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Nancy A. Gonzales

Arizona State University, nancy.gonzales@asu.edu

L. E. Dumka

Arizona State University

R. E. Millsap

Arizona State University

A. Gottschall


Arizona State University

D. B. McClain

Arizona State University

See next page for additional authors

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Gonzales, Nancy A.; Dumka, L. E.; Millsap, R. E.; Gottschall, A.; McClain, D. B.; Wong, J. J.; German, M.; Mauricio, A. M.; Wheeler, Lorey A.; Carpentier, F. D.; and Kim, S. Y., "Randomized Trial of a Broad Preventive Intervention for Mexican American Adolescents" (2012). *Faculty Publications from Nebraska Center for Research on Children, Youth, Families, and Schools*. 118.
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Authors

Nancy A. Gonzales, L. E. Dumka, R. E. Millsap, A. Gottschall, D. B. McClain, J. J. Wong, M. German, A. M. Mauricio, Lorey A. Wheeler, F. D. Carpentier, and S. Y. Kim



Published in final edited form as:

J Consult Clin Psychol. 2012 February ; 80(1): 1–16. doi:10.1037/a0026063.

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Randomized Trial of a Broad Preventive Intervention for Mexican American Adolescents

N.A. Gonzales¹, L.E. Dumka², R.E. Millsap¹, A. Gottschall¹, D.B. McClain³, J.J. Wong¹, M. Germán⁴, A.M. Mauricio¹, L. Wheeler¹, F.D. Carpentier⁵, and S.Y. Kim⁶

¹Department of Psychology & Prevention Research Center, Arizona State University

²School of Social & Family Dynamics, Arizona State University

³College of Nursing & Health Innovation, Arizona State University

⁴Montefiore Medical Center, Albert Einstein College of Medicine, University of North Carolina

⁵School of Journalism and Mass Communication, University of North Carolina

⁶Human Development and Family Sciences, University of Texas at Austin

Abstract

Objective—This randomized trial of a family-focused preventive intervention for Mexican American (MA) adolescents evaluated intervention effects on adolescent substance use, internalizing and externalizing symptoms, and school discipline and grade records in 8th grade, one year after completion of the intervention. The study also examined hypothesized mediators and moderators of intervention effects.

Method—Stratified by language of program delivery (English vs. Spanish), the trial included a sample of 516 MA adolescents (50.8% female; $M=12.3$ years, $SD=.54$) and at least one caregiver that were randomized to receive a low dosage control group workshop or the 9-week group intervention that included parenting, adolescent coping, and conjoint family sessions.

Results—Positive program effects were found on all five outcomes at one-year posttest, but varied depending on whether adolescents, parents, or teachers reported on the outcome. Intervention effects were mediated by posttest changes in effective parenting, adolescent coping efficacy, adolescent school engagement, and family cohesion. The majority of direct and mediated effects were moderated by language, with a larger number of significant effects for families that participated in Spanish. Intervention effects also were moderated by baseline levels of mediators and outcomes, with the majority showing stronger effects for families with poorer functioning at baseline.

Conclusion—Findings support the efficacy of the intervention to decrease multiple problem outcomes for MA adolescents, but also demonstrate differential effects for parents and adolescents receiving the intervention in Spanish vs. English, and depending on their baseline levels of functioning.

Keywords

prevention; Mexican American; adolescents; mental health; school engagement

Mexican American (MA) adolescents experience more emotional, behavioral, and academic problems than other ethnic groups in the U.S. They are more likely than non-Latinos to use illegal drugs, carry a weapon on school property, and engage in other delinquent behaviors (Bird et al., 2001; CDC, 2006; Grant et al., 2004). MA adolescents also report more depressive symptoms compared to other U.S. ethnic groups (e.g., Roberts & Chen, 1995), and substantially higher rates of school failure (U.S. Dept. of Education, 2007). Interventions that can reduce these disparities are critically needed because MAs are the largest and fastest growing ethnic subgroup in the U.S. (U.S. Census Bureau, 2009).

Research has shown the above negative outcomes have a significant degree of comorbidity, and also share overlapping risk factors (Hawkins, Catalano, & Miller, 1992; Kessler et al., 2005). Economic hardship and related family dysfunction contribute to an array of problems for MA youth, including substance use, deviant behavior, school disengagement, and depression (Gonzales, Germán, & Fabrett, in press). MA youth in poor urban communities also experience numerous stressors outside the family that challenge their coping abilities and heighten risk for multiple problems (Barrera et al., 2006; Tolan et al., 1997). Prevention scholars have called for interventions that target common risk and protective processes because of their potential to have broad positive impact across domains of functioning (Institute of Medicine; O'Connell, Boat & Warner, 2009). This study reports the efficacy trial of the Bridges to High School Program / Proyecto Puentes a la Secundaria, a broadly aimed prevention program that builds youth and family competencies to reduce multiple problems following transition to middle school. This transition is associated with increased risk for school disengagement and related mental health problems in poor, urban communities (Seidman et al., 1994). Bridges/ Puentes targets youth attending central urban schools and specifically aims to strengthen the following individual and family processes expected to mediate intervention effects on multiple outcomes: (a) effective parenting, (b) adolescent coping efficacy, (c) adolescent school engagement, and (d) family cohesion.

Theoretical Background for Broad Multicomponent Approach

Bridges/Puentes is a multicomponent intervention that brings parents and students together in the school setting to strengthen the home-school connection and develop competencies for successful transition through middle and high school. Program design was guided by an ecodevelopmental framework (Szapocznik & Coatsworth, 1999) which recognizes that developing youth need to adapt to multiple social contexts simultaneously, including families, peers, neighborhoods, and schools, as well as unique cultural factors, such as immigration and acculturation. For example, school engagement can be a challenge for MA youth who must envision positive futures in a context of low wage jobs, unemployment, and reduced expectations (Oyserman & Markus, 1990). These constraints combine with other features of poor, urban communities, such as the availability of drugs, deviant peers, and parents' diminished capacity for effective parenting, to reduce investment in education and increase risk for mental health problems (Dishion et al., 2004). Many MA youth also encounter challenges of learning English, acculturating to U.S. schools, and a strong sense of obligation to assist their family (Fuligni et al., 1999). Their parents often have a poor understanding of U.S. schools and are ill-prepared to monitor their progress or intervene when they have difficulties (Suarez-Orozco et al., 1995). Bridges/Puentes is unique because it integrates parenting, adolescent coping, and family strengthening intervention strategies previously used to impact the putative mediators described above (e.g., Spoth, Redmond & Shin, 2001; Hawkins et al., 1992; Weisz et al., 1992), yet also strengthens MA youth and family skills to address these cultural challenges (e.g., Martinez & Eddy, 2005). Bridges/Puentes also is unique because it targets both internalizing and externalizing, and is implemented in the school context to promote academic engagement.

This study examined whether Bridges/Puentes improved targeted mediators at posttest (7th grade), and whether change in these mediators accounted for program effects on mental health and academic outcomes one year later (8th grade). As one of the first fully randomized trials of a culturally competent family intervention targeting MA adolescents' mental health, and the first to target both U.S.-born and immigrant families, this study addresses a significant gap in prevention science and health disparities research. One year follow-up and tests of mediation also advance knowledge about whether the targeted mediators can impact MA adolescent mental health and achievement during the middle school transition.

Moderation by Baseline Risk and Linguistic Acculturation

Information on inter-individual variability in program effects is important for dissemination because it identifies subpopulations that should be recruited due to probability of benefit, and those that need added components to boost effects. This study examined differential effects due to family linguistic acculturation. Recruitment and randomization were stratified on the dominant language preference of families to ensure participants could communicate with other group members. Since family language preference was highly correlated with parent and adolescent acculturation ($r = .89$ and $r = .70$, respectively; Dillman Carpentier et al., 2007), this design allowed us to test whether family acculturation moderated efficacy. Although program content was identical for all groups, acculturation-related differences between English and Spanish groups could make them differentially responsive to program components. Moderation also could result from process differences in the language groups. For example, we previously found higher rates of attendance for Spanish-speaking families (Gonzales, Dumka, Dearthoff, Jacobs-Carter, & McCray, 2004). In a meta-analysis of adult treatment studies, Griner & Smith (2006) found Latinos treated in Spanish benefit from culturally adapted interventions to a greater extent than those treated in English. Although differential effects due to acculturation-related variables have been examined in a few prevention trials, findings have been inconclusive (Martinez & Eddy, 2005).

