functioning

Academic problems serve as a risk factor for depressive symptoms (Nolan et al., 2003; Pelkonen et al., 2003). Depression may also lead to difficulties with concentration that interfere with academic performance (Fröjd et al., 2008). PTA includes sessions that teaches students how to set academic goals and plans to achieve them. Students identify barriers to their school success, and apply a problem-solving strategy to modify thoughts and actions to improve their learning.

Health behavior

Depressed adolescents exercise less (Birkeland, Torsheim, & Wold, 2009), have less healthy eating habits, and exhibit fewer health-promoting behaviors overall (Fulkerson, Sherwood, Perry, Neumark-Sztainer, & Story, 2004). Exercise as a monotherapy has weak but significant positive effects in the prevention and treatment of adolescent depression (Dunn & Weintraub, 2008). During PTA, students are asked to consider the impact of their sleep, eating, exercise, and substance use on their well-being and mood. Each student in PTA sets individual health behavior goals and applies problem-solving to generate a plan to improve their health.

We hypothesized that students would use the skills they learned in PTA to improve their communication with their parents, to address problems in school, and to promote their overall health, and that functional improvements in these areas would in turn lead to a lessening of their depressive symptoms. Given the evidence that increasing depression can also lead to deterioration in functioning, we also explored “reverse mediation,” whereby changes in depressive symptoms precede and lead to improvements in functional domains.

The Current Study

In summary, the current study examined moderators and mediators of Positive Thoughts and Action (PTA), a developmentally-tailored cognitive behavioral depression prevention program for middle school students. PTA was previously found to be effective at reducing depressive symptoms, compared to an active control condition, both at post-intervention (citation removed for blinding) and at 12-month follow-up (citation removed for blinding). To contribute to the limited knowledge on the factors that mediate and moderate the impact of depression prevention, we examined three moderators— ethnic minority status, gender, and baseline depressive symptoms— and three mediators that represent functional outcomes targeted by PTA— parent-child communication, attitude toward school, and health behavior.

Method

Participants and Procedure

Recruitment and enrollment—1190 youth who returned parental consent forms and assented to participation were administered a screening survey by our study staff. Our goal was to identify a symptomatic sample of youth who did not yet have depressive disorders. Students who scored 14 or higher (top 25%) on the Mood and Feelings Questionnaire, administered as part of our screening survey, were seen individually for a brief follow-up by study staff to assess their eligibility for the prevention trial. Exclusion criteria were as follows: (a) parents did not understand English, (b) current suicidal ideation, (c) currently enrolled in mental health treatment for depression or to cope with stressors, (d) symptoms consistent with probable major depressive disorder (MDD) based on responses to the Patient Health Questionnaire-9, or (e) during individual follow-up, student was perceived to be inappropriate for a group-based intervention due to clear intellectual disability or behavioral problems.

From the screened sample, 120 students were enrolled in the prevention trial and randomized to receive Positive Thoughts and Actions ($n = 58$), or an Individual Support Program (ISP; $n = 62$). Participant demographics are presented in Table 1, separated by intervention condition. At baseline, PTA and ISP participants did not differ significantly in terms of gender, depressive symptoms, parent-child communication, health behavior, or attitudes towards school. However, there were significantly more ethnic minority youth in the intervention group than in the control group ($\chi^2 = 4.86, p = .03$). We retained 112 students (93%) at post-intervention, and 97 (81%) at 12-month follow-up. At 12-month follow-up, attrition levels were similar across the two treatment conditions ($\chi^2 = 1.79, p = .18$). Baseline depressive symptoms were similar among youth who remained in the study and those with missing data at 12-month follow-up ($t(118) = -.84, p = .40$).

Assessments

Assessments were conducted at pre-intervention, post-intervention, and 12-month follow-up. Trained interviewers who were blinded to intervention condition conducted structured research interviews in the family home or at our research offices. Internal reliability at pre-intervention is reported for each measure.

Depressive symptoms—The Mood and Feelings Questionnaire (MFQ) (Costello & Angold, 1988) was designed for children ranging in age from 8 to 18. The MFQ has previously demonstrated high content and criterion validity (Angold, Costello, Messer, & Pickles, 1995), and has high internal consistency in our sample (Cronbach's $\alpha = .84$). The *Patient Health Questionnaire* (PHQ-9) was administered individually to students who scored 14 or above on the MFQ, as part of a brief clinical assessment to determine eligibility for the trial, within a few days of screening. The PHQ-9 includes nine questions based upon *DSM-IV* major depression criteria (Kroenke, Spitzer, & Williams, 2001). It has been found to have high sensitivity (89.5%) and acceptable specificity (73%) for the diagnosis of major depression in adolescent populations (Richardson et al., 2012).

Parent-child communication—The Parent-Child Communication scale consists of ten items measuring youths' perception of their primary caregiver's openness to communication, and the frequency of child-parent communication about the child's problems and feelings ($\alpha = .76$) (Loeber, Farrington, Stouthamer-Loeber, & Van Kammen, 1998; Thornberry, Huizinga, & Loeber, 1995).

Health Behavior—Students reported on their health behavior using the Health-Enhancing Behavior Index (HEBI) (Donovan, Jessor, & Costa, 1993), which assesses healthy eating, regular exercise, and number of hours of sleep. A composite index is calculated by summing the average of each scale, with higher scores indicating better health behavior. In the current sample, internal consistency ranged from $\alpha = .80$ over measurement occasions.