Preventive interventions often show program \times baseline interactions with those at highest risk at baseline benefitting most from the program (Brown & Liao, 1999; Reid & Eddy, 2002). Accordingly, this study also evaluated whether Bridges/Puentes effects were moderated by baseline risk, defined as lower levels of competence on targeted mediators. This definition of risk is especially relevant for MA families because there is growing evidence this population varies substantially in their exposure to poverty-related risks and their corresponding need for the skills targeted in the program. For example, some families may be less vulnerable to family disruptions because they are protected by family and community cultural values that help maintain positive family relationships and positive parenting (Flores, Tschann, Marin & Pantoja, 2004; Gonzales, Coxe, Roosa, White, Knight, Zeiders, & Saenz, 2011). Tests of moderation by baseline risk provide a test of whether Bridges/Puentes has differential benefits for families according to their specific vulnerabilities.

Hypotheses

First, it was hypothesized that families participating in Bridges/Puentes would show greater improvements relative to families in a low-dosage control group on measures of our putative mediators: effective parenting, adolescent coping efficacy, adolescent academic engagement, family cohesion. Second, it was hypothesized that adolescents participating in Bridges/Puentes would evidence lower levels of externalizing and internalizing symptoms, substance use, and school disciplinary actions, and higher grades in 8th grade. Third, it was hypothesized that changes in putative mediators would account for intervention effects on

8th grade mental health and academic outcomes. Fourth, it was hypothesized that intervention effects would be stronger for families at greater risk due to lower levels of baseline competence on targeted mediators. Fifth, it was hypothesized that families randomized to Spanish groups would show stronger effects than those in the English groups.

Methods

Participants

The sample included 516 MA families with a student attending the 7th grade at recruitment in four urban schools chosen because they had: (a) a high proportion of MA students (69% to 82%); (b) availability of both English and Spanish speaking families (25% enrolled in Limited English Proficiency classes); (c) similar size (982 to 1141 students) and structure (all served 7th and 8th graders only); and (d) 75% to 85% of students eligible for free or reduced lunches. Of eligible families, 62% enrolled and completed pretest interviews (Dillman Carpentier, 2007).

Procedures

Recruitment and randomization—All study procedures were approved by the University's Institutional Review Board. Three cohorts of families were recruited and randomized by the research team, not the schools (see Figure 1). In the first semester of each school year, Hispanic 7th graders were randomly selected from school rosters with data indicating 'primary language spoken in the home' used to select English and Spanish recruitment samples. A phone call described the intervention and determined eligibility according to the following criteria: the adolescent was of Mexican descent, at least one caregiver of Mexican descent was interested in participating, and the family was willing to be randomly assigned to the 9-week intervention or a brief workshop (control group). Families that agreed to participate designated the predominant language used in their family and this determined their placement in either the English or Spanish subsample. When available, both caregivers were invited to participate in the intervention; only those that agreed were interviewed at pretest (W1) and subsequent follow-ups. At the beginning of the second semester (January), the study methodologist used a random number generator programmed with the appropriate probabilities to randomize all families that completed W1 data collection and were still eligible. A greater proportion of families were randomized to the intervention than control to ensure adequate intervention group size at each school. A greater proportion of English families were randomized to the intervention than control (70/30) compared to Spanish families (60/40) because pilot testing showed higher retention for Spanish families (Gonzales et al., 2004). School personnel were kept blind to condition assignment.

The final sample included 254 adolescent males (49.2%) and 262 females (50.8%) with an average age of 12.3 years ($SD=.54$). The majority were in two-parent families (83.5%, $n=431$). Mothers in 95.7% ($n=494$) of the families participated; 284 of these participated with fathers (57.5%) and 210 (42.5%) were the only caregivers. Fathers in 55.8% ($n=288$) of the families participated; 284 participated with mothers (98.6%) and 4 (1.4%) were the only caregivers. English ($n=241$) and Spanish ($n=275$) samples differed significantly on several demographic variables (see Table 1). Families in the Spanish sample had lower incomes, were substantially more likely to be immigrants, and were less acculturated than those in the English sample.

Data collection—Data collection occurred prior to the intervention (W1), immediately after the intervention (W2), and one year after the intervention (W3). Parent and adolescent data were collected through in-home, computer-assisted interviews. Each family member

received \$30 for each assessment. Data were collected for each adolescent from two teachers of state-mandated courses (Language Arts and Math). Teachers received \$10 for each assessment and were blind to random assignment. Teacher data were obtained for 99% of study participants at W1 and 82% at W3. The school district provided data on disciplinary actions and grades.

Intervention condition—Bridges/Puentes employed three primary components: (a) a parenting intervention; (b) an adolescent coping intervention; and (c) a family strengthening intervention. A school liaison also was available to help families apply program skills to address school related problems. Components were delivered in 9 weekly evening group sessions at the adolescents' schools and 2 home visits (pre-intervention and mid-program). The 9 sessions included separate simultaneous 1.25-hour groups for adolescents and parents followed by a .75-hour conjoint family session. All components were designed to optimize cultural competence and are described in greater detail by Gonzales, Dumka, Mauricio, & Germán, 2007).

Parent sessions: The parenting group intervention aimed to increase: (a) effective parenting practices, (b) family cohesion, and (c) promotion of school engagement. This component used active learning strategies to enhance parenting by increasing supportive parenting, positive reinforcement, appropriate discipline, and monitoring, and by limiting harsh parenting. Parent sessions sought to increase family cohesion by strengthening the co-parenting alliance in two-parent families and decreasing parent-adolescent conflict. To enhance school engagement, the intervention aimed to increase parents' understanding of school expectations, improve parent-teacher communication, and strengthen parenting practices associated with academic success.

Adolescent sessions: The adolescent groups aimed to increase adolescents' (a) coping efficacy; (b) academic engagement; and 3) family cohesion. Active learning methods were used to teach a range of coping strategies to manage interpersonal and school stressors, and group processes were structure to enhance coping efficacy. Adolescents explored possible selves and pursue relevant goals to increase academic motivation and engagement. Adolescents also learned strategies to balance family relationships and obligations with school, activities, and friends.

Family sessions: Family sessions that immediately followed the separate parent and adolescent groups aimed to: (a) increase family cohesion; and (b) provide opportunities to practice skills taught in adolescent and parent groups. Modeled on prior family interventions (Spoth et al., 2001), each session provided structured opportunities for mutual enjoyment, positive communication, and bicultural understanding.

Interventionist training: Group leaders (GLs) led parent or teen sessions in two-person teams. Sixty-nine percent were Latino/a (predominantly MA), 65% were bilingual, and all had prior experience working with MA families. GLs had varied professional (e.g., social service providers, teachers) and educational backgrounds (58% masters, 42% bachelors degrees). GLs received a comprehensive program manual, 45 hours of pre-service training, 3 hours of weekly training, and 2 hours of weekly supervision during the intervention. Across cohorts, GLs received a median score of 90% correct on tests of session content prior to each session.

Fidelity: Videos for all intervention sessions were coded for adherence by independent raters, with an average inter-rater agreement of 90%. Results indicated 91% of adolescent

and 88% of parent program components were delivered. Control groups were not videotaped.