Attitudes toward School—The Attitudes toward School scale from the BASC-2 ($\alpha = .87$ in the current sample) contains 8 items that capture youth's feelings of alienation, hostility, and dissatisfaction with school (Reynolds & Kamphaus, 2004). High scores indicate relative dissatisfaction and discomfort with school.

Analysis Plan

A series of hierarchical multiple regression analyses were used to test moderation and mediation. To examine moderation, we specified a Condition \times Moderator interaction in predicting each participant's change score from pre- to post-intervention and from pre-intervention to 12-month follow-up. Significant interaction terms provided evidence for moderation, and were decomposed by calculating simple slopes (Preacher, Curran, & Bauer, 2006).

To examine mediators, we used the approach recommended by MacKinnon et al. (2007) to independently test each potential mediator. This approach has been shown to be less susceptible to Type II error (missing cases of true mediation) than the Baron and Kenny (1986) four-step approach. In each mediation model, the predictor was the intervention condition; the mediator was a functional outcome (parent-child communication, health behavior, or attitudes toward school) measured at post-intervention; and the outcome was the change in depressive symptoms from pre-intervention to 12-month follow-up. MacKinnon et al. (2007) recommends calculating the indirect effect by multiplying the path coefficients from two regression models: the path from the predictor to the mediator ($X \rightarrow M$), and the path from mediator to outcome ($M \rightarrow Y$), with X (the predictor) accounted for. Given our sample size, we were powered to detect significant indirect effects if the path from intervention condition to mediator and the path from mediator to depressive symptoms were in the range of .26 to .39 (Fritz & MacKinnon, 2007).

Parental education was included as a control variable in all mediation and moderation analyses, given differences in the distribution of parental education levels at baseline (see Table 1). In reporting results, we follow the practice recommended by statisticians such as Cumming (2014) and Gelman (2012), as well as the APA Publication Manual (2010), and report the confidence intervals (CIs) for our parameter estimates, which provide a better estimate of the reproducibility of a result than p -value cutoffs.

Results

Moderators

Table 2 summarizes results from the hierarchical regression analyses testing moderation. Gender, ethnicity, and baseline depressive symptom score did not significantly moderate the association between intervention condition and change in depressive symptoms from pre- to post-intervention. At 12-month follow-up, intervention impact continued to be unaffected by gender and baseline depressive symptoms. However, ethnic minority status significantly moderated the association between intervention condition and change score from baseline to 12-month follow-up. Both ethnic minority and White students evidenced decreases in depressive symptoms from pre- to post-intervention. While White students continued to improve from post-intervention to 12-month follow-up, depressive symptoms among ethnic minority students increased from post-intervention to 12-month follow-up.

Posthoc Analyses

We conducted posthoc analyses to understand the moderating effect of ethnicity on 12-month outcomes. Our analyses focused on SES, experiences of discrimination, social stress, and attrition as potential explanations of the moderator finding above. Ethnic minority youth had lower SES than White students ($t(118) = -1.96, p = .05$), reported more frequent discrimination ($t(118) = -2.69, p = .008$), and also reported marginally more perceived social stress ($t(118) = 1.77, p = .08$). We conducted separate hierarchical regression analyses with SES, perceived discrimination, and social stress as a moderator of intervention impact at 12 months. SES did not moderate PTA outcomes at 12 months ($B = 2.80, 95\% \text{ CI } [-1.66, 7.25], p = .22$), nor did perceived discrimination ($B = 1.18, 95\% \text{ CI } [-1.97, 4.33], p = .46$) or social stress ($B = .03, 95\% \text{ CI } [-.39, .44], p = .90$).

We also conducted an analysis of variance (ANOVA) with intervention condition, ethnicity, and attrition at 12-month follow-up predicting pre- and post-intervention depressive symptoms. In analyses predicting depressive symptoms at baseline, main effects for intervention group ($F(1,112) = 1.58, p = .21$), ethnicity ($F(1,112) = 1.01, p = .32$), and attrition status ($F(1, 112) = .30, p = .56$) were nonsignificant, as were the treatment group \times ethnicity ($F(1, 112) = .01, p = .92$) and intervention condition \times ethnicity \times attrition ($F(1, 112) = .08, p = .78$) interactions. The condition \times attrition interaction ($F(1,112) = 2.95, p = .09$) and the ethnicity \times attrition interactions ($F(1,112) = 2.71, p = .10$) were marginally significant. There was a trend for ethnic minority students who dropped out of the study to have lower initial depression scores than White students who dropped out. To further ascertain whether the moderating effect of ethnicity on 12-month outcomes was attributable to differential attrition between White and ethnic minority participants, we imputed missing data using multivariate regression. We repeated the hierarchical regression analysis described above on the imputed dataset, with ethnic minority status interacting with condition predicting change in depressive symptoms from pre-intervention to 12-month follow-up. The interaction was no longer significant ($B = 4.43, 95\% \text{ CI } [-4.33, 13.21], p = .31$).

Mediators

We independently examined three potential mediators of the association between intervention condition and depressive symptoms at 12-month follow-up: parent-child communication, health behavior, and attitudes toward school. All mediators were measured at post-intervention. Table 3 summarizes coefficients from the predictor to mediator ($X \rightarrow M$) path; the mediator to outcome path ($M \rightarrow Y$), with X accounted for; and the product of these coefficients, or the indirect effect, for each mediator. As shown, the predictor to mediator ($X \rightarrow M$) path was not significant for any of the 3 mediators: parent-child communication ($B = 0.10, 95\% \text{ CI } [-1.13, 1.34], p = 0.87$), health behavior ($B = 0.54, 95\% \text{ CI } [-.22, 1.30], p = .16$); and attitudes towards school ($B = -3.66, 95\% \text{ CI } [-7.58, 0.25], p = .07$). We then tested the mediator to outcome ($M \rightarrow Y$) paths, with X accounted for, independently for each mediator. As shown, this association was significant for parent-child communication ($B = 0.72, 95\% \text{ CI } [.02, 1.43], p = 0.04$) and attitudes towards school ($B = .26, 95\% \text{ CI } [0.04, 0.48], p = .02$), but not health behavior ($B = 0.54, 95\% \text{ CI } [.33, -.57], p = .34$). The indirect effect (product of coefficients) was not significant for any of the

mediators: parent-child communication ($B = .13$, 95% CI $[-.41, .66]$, $p = .64$); health behavior ($B = .30$, 95% CI $[-.43, 1.02]$, $p = .42$); and attitudes towards school ($B = -.95$, 95% CI $[-2.24, .33]$, $p = .15$).

We also examined whether PTA impacted each functional outcome at 12-month follow-up by way of improving depressive symptoms, measured at post-intervention. The indirect effects for these “reverse mediation” analyses are summarized in the bottom portion of Table 3. As shown, the $M \rightarrow Y$ (in reverse mediation, the symptoms \rightarrow functional outcome) relation was significant for parent-child communication ($B = -.09$, 95% CI $[-5.78, -.92]$, $p = .003$) and attitudes towards school ($B = .24$, 95% CI $[.06, .42]$, $p = .01$), but not for health behavior ($B = -.02$, 95% CI $[-.06, .03]$, $p = .47$). The $X \rightarrow M$ (in reverse mediation, intervention condition \rightarrow depressive symptoms) relation is significant ($B = -2.90$, 95% CI $[-5.78, -.02]$, $p = .04$). The products of coefficients, however, was not significant for any functional outcome: parent child communication ($B = .09$, 95% CI $[-.10, .29]$, $p = .36$); health behavior ($B = .05$, 95% CI $[-.10, .19]$, $p = .51$); and attitudes towards school ($B = -.70$, 95% CI $[-1.71, .30]$, $p = .17$).

Discussion

The current study builds upon prior findings demonstrating the efficacy of Positive Thoughts and Actions (PTA), a school-based depression prevention program, by examining moderators and mediators of intervention effects. At post-intervention, PTA was equally effective for White as well as ethnic minority youth, for boys and girls, and for students at varying levels of baseline depressive symptoms. At 12-month follow-up, however, PTA appeared to be more effective for White than for ethnic minority youth. Posthoc analyses indicated that this may be explained by the tendency for ethnic minority youth, especially those with lower baseline symptoms, to drop out by 12 months. We found that PTA had a positive impact on hypothesized mediators, including health behavior and attitudes towards school. Tests of the indirect paths, however, did not suggest that the effect of PTA on depressive symptoms at 12-month follow-up were mediated by functional outcomes, or that the effect of PTA on functional outcomes at 12-month follow-up were mediated by reductions in depressive symptoms.

Moderators

We found that PTA led to similar improvements for ethnic minority and White students at post-intervention. A recent review concluded that, on average, psychotherapies worked equally well for White and ethnic minority populations. Approximately 60–70% of randomized trials or meta-analyses that examined ethnic differences found no significant moderator effects (Huey, Tilley, Jones, & Smith, 2014). Moreover, when ethnic differences did arise, results favored ethnic minorities as often as they favored White individuals, indicating that certain interventions may favor White participants under some circumstances but ethnic minorities under others. As far as we know, there has been only one other trial of an indicated depression prevention program for youth that tested ethnicity as a moderator of intervention effects. In that study, Marchand et al. (2010) found that the program had similar

effects for Asian American, Latino, and European American adolescents at post-intervention and at 6-month follow-up.

At 12-month follow-up, PTA appeared to be less effective for ethnic minority than for White adolescents. Our posthoc analyses indicated that this was accounted for by differential attrition across ethnic minority and White youths, such that ethnic minority students were most likely to drop out by 12-month follow-up, especially if they had fewer depressive symptoms at baseline. These findings are consistent with prior literature documenting higher rates of dropout from psychotherapy among ethnic minority individuals (Rosenheck, Fontana, & Cottrol, 1995; Sue, Fujino, Hu, Takeuchi, & Zane, 1991; Wierzbicki & Pekarik, 1993). Boyd-Franklin (2003) attributed this higher dropout rate to the perceived stigma of psychotherapy among many ethnic minority communities, and a mismatch between the deeply personal nature of psychotherapy and the coping styles of many ethnic minority individuals (Boyd-Franklin, 2003). Lester et al. (2010) found that African American women who dropped out of a trial for treatment of post traumatic stress disorder appeared to have benefited more from treatment than the European American women who dropped out. They hypothesized that, as a result of the cultural stigma surrounding psychotherapy among many ethnic minority groups (Sue, 1998), African Americans who choose to enroll in treatment may enter treatment with higher motivation and engagement because they would have had to overcome negative perceptions of mental health treatment. Additionally, ethnic minority clients may feel pressured to stop treatment as soon as some benefits were achieved.