Attendance: Of families randomized to Bridges/Puentes, 64% attended at least 5 and 33% attended all 9 sessions. Spanish families attended significantly more sessions (Dillman Carpentier, 2007); mean number of sessions was 5.81, 4.50, and 6.15, respectively for mothers, fathers and adolescents in the Spanish sample, and 4.69, 3.57, and 4.91, respectively, for mothers, fathers, and adolescents in the English sample. These attendance statistics include families that did not attend any sessions (11.29% Spanish, 22.80% English).

School liaison: The school liaison (SL) was a Latino, bilingual masters level prevention expert with experience working in schools. The same SL was hired and paid on an hourly basis to work across schools with all families wanting additional help to address school related difficulties (e.g., class grades, school disciplinary actions, bullying). The SL's goal was not to intervene for families, but rather to increase parents' and adolescents' efficacy by coaching them to use the skills taught in the intervention. Families were introduced to the SL during the 3rd family group session and thereafter were self-referred or referred by their group leaders if they needed SL help to address a specific school concern. Only 33 families (9.8%) consulted the SL and there were no differences between English and Spanish groups in their use of the SL.

Control condition: Parents and adolescents jointly attended a single 1.5 hour evening workshop that was conducted at the school on a different night and by different GLs than the intervention. Participants received handouts on school resources, discussed barriers to school success, and developed their own family plan to support middle school success. In contrast to the intervention, this workshop did not teach specific parenting or coping skills. The control workshop was rated positively by parents (mean=4.44, SD=.52; 1=awful, 5=wonderful) and teens (mean = 4.34, SD = .78) at the posttest interview, and did not differ significantly from parent (mean=4.51, SD=.55) and teen ratings (mean = 4.39, SD = .79) of the intervention.

Measures

Multiple agents were used to assess mental health and academic outcomes. Adolescents, parents, and teachers reported on externalizing and internalizing symptoms. School archival records were used for grades and school discipline actions. Substance use was assessed only by adolescent report based on evidence that they are the single best reporter for this outcome (Fisher et al., 2006). For the current analyses, each mediator was assessed by one reporter (e.g., mothers reported on maternal parenting, fathers reported on paternal parenting, adolescents reported on their coping efficacy). With exceptions noted below, all scales were tested for factorial invariance in relation to language of the interview. A sequence of nested multiple-group CFA models were fit to W1 item data for each scale, using Mplus 3.1 (Muthén & Muthén, 1998). Models examined increasingly stringent levels of invariance: configural, metric, strong, and strict (Millsap, 2011). Items were removed if they showed substantial group differences in loadings, intercepts, or unique factor variances. Resulting scales met requirements for strong invariance. Alpha coefficients are reported in Table 2.

Mediators

Effective parenting—Mothers and fathers reported on five dimensions of their own parenting using scales previously validated with MA families (Barrera et al., 2006; Dumka, et al., 2009; Formoso, Gonzales & Aiken, 2000; White, Roosa, Weaver & Nair, 2009). All scales used a response set ranging from 1 (almost never or never) to 5 (almost always or

always). Supportive parenting was measured with 7 items from a parent self-report adaptation of the Inventory of Parent and Peer Attachment (Armsden & Greenberg, 1987; e.g., “When my child was angry about something, I tried to be understanding”). Positive reinforcement was assessed with 11 items that asked about parents’ use of verbal expressions of appreciation, affection, and affirmation, and giving tangible rewards (e.g., “I rewarded my child for doing something well by giving [him/her] an extra privilege”). Harsh parenting was assessed with 5 items (e.g., “I screamed at my child when [he/she] did something wrong”) adapted from the Children's Report of Parental Behavior Inventory (CRPBI; Schaefer, 1965). Monitoring was assessed with 7 items adapted from Small and Kerns (1993; e.g., “I knew how [TC] was spending his/her time”). Consistent discipline was assessed with 11 items adapted from the Inconsistent Discipline subscale of the CRPBI (Schaeffer, 1962) with items added to assess rule enforcement (e.g., “When I made a rule for my child, I made sure it was followed”).

Family cohesion—Adolescents reported on family cohesion with 8 items from the FACES II scale (Olson, et al., 1982; e.g., “Family members were supportive of each other during difficult times”) that ranged from 1 (almost never or never) to 5 (almost always or always). The scale has shown good reliability and relations with MA children's mental health (Deng et al., 2006).

Adolescent coping efficacy—Adolescents completed the 8-item Coping Efficacy Scale that has been used in prior research as a mediator of intervention effects on psychological outcomes (Sandler, Tein, Mehta, Wolchik, & Ayers, 2000), and in research with MA adolescents (Murphy et al., 2008). Adolescents responded to items (e.g., “Overall, how successful have you been in handling your problems?”) on a scale from 1 (not at all good) to 4 (very good).

School engagement—The School is Important Now Scale (Lord et al., 1994), the Academic Liking Scale (Roeser et al., 1994), and the Importance of Education Scale (Smith et al., 1997) were combined to create the 9-item School Engagement Scale, which has good psychometric properties and expected relations with indicators of academic resilience and adolescent externalizing (Dumka, Gonzales, Bonds, & Millsap, 2009). Adolescents responded to items (e.g., “It is very important to finish high school” and “I like school a lot”) on a scale from 1 (not at all true) to 5 (very true).

Outcomes

Substance use—Adolescents reported their use of tobacco, alcohol, marijuana, and other illegal substances based on 6 questions taken from the 2001 Youth Risk Behavior Survey (YRBS, 2001) that were each coded to form dichotomous categories of lifetime use (0 = no use, and 1 = use). The total number of substances ever used was derived for each adolescent.

Internalizing and externalizing symptoms—Internalizing and externalizing symptoms were assessed separately by adolescent report on the Youth Self Report (YSR), by mothers and fathers on the Child Behavior Checklist Parent Form (CBCL-PF), and by the average of two teacher reports on the Child Behavior Checklist Teacher Report Form (CBCL-TRF). Because these are standard scales (Achenbach, 1991) that have been validated extensively with diverse populations, they were not subjected to language invariance analyses.

Grade point average (GPA)—Archival school data included separate letter grades ranging from 0 (F) to 4 (A+) for the four classes required for all students (Language Arts,

Math, Social Studies, Science). These four grades were averaged to yield an overall GPA for each student.

School disciplinary actions—Discipline records were collected from the school district or directly from schools if students had moved out of the district. The total number of disciplinary actions (e.g., suspension, detention) was determined across 9 categories: substance use, fighting, assault, gang-related, weapons, harassment, property, disorderly conduct, and other events.

Data Analyses and Overview

All analyses were performed using Mplus 5 (Muthén & Muthén, 1998-2007). First, we used ANCOVAs to examine intervention effects on W2 mediators. Next, we examined intervention effects on W3 outcomes using ANCOVAs and path models to test mediated effects. Three sets of data were analyzed by reporter: adolescents (n=516), mothers (n=494), and fathers (n=288). Missing data were handled using full information maximum likelihood (FIML; Arbuckle, 1996). Language was the only baseline variable found to be associated with missingness and was included in all analyses for missing data adjustments. Intent to treat analyses retained all participants who were assigned to the intervention or control conditions regardless of attendance. Preliminary analyses examined school, cohort, and gender effects, along with the interactions between these variables and the intervention. No school or cohort effects were found, and few gender effects were found; these analyses are not reported. An alpha level of .05 was used for significance, with “marginal significance” defined as an alpha between .05 and .10.

Testing intervention effects on mediators—Analysis of covariance (ANCOVA) examined intervention effects on each W2 mediator: Parenting (5 dimensions each for mothers and fathers), adolescent Coping Efficacy, adolescent Academic Engagement, and Family Cohesion. The intervention status (binary), baseline mediator score, adolescent gender, and language variables (binary) were included as predictors. Three two-way interactions (intervention by baseline mediator, intervention by language, and baseline mediator by language) and a single three-way interaction (baseline mediator by intervention by language) were included. The baseline mediator was centered prior to creating interaction terms (Aiken & West, 1991).

The following principles were used for all ANCOVAs. Interactions were evaluated before main effects and, if not significant, were dropped from the models. Significant intervention by language interactions triggered separate evaluations of lower order effects by language (these models included the intervention by baseline mediator interaction in cases of a significant three-way interaction). Finally, a significant intervention by baseline mediator effect was probed (in the full sample or language subsamples, when relevant) by evaluating the intervention effects separately at the 15th and 85th percentiles on the baseline mediator distribution. Effect sizes for intervention main effects were calculated as the difference between the estimated intervention and control group means on the mediator, divided by a pooled estimate of the standard deviation of the mediator. Effect sizes for probed baseline by intervention interactions were calculated as differences between estimated intervention and control mediator scores, given the baseline score at the desired percentile, divided by an estimated pooled standard deviation for the mediator scores, again conditional on the baseline percentile.

Testing intervention effects on adolescent outcomes—Intervention effects on W3 outcomes were first evaluated using the same ANCOVA procedure described above. The intervention status, baseline score on the outcome, gender, and language variables, and the

corresponding two and three-way interactions were included as predictors of 11 W3 outcome variables (Substance Use, 4 reporters of Internalizing and Externalizing, GPA, and School Disciplinary Actions).

Testing mediated effects on adolescent outcomes—Significant W2 mediators were then used in path models to test mediated effects of intervention status on W3 outcomes. The sample used for each mediation model was determined by the reporter of the mediator and the significant language subsample, when appropriate. Figure 2 displays the mediation model used in all analyses, with the various paths denoted by letters. Gender, baseline mediator, and baseline outcome scores were centered before creating interaction terms. Given adequate fit for the model in Figure 2, path coefficient estimates were evaluated for significance. If the a and b paths were at least marginally significant, mediated effects of the intervention were evaluated by forming the product of the a and b path coefficients and evaluating it for significance using a confidence interval produced by the PRODCLIN program (MacKinnon, Fritz, Williams, & Lockwood, 2007). Evaluation of this mediated effect was undertaken only after consideration of the interaction paths (g, h, i, k). If any of these paths was significant, mediated effects were evaluated conditionally through a re-centering procedure that examined effects at the 15th and 85th percentiles of the moderator distribution.

Results

Preliminary Analyses

Table 3 gives descriptive statistics on W1 and W2 mediators and Table 4 gives descriptive statistics on W1 and W3 outcomes for the adolescent, mother, and father samples. Each Table includes statistics for the full sample (languages combined) and for the separate English and Spanish samples. Correlations among all variables are available online for each of these samples (Tables A1 to C3). There were no differences between intervention conditions on mediators or outcomes at W1. The English sample reported higher average levels of problem outcomes than the Spanish sample at W1 and W3, and across all three reporters. Although language group differences were fewer and smaller on the mediators, adolescents in the Spanish sample reported higher levels of family cohesion and their fathers reported lower frequencies on every parenting dimension compared to the English sample.

Intervention Effects on Mediators

ANCOVA results for W2 mediators are shown in Table 5. Of the 13 mediators tested, 9 produced significant intervention effects. Three mediators produced significant main effects that were all in the expected direction, with the intervention condition associated with higher scores at posttest (W2): Family Cohesion in the English sample ($d=0.13$), Father Supportive Parenting in the full sample ($d=0.46$), and Father Consistent Discipline in the Spanish sample ($d=0.47$). Intervention effects in the form of interactions with the baseline mediator were found for 6 mediators and were probed using procedures described earlier; these were Mother Positive Reinforcement, Mother Harsh Parenting, Mother Monitoring, Father Monitoring, Adolescent Coping Efficacy, and Adolescent School Engagement.

Five mediators showed significant intervention effects at one of the two percentiles, as shown in Table 4. The positive intervention effect on Mother Positive Reinforcement ($d=2.58$) was significant for the full sample for mothers who were low (15th percentile) on Positive Reinforcement at baseline. The significant effect on Mother Harsh Parenting was found for those with higher baseline Harsh Parenting in the Spanish group ($d=5.33$). Positive intervention effects on Mother Monitoring were found for English mothers who were low on Monitoring at baseline ($d=2.19$). Finally, positive intervention effects on Father Monitoring

were found for Spanish fathers with high levels of Monitoring at baseline ($d=3.16$). The positive intervention effect on adolescent School Engagement was significant for Spanish adolescents who were low on School Engagement at baseline ($d=2.77$). For adolescent Coping Efficacy, the intervention effect in the significant Spanish sample failed to reach significance at either percentile in the ANCOVAs.

Intervention Effects on Adolescent Outcomes

Table 6 presents results of the ANCOVAs testing intervention effects on the 11 W3 outcome variables. Five outcome variables showed significant moderation of the intervention effect by baseline: Substance Use, adolescent report Externalizing, father report of Externalizing, teacher report of Internalizing, and GPA. Two variables showed three-way interactions for intervention, baseline status, and language: adolescent and teacher reports of Externalizing. These effects are summarized below with the mediation effects.

Table 7 presents results of the path model analyses testing mediated effects on W3 outcomes. Father Support was not tested because it was not related to any W3 outcome variables. The remaining 8 significant mediators appear in Table 7 with significant relations to at least one W3 outcome. The column headed “ $a \times b$ ” gives the standardized path coefficient and significance for the mediated effect of the intervention on the outcome. Significant direct intervention effects were also found in these analyses, as indicated in the column labeled “c.” The majority of mediation effects in Table 7 were moderated by the baseline mediator; a few were moderated by the baseline outcome but are not reported in Table 7. Parameter estimates given in Table 7 for the a , b , c , and $a \times b$ path coefficients are based on probes using re-centering.

Substance use—The ANCOVAs showed a significant intervention by baseline interaction effect on Substance Use. Probes showed lower Substance Use at W3 in the intervention group compared to the control group for adolescents who engaged in high levels (85th percentile) of baseline Substance Use ($d=3.65$). Mediation path modeling showed three significant mediators that accounted for decreased substance use in the intervention group. A significant mediated effect of the intervention through Mother Positive Reinforcement was found for those with low baseline Positive Reinforcement, through Mother Harsh Parenting in the Spanish subsample for those with high baseline Harsh Parenting and for those with low baseline substance use, and through Coping Efficacy for Spanish adolescents with low baseline Coping Efficacy. In all of these mediated pathways, adolescents in the intervention group showed lower levels of Substance Use at W3 than the control group.

Internalizing—The ANCOVAs did not reveal any intervention effects on adolescent or mother reports of Internalizing. However, path modeling showed an indirect (mediated) effect on mother report through School Engagement for Spanish adolescents low on baseline School Engagement, and through Mother Harsh Parenting for those with high baseline Harsh Parenting. In both cases, the intervention group had lower W3 internalizing scores than the control group.

The ANCOVAs showed a marginally significant intervention effect on father report of Internalizing at W3 ($d=0.26$), with the intervention group lower than the control group. No significant mediated effects for the intervention on father report of Internalizing were found.

A significant intervention by baseline interaction was found for teacher report of Internalizing at W3. Adolescents in the intervention group with high baseline Internalizing were lower on teacher report of Internalizing at W3 than the control group ($d=2.35$). Mediation modeling found three pathways, but only for the Spanish sample; in all three

cases, the effects were associated with lower W3 Internalizing in the intervention group. A mediated effect through Coping Efficacy was found for Spanish adolescents low on baseline Coping Efficacy; through Mother Harsh Parenting for Spanish adolescents with high baseline Harsh Parenting; and through School Engagement for Spanish adolescents low on baseline School Engagement.

Externalizing—The ANCOVAs showed a significant three-way intervention by baseline status by language interaction for adolescent report of Externalizing. For Spanish adolescents reporting higher baseline Externalizing, those in intervention group reported higher levels of Externalizing than the control group at W3 ($d=2.96$). Mediation path modeling showed three significant pathways for adolescent report of Externalizing. For Spanish adolescents, School Engagement significantly mediated intervention effects. Whereas adolescents in the intervention group with low baseline School Engagement had lower Externalizing at W3, those with higher baseline School Engagement had higher Externalizing at W3 than the control group. For English adolescents, an intervention effect mediated through Mother Monitoring was found in the English group for those with low baseline Monitoring, and through Family Cohesion for adolescents low on baseline externalizing. In both cases, adolescents in the intervention group reported lower W3 Externalizing than the control group.