Collectively, our results indicated that PTA was equally effective for students in our elevated-risk sample regardless of their baseline depression score and their gender. The hypothesis that intervention programs might be more efficacious for females and for those with higher levels of initial depression assumes that these students may be more likely to engage with prevention programs because of their elevated symptoms. This may be most pertinent to universal prevention programs, where there is a wider range of baseline symptomatology in the sample by design. Since our sample included only students who had elevated depressive symptoms but who did not meet diagnostic criteria for a major depressive episode, gender and baseline symptomatology may be less pertinent in predicting varied outcomes.

Mediators

The nonsignificant indirect effects found in this study should be interpreted in the context of a relatively small sample size. Indeed, we were powered to detect mediation only if the path from intervention condition to mediator, and the path from mediator to depressive symptoms, was in the range of .26 to .39 (Fritz & MacKinnon, 2007). While this range of effects is generally considered “small” to “moderate” (Cohen, 1988), it is a high bar to meet given that the average effect size for depression prevention programs is $d = .30$ at post-intervention and $d = .20$ at 12-month follow-up (Merry & Stasiak, 2012). A much larger sample would have been needed to detect the range of indirect effects found in this study.

Unfortunately, the lack of evidence of mediating pathways in this study is consistent with findings from prior studies, which have largely failed to document intervention mechanisms even in the context of a reduction in depressive symptoms (Horowitz et al., 2007; Pössel et

al., 2005) and predicted changes in hypothesized mediating variables (Cowen, 2014). Alternative ways of conceptualizing mediation may complement the current focus on cognitive and behavioral skills. Hollon, Stewart, and Strunk (2006), for instance, suggested that the mechanisms of intervention effects may be idiosyncratic across participants. Tang and Derubeis (1999) observed that many patients treated with cognitive therapy for depression show sudden gains in depressive symptoms that appeared to be preceded by cognitive change, but that this change occurred at different points in treatment for different patients. As Jacobs (2014) observed: “Just as depression is multiply determined, so might improvement be multiply determined” (p. 11). The development of methods for testing these idiosyncratic mechanisms, including both trial designs and statistical methods, could be a worthwhile endeavor. Others have suggested that the nonspecific factors—including therapeutic alliance, installation of hope, normalizing of individual experience, and, in group settings, social support from other members—may be underexplored mechanisms of intervention effects (Stice, Rohde, Seeley, & Gau, 2010). Nonspecific factors are rarely examined as potential mediators in depression prevention studies, but may account for improvement among some subsets of participants (Stice et al., 2010).

Limitations

Some potential limitations of this project should be considered. First, we did not have the sample size necessary to disaggregate ethnic minority groups. Certainly, “ethnic minorities” comprise a diverse group of youths and identifying how various ethnic/racial groups respond to treatment is an important direction for future research. Additionally, our sample size may have impeded our power to detect mediation effects, and our measurement did not allow us to examine non-specific components as a potential mediator of PTA effects.

Conclusion

To summarize, the current findings indicate that Positive Thoughts and Action (PTA), a school-based prevention program for youth at risk for depression onset, is effective for both boys and girls and at varying levels of depressive symptoms at baseline. Immediately after the intervention, PTA was effective for both ethnic minority and White adolescents. At 12-month follow-up, however, White students endorsed fewer depressive symptoms than ethnic minority students, a finding that may be accounted for by the tendency of ethnic minority youth with low baseline symptoms to drop out of the study by 12 months. Although PTA improved health behavior and attitudes toward school, there was no evidence that these variables mediated the impact of PTA on depressive symptoms. Given the increasing number of ethnic minority youths in the U.S., which are expected to increase over the next few decades (Passel & Cohn, 2008), further attention to sustaining intervention effects in this population is warranted. In addition, the elusive search for mediating mechanisms may benefit from innovative conceptualizations and novel methods.

Acknowledgments

This research was supported by Grant R34 MH083076 from the National Institute of Mental Health (awarded to C. McCarty). The authors wish to thank the participating schools, parents, and students for their valuable contributions to science. This study is registered on [ClinicalTrials.gov](https://clinicaltrials.gov) as NCT01220635.

References

- Aguinis H, Beaty JC, Boik RJ, Pierce CA. Effect size and power in assessing moderating effects of categorical variables using multiple regression: A 30-year review. *Journal of Applied Psychology*. 2005; 90(1):94–107. [PubMed: 15641892]
- American Psychological Association. *Publication Manual of the American Psychological Association*. 6th. Washington DC: American Psychological Association; 2010.
- Angold A, Costello EJ, Messer SC, Pickles A. Development of a short questionnaire for use in epidemiological studies of depression in children and adolescents. *International Journal of Methods in Psychiatric Research*. 1995; 5(4):237–249.
- Baron RM, Kenny DA. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*. 1986; 51:1173–1182. [PubMed: 3806354]
- Birkeland MS, Torsheim T, Wold B. A longitudinal study of the relationship between leisure-time physical activity and depressed mood among adolescents. *Psychology of Sport and Exercise*. 2009; 10(1):25–34.
- Boyd-Franklin, N. *Black families in therapy: Understanding the african american experience*. 2nd. New York, NY, US: Guilford Press; 2003.
- Brendgen M, Vitaro F, Bukowski WM, Dionne G, Tremblay RE, Boivin M. Can friends protect genetically vulnerable children from depression? *Development and Psychopathology*. 2013; 25(2): 277–289. [PubMed: 23627944]
- Brière FN, Rohde P, Shaw H, Stice E. Moderators of two indicated cognitive-behavioral depression prevention approaches for adolescents in a school-based effectiveness trial. *Behaviour Research and Therapy*. 2014; 53:55–62. [PubMed: 24418653]
- Brittian AS, Umaña-Taylor AJ, Lee RM, Zamboanga BL, Kim SY, Weisskirch RS, Caraway SJ. The moderating role of centrality on associations between ethnic identity affirmation and ethnic minority college students' mental health. *Journal of American College Health*. 2013; 61(3):133–140. [PubMed: 25158010]
- Chen J, Rizzo J. Racial and ethnic disparities in use of psychotherapy: Evidence from U.S. national survey data. *Psychiatric Services*. 2010; 61:364–372. doi:http://dx.doi.org.offcampus.lib.washington.edu/10.1176/appi.ps.61.4.364. [PubMed: 20360275]
- Clarke GN, Hawkins W, Murphy M, Sheeber L. School-based primary prevention of depressive symptomatology in adolescents: Findings from two studies. *Journal of Adolescent Research*. 1993; 8(2):183–204.
- Cohen, J. *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: L. Erlbaum Associates; 1988.
- Costello EJ, Angold A. Scales to assess child and adolescent depression: Checklists, screens, and nets. *Journal of the American Academy of Child and Adolescent Psychiatry*. 1988; 27:726–737. [PubMed: 3058677]
- Cowen S. A meta-analysis of school-based Depression Prevention programs for children and adolescents (PhD). 2014 Available from BYU Scholar Archive.
- Crawford TN, Cohen P, Midlarsky E, Brook JS. Internalizing symptoms in adolescents: Gender differences in vulnerability to parental distress and discord. *Journal of Research on Adolescence*. 2001; 11:95–118. doi:http://dx.doi.org.offcampus.lib.washington.edu/10.1111/1532-7795.00005.
- Cumming G. The new statistics: Why and how. *Psychology Science*. 2014; 25:7–29.
- Cundiff JL. Is mainstream psychological research 'womanless' and 'raceless'? an updated analysis. *Sex Roles*. 2012; 67:158–173.
- de Bruyn EH, Cillessen AHN. Heterogeneity of girls' consensual popularity: Academic and interpersonal behavioral profiles. *Journal of Youth and Adolescence*. 2006; 35(3):412–422.
- Dobalian A, Rivers P. Racial and ethnic disparities in the use of mental health services. *The Journal of Behavioral Health Services and Research*. 2008; 35(2):128–141. [PubMed: 18074230]
- Donovan JE, Jessor R, Costa FM. Structure of health-enhancing behavior in adolescence: A latent-variable approach. *Journal of Health and Social Behavior*. 1993; 34:346–362. [PubMed: 8034951]