The ANCOVAs showed a significant main effect on mother report of Externalizing at W3, with significantly lower Externalizing in the intervention at W3 ($d=0.32$). Path modeling revealed mediation through Mother Harsh Parenting at high levels of baseline Harsh Parenting.

There was an intervention by baseline interaction for father report of Externalizing. For adolescents with low baseline Externalizing, fathers reported lower W3 Externalizing in the intervention group compared to the control group ($d=3.49$). Path modeling found mediation through father Monitoring for Spanish adolescents with high baseline Monitoring.

The ANCOVAs showed a significant intervention by baseline status by language interaction for teacher report of Externalizing at W3. Probes within the English sample found adolescents in the intervention group with low baseline Externalizing were higher on W3 Externalizing than the control group ($d=3.13$). Path modeling did not reveal any mediators for this effect, however, three pathways of mediation showed positive effects for the Spanish sample. Mediated effects for Spanish adolescents were found through Father Consistent Discipline, through Mother Harsh Parenting in families with high baseline Harsh Parenting, and through School Engagement for adolescents with low baseline School Engagement. In all three cases, adolescents in the intervention group were lower than the control group on teacher report of Externalizing at W3.

GPA—The ANCOVAs showed a significant intervention effect on W3 GPA. Intervention group adolescents with low baseline GPAs had higher GPAs at W3 than the control group ($d=2.97$). Path modeling revealed three significant mediators of this effect for the Spanish sample. Intervention effects on W3 GPA were mediated through Mother Harsh Parenting for Spanish adolescents with high Harsh Parenting and for those with low GPAs at baseline, through Father Monitoring for Spanish adolescents with high baseline Monitoring, and through School Engagement for Spanish adolescents low on baseline School Engagement.

School disciplinary actions—The ANCOVAs showed a significant main effect on W3 School Disciplinary Actions, with fewer Disciplinary Actions in the intervention than the control group ($d=0.34$). Path modeling showed a mediated effect through Mother Positive Reinforcement for adolescents whose mothers reported low baseline Positive

Reinforcement, with the intervention group having fewer School Disciplinary Actions than the control group.

Clinical Significance

We evaluated clinical significance using outcomes that had interpretable scaling units. Two such outcomes illustrate meaningful effects at the one-year follow-up. For GPA, the significant intervention effect ($d = 2.97$) at the 15th percentile on baseline GPA showed that, for adolescents with an average baseline GPA of 1.3 (D-), 8th grade GPA was estimated at 2.39 (C+) for adolescents in the intervention compared to 1.53 (D) for the control group. For Substance Use, the significant program effect ($d = 3.65$) at the 85th percentile on baseline Substance Use showed that, for adolescents who had experimented with at least 1 substance by 7th grade, estimated lifetime use in 8th grade was 1.1 substances for the intervention group compared to 2.18 for the control group.

Discussion

This randomized prevention trial examined whether a family intervention delivered in early adolescence can reduce risk for multiple problem outcomes that represent significant public health burdens for MA youth in the U.S. Findings showed one-year Bridges/ Puentes effects on all five outcomes assessed at one year posttest, and also showed these effects were mediated by several competencies specifically targeted in the program. However, the majority of intervention effects were moderated by language and baseline risk, and varied depending on whether adolescents, parents or teachers reported on the outcome. Although findings showed some evidence of adverse effects, the bulk of evidence supports the efficacy of Bridges/Puentes to decrease multiple problem outcomes and increase grades for MA adolescents.

Bridges/ Puentes reduced mother and father report of externalizing symptoms, teacher and father report of internalizing symptoms, adolescent report of substance use, and school grades and disciplinary actions across both language samples. Additional indirect (mediated) effects were found to reduce mother report of internalizing in the Spanish sample. Effects on substance use, teacher report of internalizing, and GPA were significant for those with poorer baseline functioning on these outcomes. Consistent with previous prevention trials showing program by baseline interactions (Brown & Liao, 1999; Reid & Eddy, 2002), these findings have public health significance because those at greatest risk are receiving the greatest benefit. Although gender effects were not a focus of the current study, preliminary analyses showed few gender differences in program effects, perhaps because extensive pilot testing and program revisions were conducted during development to ensure the program was appealing and relevant for both male and female adolescents.

Several findings were corroborated across reporter and with archival records. Findings based on school discipline records corroborated mother and father reports showing the intervention reduced externalizing behaviors. These findings and those for internalizing also indicate program benefits were found across contexts (i.e., at home and school). However, findings based on adolescent and teacher report of externalizing showed adverse program effects, albeit for different subgroups. Adverse effects were found on adolescent self-report of externalizing for those reporting higher baseline scores in the Spanish sample. For the English sample, adverse effects were found on teacher report, but only for those initially low on baseline externalizing.

The possibility for iatrogenic effects of group based interventions has been shown before in interventions that place homogenous groups of deviant peers together to receive services (Dishion, McCord, & Poulin, 1999). Dodge, Lansford and Dishion (2006) suggest this is due

to deviant peer contagion as well as the process of deviancy training by which externalizing behavior is enhanced through peer modeling and positive reinforcement. Although Bridges/ Puentes did not target youth at risk for problem behavior, it was conducted in high risk schools. Thus, it is possible similar processes occurred to explain these effects. However, these findings must be interpreted in the broader context of results that show far more benefits on targeted mediators and outcomes, including indirect benefits on adolescent and teacher reports of externalizing for families showing positive change on mediators. Further, it is possible these findings reflect temporary increases in peer influenced risk-taking, and will not lead to more serious antisocial outcomes over time.

Mediators of Intervention Effects

Bridges/ Puentes produced improvements in all four targeted competence domains: parenting, adolescent coping efficacy, adolescent school engagement, and family cohesion. As hypothesized, specific effects varied across language groups and were generally stronger for the Spanish sample. The majority of effects on mediators (6 of 9) were moderated by baseline risk and, in all but one case (father monitoring), those at higher risk derived greater benefit. This pattern indicates that families benefited in different ways from this broadly focused intervention, depending on their specific needs and vulnerabilities.

Analyses on the full sample, collapsed across language, showed higher levels of father supportive parenting in the intervention compared to the control group, and higher levels of mother positive reinforcement for mothers initially reporting lower levels of this skill at baseline. Although father supportive parenting did not show any effects on 8th grade outcomes, maternal positive reinforcement was a significant mediator that accounted for fewer school discipline problems and substances use in the intervention compared to the control group in 8th grade.

Effects for Spanish-dominant families—The Spanish sample showed several additional effects not found for the English sample; increased coping efficacy and school engagement for adolescents low on these competencies at baseline; decreased mother harsh parenting for those high on baseline harsh parenting; increased father consistent discipline, and increased father monitoring for fathers reporting initially higher levels of monitoring. Mediation analyses showed that intervention effects on these mediators in the Spanish group accounted for subsequent improvements on multiple outcomes in 8th grade.

Two mediators in particular, mother harsh parenting and adolescent school engagement, showed broad effects for the Spanish sample. Program-induced changes on mother harsh parenting predicted lower rates of substance use, externalizing (mother and teacher report), and internalizing (mother and teacher report), and higher grades in 8th grade. These findings point to active intervention ingredients and suggest that intervention strategies that reduce harsh parenting are core components that should be preserved in future dissemination efforts.

School engagement also was a core program mediator that demonstrated broad effects to increase grades and reduce externalizing (adolescent and teacher report) and internalizing symptoms (mother and teacher report) for the Spanish group. These findings are consistent with long-term follow-up of the Raising Healthy Children Program (Hawkins et al., 2001), a classroom intervention implemented in first through eighth grade that found school bonding mediated effects on several critical outcomes in high school. Our study is one of the first to show effects on school engagement with a short-term, family intervention implemented in middle school, and for low acculturated MAs. However, the study also found the intervention decreased school engagement and, in turn, increased adolescent report of externalizing for Spanish youth that reported higher school engagement at baseline.

Although these youth were at lower risk academically, it is possible they were influenced negatively by their interactions with less academically-oriented peers, perhaps through similar processes of modeling and reinforcement associated with other group-based, peer interventions (Dodge et al., 2006).

Intervention effects on coping efficacy were only marginal when examined in the ANCOVA analyses. However, path modeling showed coping efficacy significantly mediated intervention effects on substance use and teacher report of internalizing for Spanish adolescents low on coping efficacy at baseline. These findings are consistent with theory and empirical findings that link adolescent coping with internalizing symptoms, such as anxiety and depression (Weisz, Rudolph, Granger, & Sweeney, 1992), and with substance use (Wills, 1986).

Fathers' parenting showed more limited evidence of mediation compared to mothers' parenting, perhaps due to the smaller size of the father sample or lower rates of father attendance. Fathers' monitoring mediated intervention effects to predict fewer externalizing symptoms (father report) and higher GPA in 8th grade, but only for families with high baseline scores on monitoring. Fathers in the intervention also showed increased consistent discipline that predicted fewer externalizing symptoms reported by teachers. Father effects were especially relevant to school grades and behavior, suggesting that father involvement in an intervention focused on academic success may be especially influential in motivating low acculturated MA youth.

A large number of effects were found on putative mediators for the Spanish but not the English sample, indicating that Latinos treated in Spanish may benefit from culturally adapted interventions more than those treated in English (Griner and Smith; 2006). It is possible the program was more sensitive to the unique needs of less acculturated, immigrant families and that these families were more motivated to attend and also better able to benefit from the program. Prior analyses with this sample have found that adolescent acculturation status and traditional family values predicted attendance, over and above language assignment (Dillman Carpentier, 2006). Together these findings indicate that Bridges/Puentes may fill an important need for immigrant families and that future program revisions are needed to strengthen engagement and program effects for more acculturated families. These results also raise the question of whether culture-specific interventions are optimal for more acculturated families that might not identify as closely with the cultural characteristics and unique challenges of MA families.

Effects for English-dominant families—The English group showed positive effects on two mediators, family cohesion and maternal monitoring, that were not significant for the Spanish group. Mediation analyses also showed that maternal monitoring and family cohesion had significant indirect effects on adolescent report of externalizing in the English sample. Although we did not advance mediator-specific hypotheses for expected language group differences, several studies have reported that more acculturated families are less harmonious and have parents that are more inclined to allow greater autonomy (e.g., less monitoring and supervision) as adolescents mature (Gonzales, Fabrett, & Knight, 2009). It is possible English families benefited from program components that emphasized maintaining family cohesion and monitoring because they had more to gain in these domains. These results highlight the importance of considering acculturation status when designing and testing interventions with Latino families.

Evidence of mediation was limited for the English group. Further, mediation for this group involved changes in parenting and family cohesion, and not on the mediators solely targeted in the adolescent group (coping, school engagement). Although this suggests the parenting

and family components may be the most important to retain for this group, it is possible there were other mechanisms of change operating in the adolescent groups that might account for positive intervention effects on GPA, internalizing (father and teacher report), and externalizing (father and teacher report) that were not explained by any of the mediators assessed in the current study. For example, the adolescent group explored possible selves and goal-setting in every session as a means to enhance coping and school engagement and these may be important mediators that could help to account for these broad effects.

Study Limitations, Strengths, and Implications

This initial trial of Bridges/Puentes achieved higher levels of recruitment than typical for low-income populations, and was implemented with fidelity with a sample that was diverse in terms of immigration and acculturation. Thus, it was well suited to evaluate efficacy and cultural variability in effects for MA youth. A limitation, however, was the confounding of language group assignment, immigration status, and family acculturation. Consequently, it is not possible to determine whether language effects are due to differences in group processes that occur as a result of group composition, or to differential vulnerability due to acculturation or immigration-related factors. Nevertheless, these findings add to a small but growing number of studies that report differential effects related to participant language or immigrant status.

The study used multiple reporters for the primary outcomes of interest, bolstering confidence in findings that were replicated across reporter. However, the study would be strengthened further with multiple reporters on the mediators, including observational measures to assess changes in parent-child and family interactions. Additional measures of adolescent coping and other competencies gained from the adolescent group, such as changes in adolescents' possible selves and goal pursuits (e.g., Oyserman & Markus, 1990), would have strengthened the study and potentially provided a better understanding of the mechanisms underlying program effects.

A final limitation inherent in a multicomponent intervention is the difficulty in isolating aspects of the program that are most beneficial. Although the current study aimed to identify mediators that could account for the preventive impact of the intervention, future analyses should examine relative and additive effects among mediators. A dismantling design also could address whether there is added benefit from including separate adolescent, parent, and family components. On the other hand, multicomponent interventions have been advocated for high risk populations because they can target risk and protective factors in multiple contexts (Greenberg et al., 1999) and enable participants to benefit differentially from those components most relevant to their needs (Henggeler et al., 2002).

Despite limitations, the current study makes important contributions to the literature. Results show that family interventions are a potentially important strategy to reduce mental health and academic disparities for the growing MA population. Other family programs have demonstrated effects on parenting and externalizing outcomes for Latino youth (Pantin et al., 2003), but this is the first to show effects on internalizing and academic outcomes and for low acculturated MAs, a group that experiences the greatest barriers to academic success in the U.S. These findings also advance theory by linking key mediators with multiple outcomes in a randomized experimental design. For example, evidence linking changes in school engagement with externalizing and internalizing (across reporters), supports the interrelated nature of school success and mental health and potential benefits of addressing both when intervening with Latino youth.

This study provides promising evidence that Bridges/Puentes modified an important web of risk and protective factors at a critical developmental transition. These changes are

hypothesized to reduce risk for future mental health and substance use disorders, and the emergence of negative outcomes across domains of functioning in mid to late adolescence. Although effect sizes were small at the one-year follow-up, several effects were moderated by baseline risk and were substantially stronger for high risk adolescents. Moreover, a number of prevention trials that have demonstrated change in theoretically supported mediators in childhood and early adolescence have shown effects increase over time and are even greater in late adolescence than at one-year posttest (e.g., DeGarmo et al., 2004; Hawkins et al., 2001). Hence, the meaningful effects of this trial will require longer follow-up, particularly through high school when mental health problems peak and lead to more serious consequences (Kessler et al., 2005).

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

We are grateful to the families who participated in this project and to the following districts and schools that collaborated: Cartwright School District, Phoenix Elementary District #1, Marc T. Atkinson Middle School, Desert Sands Middle School, Frank Borman Middle School, Estrella Middle School, and Phoenix Preparatory Academy. This research was supported by NIMH grant R01-MH64707. The content is solely the responsibility of the authors and does not necessarily represent the official views of the funding agencies.