- Dunn AL, Weintraub P. Exercise in the prevention and treatment of adolescent depression: A promising but little researched intervention. *American Journal of Lifestyle Medicine*. 2008; 2:507–518.
- Dweck, CS. *Mindset*. New York, NY: Random House; 2006.
- Fritz MS, MacKinnon DP. Required sample size to detect the mediated effect. *PSCI Psychological Science*. 2007; 18(3):233–239.
- Fröjd SA, Nissinen ES, Pelkonen MUI, Marttunen MJ, Koivisto A, Kaltiala-Heino R. Depression and school performance in middle adolescent boys and girls. *Journal of Adolescence*. 2008; 31(4):485–498. [PubMed: 17949806]
- Fulkerson JA, Sherwood NE, Perry CL, Neumark-Sztainer D, Story M. Depressive symptoms and adolescent eating and health behaviors: A multifaceted view in a population-based sample. *Preventive Medicine*. 2004; 38:865–875. [PubMed: 15193910]
- Galambos NL, Leadbeater BJ, Barker ET. Gender differences in and risk factors for depression in adolescence: A 4-year longitudinal study. *International Journal of Behavioral Development*. 2004; 28:16–25.
- Gau JM, Stice E, Rohde P, Seeley J. Negative life events and substance use moderate cognitive behavioral adolescent depression prevention intervention. *Cognitive Behaviour Therapy*. 2012; 41:241–250. [PubMed: 22414236]
- Gelman A, Hill J, Yajima M. Why we (usually) don't have to worry about multiple comparisons. *Journal of Research on Educational Effectiveness*. 2012; 5:189–211.
- Gillham JE, Hamilton J, Freres DR, Patton K, Gallop R. Preventing depression among early adolescents in the primary care setting: A randomized controlled study of the penn resiliency program. *Journal of Abnormal Child Psychology*. 2006; 34(2):203–219. [PubMed: 16741684]
- Hall GCN. Psychotherapy research with ethnic minorities: Empirical, ethical, and conceptual issues. *Journal of Consulting and Clinical Psychology*. 2001; 69(3):502–510. [PubMed: 11495179]
- Hankin BL, Abramson LY, Moffitt TE, Silva PA, McGee R, Angell KE. Development of depression from preadolescence to young adulthood: Emerging gender differences in a 10-year longitudinal study. *Journal of Abnormal Psychology*. 1998; 107(1):128–140. [PubMed: 9505045]
- Hankin BL, Mermelstein R, Roesch L. Sex differences in adolescent depression: Stress exposure and reactivity models. *Child Development*. 2007; 78(1):279–295. [PubMed: 17328705]
- Hollon SD, Stewart MO, Strunk D. Enduring effects for cognitive behavior therapy in the treatment of depression and anxiety. *Annual Review of Psychology*. 2006; 57:285–315.
- Horowitz JL, Garber J. The prevention of depressive symptoms in children and adolescents: A meta-analytic review. *Journal of Consulting and Clinical Psychology*. 2006; 74:401–415. [PubMed: 16822098]
- Horowitz JL, Garber J, Ciesla JA, Young JF, Mufson L. Prevention of depressive symptoms in adolescents: A randomized trial of cognitive-behavioral and interpersonal prevention programs. *Journal of Consulting and Clinical Psychology*. 2007; 75(5)
- Huey SJJ, Tilley JL, Jones EO, Smith CA. The contribution of cultural competence to evidence-based care for ethnically diverse populations. *Annual Review of Clinical Psychology*. 2014; 10:305–338.
- Jacobs RH, Becker SJ, Curry JF, Silva SG, Ginsburg GS, Henry DB, Reinecke MA. Increasing positive outlook partially mediates the effect of empirically supported treatments on depression symptoms among adolescents. *Journal of Cognitive Psychotherapy*. 2014; 28(1):3–19. [PubMed: 24944436]
- Jaycox LH, Reivich KJ, Gillham J, Seligman MEP. Prevention of depressive symptoms in school children. *Behaviour Research and Therapy*. 1994; 32:801–816. [PubMed: 7993324]
- Kazdin AE, Nock MK. Delineating mechanisms of change in child and adolescent therapy: Methodological issues and research recommendations. *Journal of Child Psychology and Psychiatry*. 2003; 44(8):1116–1129. [PubMed: 14626454]
- Kazdin AE, Weisz JR. Identifying and developing empirically supported child and adolescent treatments. *Journal of Consulting and Clinical Psychology*. 1998; 66(1):19–36. [PubMed: 9489260]
- Kindt KCM, Kleinjan M, Janssens JMAM, Scholte RHJ. Evaluation of a school-based depression prevention program among adolescents from low-income areas: A randomized controlled

- effectiveness trial. *International Journal of Environmental Research and Public Health*. 2014; 11:5273–5293. [PubMed: 24837666]
- Kroenke K, Spitzer RL, Williams JB. The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*. 2001b; 16(9):606–613. [PubMed: 11556941]
- Lester K, Artz C, Resick PA, Young-Xu Y. Impact of race on early treatment termination and outcomes in posttraumatic stress disorder treatment. *Journal of Consulting and Clinical Psychology*. 2010; 78:480–489. [PubMed: 20658805]
- Lewinsohn PM, Roberts RE, Seeley JR, Rohde P, Gotlib IH, Hops H. Adolescent psychopathology: II. psychosocial risk factors for depression. *Journal of Abnormal Psychology*. 1994; 103(2):302–315. [PubMed: 8040500]
- Loeber, R.; Farrington, DP.; Stouthamer-Loeber, M.; Van Kammen, WB. *Antisocial behavior and mental health problems: Explanatory factors in childhood and adolescence*. Mahwah, NJ: Lawrence Erlbaum Associates; 1988.
- Liu LL, Lau AS. Teaching about race/ethnicity and racism matters: An examination of how perceived ethnic racial socialization processes are associated with depression symptoms. *Cultural Diversity and Ethnic Minority Psychology*. 2013; 19:383–394. [PubMed: 24188535]
- Lochman JE. Issues in prevention with school-aged children: Ongoing intervention refinement, developmental theory, prediction and moderation, and implementation and dissemination. *Prevention & Treatment*. 2001; 4:4–11. doi:http://dx.doi.org.offcampus.lib.washington.edu/10.1037/1522-3736.4.1.44c.
- Loeber, R.; Farrington, DP.; Stouthamer-Loeber, M.; Van Kammen, WB. *Antisocial behavior and mental health problems: Explanatory factors in childhood and adolescence*. Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers; 1998.
- MacKinnon DP, Dwyer JH. Estimating mediated effects in prevention studies. *Evaluation Review*. 1993; 17:144–158. doi:http://dx.doi.org/10.1177/0193841X9301700202.
- MacKinnon DP, Lockwood CM, Hoffman JM, West SG, Sheets V. A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods*. 2002; 7(1):83–104. [PubMed: 11928892]
- Marchand E, Ng J, Rohde P, Stice E. Effects of an indicated cognitive-behavioral depression prevention program are similar for asian american, latino, and european american adolescents. *Behaviour Research and Therapy*. 2010; 48(8)
- Merry SN, Stasiak K. Preventing depression in adolescents. *British Medical Journal*. 2012; 345:e6720. [PubMed: 23044782]
- Miranda J, Bernal G, Lau A, Kohn L, Hwang WC, LaFromboise T. State of the science on psychosocial interventions for ethnic minorities. *Annual Review of Clinical Psychology*. 2005; 1:113–142.
- Nolan SA, Flynn C, Garber J. Prospective relations between rejection and depression in young adolescents. *Journal of Personality & Social Psychology*. 2003; 85(4)
- Nolen-Hoeksema S. Gender differences in depression. *Current Directions in Psychological Science*. 2001; 10(5):173–176.
- Passel, JS.; Cohn, D. *U.S. population projections: 2005–2050*. Washington D.C.: Pew Research Center; 2008.
- Pelkonen M, Marttunen M, Aro H. Risk for depression: A 6-year follow-up of finnish adolescents. *Journal of Affective Disorders*. 2003; 77(1):41–51. [PubMed: 14550934]
- Peterson, AC.; Leffert, N.; Graham, B.; Alwin, J.; Ding, S. Promoting mental health during the transition to adulthood. In: Schulenberg, J.; Maggs, JL.; Hurrelmann, K., editors. *Health risks and developmental transitions during adolescence*. New York, NY, US: Cambridge University Press; 1997. p. 471–497.
- Plant E, Sachs-Ericsson N. Racial and ethnic differences in depression: The roles of social support and meeting basic needs. *Journal of Consulting & Clinical Psychology*. 2004; 72(1):41–52. [PubMed: 14756613]
- Pössel P, Baldus C, Horn AB, Groen G, Hautzinger M. Influence of general self-efficacy on the effects of a school-based universal primary prevention program of depressive symptoms in adolescents: A