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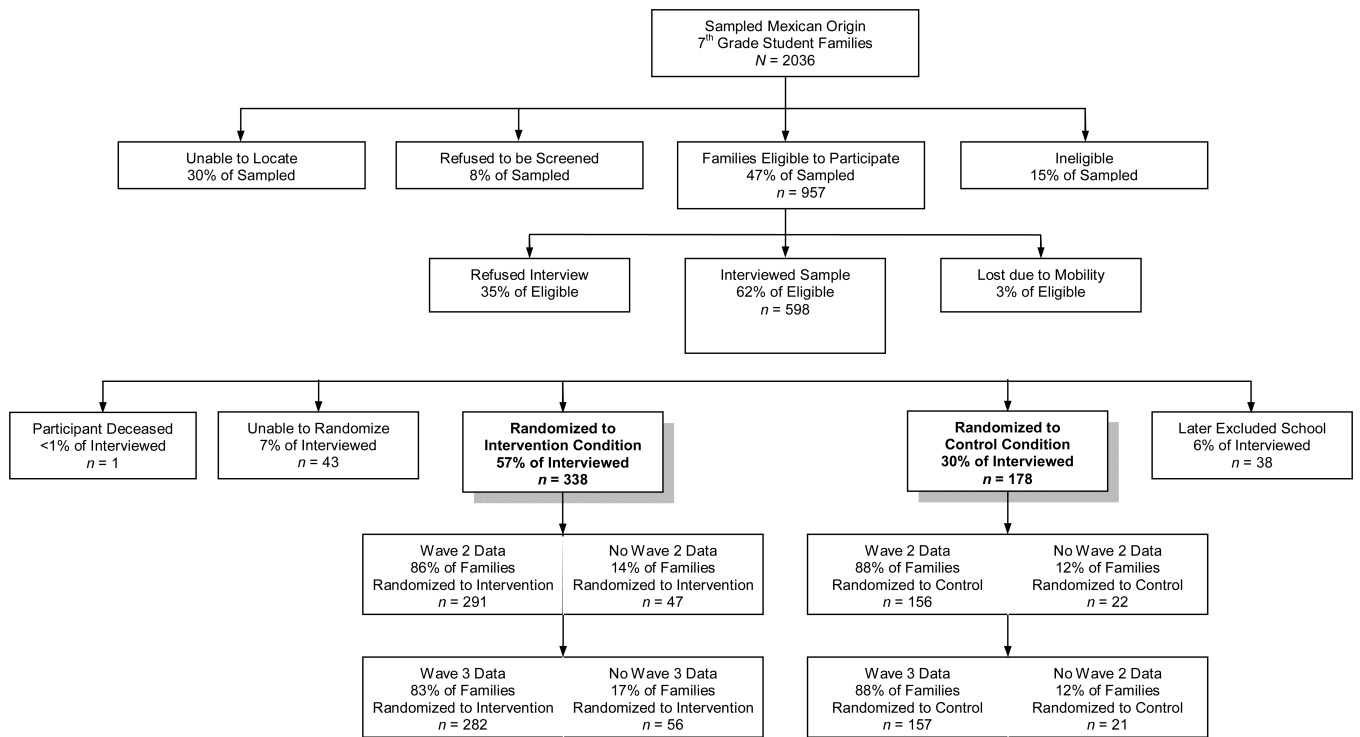


Figure 1.
CONSORT Flowchart of Bridges/ Puentes Recruitment, Enrollment, Randomization, and Assessments

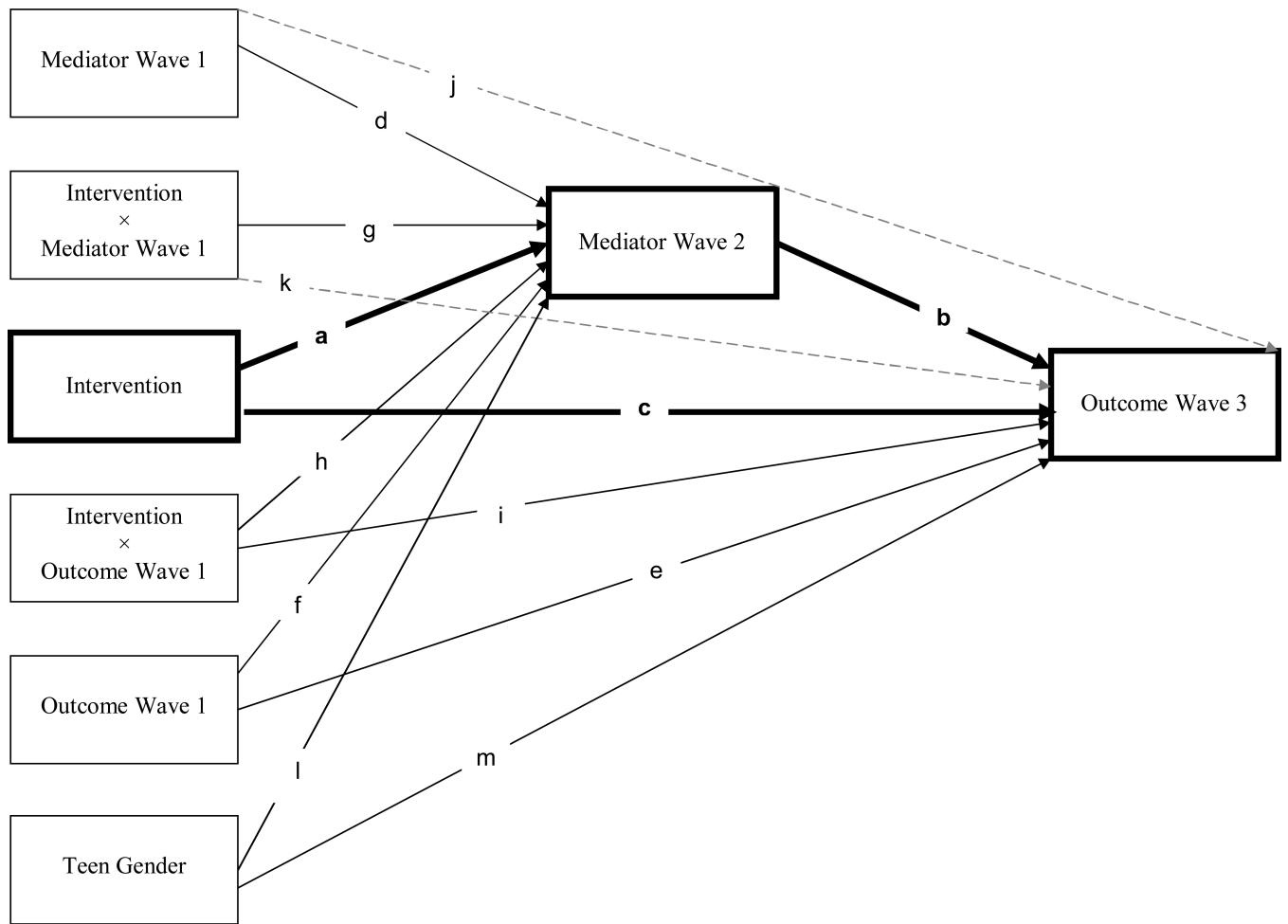


Figure 2. Mediation path model (denoted by bolded lines) with baseline covariates and intervention by baseline interactions.

Table 1

Demographic Differences between Spanish and English Samples

	<i>1</i> n	English	Spanish
Mean annual household income ^{2***}	513	\$42,090.40	\$32,359.22
Mean annual household income per capita ^{2***}	515	\$8,691.31	\$6,174.22
Percent of mothers born in Mexico ^{3***}	494	17.75%	96.58%
Percent of fathers born in Mexico ^{3***}	288	26.00%	98.00%
Percent of adolescents born in Mexico ^{3***}	516	0.00%	36.36%
Mean number of years Mexico born mothers resided in US ^{2***}	295	25.44	13.22
Mean number of years Mexico born fathers resided in US ^{2***}	195	21.67	12.84
Mother's score on ARSMA-II Anglo orientation scale ^{2***}	476	4.17	2.09
Father's score on ARSMA-II Anglo orientation scale ^{2***}	274	4.08	2.40
Adolescent's score on ARSMA-II Anglo orientation scale ^{2***}	511	4.20	3.68

¹ n = sample size on which tests of significance are based due to missing data

² Variables are continuous and tests of significance between group differences are based on t-test analyses.

³ Variables are binary and tests of significant between group difference are based on Pearson Chi Square statistic

*** p < .001. Acculturation was assessed by the Anglo orientation subscale of the Acculturation Scale for Mexican Americans-II (Cuellar, Arnold & Maldonado, 1995).