- randomized and controlled follow-up study. *Journal of Child Psychology and Psychiatry*. 2005; 46(9):982–994. [PubMed: 16109001]
- Preacher KJ, Curran PJ, Bauer DJ. Computational tools for probing interactions in multiple linear regression, multilevel modeling, and latent curve analysis. *Journal of Educational and Behavioral Statistics*. 2006; 31:437–448.
- Reynolds, CR.; Kamphaus, RW. *BASC-2: Behavior assessment system for children manual*. 2nd. Minneapolis: Pearson; 2004.
- Richardson LP, McCauley E, McCarty CA, Grossman DC, Myaing M, Zhou C, Katon W. Predictors of persistence after positive depression screen among adolescents. *Pediatrics*. 2012; 130:e1541–e1548. [PubMed: 23166342]
- Rosenheck R, Fontana A, Cottrol C. Effect of clinician-veteran racial pairing in the treatment of posttraumatic stress disorder. *The American Journal of Psychiatry*. 1995; 152(4):555–563. [PubMed: 7694904]
- Schraedley PK, Gotlib IH, Hayward C. Gender differences in correlates of depressive symptoms in adolescents. *Journal of Adolescent Health*. 1999; 25(2):98–108. [PubMed: 10447037]
- Schwartz D, Gorman AH, Duong MT, Nakamoto J. Peer relationships and academic achievement as interacting predictors of depressive symptoms during middle childhood. *Journal of Abnormal Psychology*. 2008; 117(2):289–299. [PubMed: 18489205]
- Seligman MEP, Schulman P, DeRubeis RJ, Hollon SD. The prevention of depression and anxiety. *Prevention and Treatment*. 1999; 2(1):8–29.
- Shih JH, Eberhart NK, Hammen CL, Brennan PA. Differential exposure and reactivity to interpersonal stress predict sex differences in adolescent depression. *Journal of Clinical Child and Adolescent Psychology*. 2006; 35(1):103–115. [PubMed: 16390306]
- Siegel JM, Aneshensel CS, Taub B, Cantwell DP, Driscoll AK. Adolescent depressed mood in a multiethnic sample. *Journal of Youth and Adolescence*. 1998; 27:413–427.
- Stata Corp. *Stata: Release 13*. College Station, TX: Stata LP; 2013.
- Stice E, Rohde P, Gau JM, Wade E. Efficacy trial of a brief cognitive-behavioral depression prevention program for high-risk adolescents: Effects at 1- and 2-year followup. *Journal of Consulting and Clinical Psychology*. 2010; 78:856–867. [PubMed: 20873893]
- Stice E, Rohde P, Seeley JR, Gau JM. Testing mediators of intervention effects in randomized controlled trials: An evaluation of three depression prevention programs. *Journal of Consulting and Clinical Psychology*. 2010; 78:273–280. [PubMed: 20350038]
- Stice E, Shaw H, Bohon C, Marti CN, Rohde P. A meta-analytic review of depression prevention programs for children and adolescents: Factors that predict magnitude of intervention effects. *Journal of Consulting and Clinical Psychology*. 2009; 77:486–503. [PubMed: 19485590]
- Sue S. In search of cultural competence in psychotherapy and counseling. *American Psychologist*. 1998; 53:440–448. [PubMed: 9572007]
- Sue S, Fujino DC, Hu L, Takeuchi DT, Zane NWS. Community mental health services for ethnic minority groups: A test of the cultural responsiveness hypothesis. *Journal of Consulting and Clinical Psychology*. 1991; 59:533–540. [PubMed: 1918557]
- Sue S, Zane N, Hall GCN, Berger LK. The case for cultural competency in psychotherapeutic interventions. *Annual Review of Psychology*. 2009; 60(1)
- Tang TZ, DeRubeis RJ. Sudden gains and critical sessions in cognitive-behavioral therapy for depression. *Journal of Consulting and Clinical Psychology*. 1999; 67:894–904. [PubMed: 10596511]
- Telzer EH, Fuligni AJ. Positive daily family interactions eliminate gender differences in internalizing symptoms among adolescents. *Journal of Youth and Adolescence*. 2013; 42(10):1498–1511. [PubMed: 23733435]
- Thornberry, TP.; Huizinga, D.; Loeber, R. The prevention of serious delinquency and violence: Implications from the program of research on the causes and correlates of delinquency. In: Howell, J.; Krisberg, B.; Hawkins, JD.; Wilson, JD., editors. *Sourcebook on serious, violent, and chronic juvenile offenders*. Thousand Oaks, CA: Sage; 1995. p. 213–327.
- Turner RJ, Taylor J, Gundy KV. Personal resources and depression in the transition to adulthood: Ethnic comparisons. *Journal of Health and Social Behavior*. 2004; 45:34–52. [PubMed: 15179906]

- Wierzbicki M, Pekarik G. A meta-analysis of psychotherapy dropout. *Professional Psychology: Research and Practice*. 1993; 24:190–195.
- Zahn-Waxler, C. The development of empathy, guilt, and internalization of distress: Implications for gender differences in internalizing and externalizing problems. In: Davidson, R., editor. *Wisconsin symposium on emotion: Vol. 1. anxiety, depression, and emotion*. Oxford, England: Oxford University Press; 2000. p. 226-265.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 1

Sample Demographic Characteristics

Characteristics	ISP <i>n</i> = 62	PTA <i>n</i> = 58	<i>t</i> or χ^2	<i>p</i>
Mean Age (<i>SD</i>)	12.7 (.77)	12.8 (.69)	-0.13	.45
Sex, <i>n</i> (%)			1.03	.31
Female	35 (56.5)	38 (65.5)		
Male	27 (43.5)	20 (34.5)		
Grade, <i>n</i> (%)			0.02	.89
7 th	35 (56.5)	32 (55.2)		
8 th	27 (43.5)	26 (44.8)		
Race, <i>n</i> (%)			3.04	.69
White	38 (62.9)	28 (48.3)		
African American	03 (4.8)	05 (8.6)		
Asian	9 (14.5)	11 (19.0)		
Native American	5 (8.1)	7 (12.1)		
Native Hawaiian/Pacific Islander	1 (1.6)	2 (3.4)		
Other/Multiracial	5 (8.1)	5 (8.6)		
Ethnicity, <i>n</i> (%)			1.14	.29
Hispanic	4 (6.5)	7 (12.0)		
Non-Hispanic	58 (93.5)	51 (88.0)		
Parental Education, <i>n</i> (%)			14.97	.001
HS Diploma/GED/Some College/AA	32 (51.6)	21 (36.2)		
Bachelor's Degree	14 (22.6)	32 (55.2)		
Masters/Professional/Doctoral Degree	16 (25.8)	5 (8.6)		
Family Constellation, <i>n</i> (%)			0.01	.93
Single (never married, divorced, widowed, long-term separated)	23 (37.1)	22 (38.0)		
Married (or 2 cohabitating parents)	39 (62.9)	36 (62.0)		
Annual Household Income, <i>n</i> (%)			3.35	.17
50,000	23 (37.7)	21 (36.2)		
50,000 to 100,000	16 (25.8)	23 (39.7)		
100,000	22 (35.5)	13 (22.8)		

Table 2

Hierarchical regression analyses with Intervention Condition \times Moderator predicting change in depressive symptom scores

Moderator	Post-intervention		12-month follow-up	
	t	p	t	p
Gender	1.29	.20	.54	.59
Ethnic minority status	.15	.88	2.04	.04
Baseline depressive symptoms	.40	.69	-.65	.52

Note. Gender is dummy-coded, where 0 = female and 1 = male. Ethnicity is dummy coded, where 0 = non-minority and 1 = minority. All analyses control for parent education.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 3

Summary of indirect effects from mediation and “reverse mediation” analyses.

Functional Outcome	(M → Y)			(X → M)			Product of coefficients		
	B [95% CI]	p		B [95% CI]	p		B [95% CI]	p	
Mediation (PTA → Functional Outcome → Symptoms)									
Parent-child communication	0.10 [-1.13, 1.34]	.87		0.72 [0.2, 1.43]	.04		.07 [-.81, .96]	.87	
Health behaviour	0.54 [-.22, 1.30]	.16		0.54 [.33, .57]	.34		.30 [-.43, 1.02]	.42	
Attitudes towards school	-3.66 [-7.58, 0.25]	.07		.26 [0.04, 0.48]	.02		-.95 [-2.24, .33]	.15	
Reverse mediation (PTA → Symptoms → Functional Outcome)									
Parent-child communication	-.09 [-.15, -.03]	.003		-2.90 [-5.78, -.02]	.04		.09 [-.10, .29]	.36	
Health behavior	-.02 [-.06, .03]	.47		-2.90 [-5.78, -.02]	.04		.05 [-.10, .19]	.51	
Attitudes towards school	.24 [.06, .42]	.01		-2.90 [-5.78, -.02]	.04		-.70 [-1.71, .30]	.17	