Table 2

Alpha Coefficients for mediators at waves 1 and 2 and for outcomes at waves 1 and 3.

Variable	Full (n = 516)			English (n = 241)			Spanish (n = 275)		
	W1	W2	W3	W1	W2	W3	W1	W2	W3
<i>Mediators</i>									
MR Supportive Parenting ^a	.82	.85	---	.84	.86	---	.80	.85	---
FR Supportive Parenting ^b	.85	.81	---	.87	.87	---	.83	.77	---
MR Positive Reinforcement	.88	.89	---	.89	.90	---	.88	.88	---
FR Positive Reinforcement	.89	.89	---	.89	.92	---	.89	.85	---
MR Harsh Parenting	.68	.69	---	.69	.69	---	.66	.70	---
FR Harsh Parenting	.64	.57	---	.64	.65	---	.63	.62	---
MR Monitoring	.78	.80	---	.81	.81	---	.76	.80	---
FR Monitoring	.82	.81	---	.82	.88	---	.82	.76	---
MR Consistent Discipline	.69	.68	---	.75	.69	---	.64	.67	---
FR Consistent Discipline	.76	.84	---	.75	.73	---	.74	.78	---
Family Cohesion	.82	.86	---	.84	.82	---	.81	.87	---
Coping Efficacy	.81	.83	---	.80	.83	---	.80	.85	---
School Engagement	.70	.73	---	.71	.71	---	.69	.75	---
<i>Outcomes</i>									
AR of Internalizing ^c	.88	---	.87	.89	---	.89	.87	---	.85
MR of Internalizing	.85	---	.86	.86	---	.83	.83	---	.85
FR of Internalizing	.86	---	.86	.86	---	.89	.86	---	.85
TR of Internalizing ^d	.79	---	.85	.82	---	.83	.75	---	.84
AR of Externalizing	.87	---	.90	.88	---	.89	.86	---	.90
MR of Externalizing	.89	---	.90	.90	---	.92	.86	---	.89
FR of Externalizing	.90	---	.91	.91	---	.92	.87	---	.91
TR of Externalizing	.94	---	.94	.95	---	.94	.91	---	.94
Substance Use	.64	---	.68	.66	---	.70	.57	---	.65
GPA ^e	---	---	---	---	---	---	---	---	---

Variable	Full (n = 516)			English (n = 241)			Spanish (n = 275)		
	W1	W2	W3	W1	W2	W3	W1	W2	W3
School Discipline Actions ^a	---	---	---	---	---	---	---	---	---

^aMIR = mother report

^bFR = father report

^cAR = adolescent report

^dTR = teacher report.

^{*} alpha coefficient not applicable for GPA or school discipline actions.

Table 3
Descriptive statistics for baseline and wave 2 mediators for adolescent, mother, and father full samples and English and Spanish subsamples.

Variable (W1 alpha)	Adolescent Sample			Mother Sample			Father Sample		
	Full (n = 516)	English (n =241)	Spanish (n=275)	Full (n = 494)	English (n = 231)	Spanish (n=263)	Full (n = 288)	English (n = 121)	Spanish (n=167)
<i>Baseline Mediators</i>									
Coping Efficacy	3.04 (0.44)	3.05 (0.44)	3.03 (0.44)	---	---	---	---	---	---
School Engagement	4.54 (0.45)	4.54 (0.46)	4.54 (0.45)	---	---	---	---	---	---
Family Cohesion	3.38 (0.84)	3.30(0.81)	3.43 (0.88) [*]	---	---	---	---	---	---
Supportive Parenting	---	---	---	4.22 (0.64) ^a	4.27 (0.60) ^a	4.18 (0.67) ^a	4.06 (0.71) ^b	4.13 (0.70) ^b	4.00 (0.71) ^b
Positive Reinforcement	---	---	---	4.23 (0.65) ^a	4.28 (0.63) ^a	4.19 (0.66) ^a	4.11 (0.71) ^b	4.22 (0.66) ^{b*}	4.04 (0.73) ^{b*}
Harsh Parenting	---	---	---	2.08 (0.72) ^a	2.05 (0.72) ^a	2.11 (0.71) ^a	1.92 (0.66) ^b	2.01 (0.68) ^{b*}	1.85 (0.63) ^{b*}
Monitoring	---	---	---	4.38 (0.63) ^a	4.36 (0.63) ^a	4.40 (0.63) ^a	4.06 (0.77) ^b	4.17 (0.71) ^{b*}	3.98 (0.80) ^{b*}
Consistent Discipline	---	---	---	3.71 (0.84) ^a	3.80 (0.80) ^{a*}	3.63 (0.85) ^{a*}	3.52 (0.93) ^b	3.85 (0.83) ^{b***}	3.29 (0.93) ^{b***}
<i>Wave 2 Mediators</i>									
Coping Efficacy	3.06 (0.48)	3.05 (0.44)	3.07 (0.51)	---	---	---	---	---	---
School Engagement	4.52 (0.43)	4.48 (0.43)	4.55 (0.44)	---	---	---	---	---	---
Family Cohesion	3.56 (0.76)	3.55 (0.76)	3.57 (0.76)	---	---	---	---	---	---
Supportive Parenting	---	---	---	4.16 (0.61) ^a	4.15 (0.61) ^a	4.18 (0.61) ^a	4.01 (0.64) ^b	3.92 (0.80) ^b	4.06 (0.57) ^b
Positive Reinforcement	---	---	---	4.17 (0.60) ^a	4.16 (0.61) ^a	4.19 (0.58) ^a	4.03 (0.65) ^b	3.91 (0.82) ^b	4.10 (0.58) ^b
Harsh Parenting	---	---	---	1.88 (0.65) ^a	1.82 (0.64) ^a	1.93 (0.66) ^a	1.78 (0.56) ^b	1.82 (0.53) ^b	1.75 (0.57) ^b
Monitoring	---	---	---	4.42 (0.57) ^a	4.41 (0.57) ^a	4.44 (0.56) ^a	4.17 (0.65) ^b	4.18 (0.73) ^b	4.16 (0.62) ^b
Consistent Discipline	---	---	---	3.79 (0.73) ^a	3.81(0.70) ^a	3.78 (0.76) ^a	3.56 (0.87) ^b	3.73 (0.90) ^b	3.43 (0.85) ^{b**}

Descriptive statistics are adjusted for missing data using the FIML procedure in Mplus 5 (Muthén & Muthén, 1998-2007).

^aDescriptive statistics for mother report

^bDescriptive statistics for father report.

* English and Spanish subsample means are significantly different at $p < .05$

** English and Spanish subsample means differ significantly at $p < .01$

*** English and Spanish subsample means are significantly different at $p < .001$.

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Table 4
Descriptive statistics for baseline and wave 3 outcomes for adolescent, mother, and father full samples and English and Spanish subsamples.

Variable	Adolescent Sample			Mother Sample			Father Sample		
	Full (n = 516)	English (n = 241)	Spanish (n=275)	Full (n = 494)	English (n = 231)	Spanish (n=263)	Full (n = 288)	English (n = 121)	Spanish (n=167)
<i>Baseline Outcomes</i>									
Substance Use	0.52 (0.96)	0.71 (1.11)***	0.35 (0.76)***	0.54 (0.98)	0.73 (1.13)***	0.36 (0.78)***	0.44 (0.86)	0.60 (0.95)**	0.32 (0.77)**
AR ^a of Internalizing	13.84 (8.72)	14.65 (9.08)*	13.13 (8.33)*	13.90 (8.79)	14.80 (9.12)*	13.10 (8.41)*	13.57 (8.33)	14.25 (8.88)	13.08 (8.09)
MR ^b of Internalizing	9.15 (6.84)	8.73 (7.16)	9.45 (6.52)	9.14 (6.85)	8.80 (7.16)	9.44 (6.55)	---	---	---
FR ^c of Internalizing	7.91 (6.59)	7.45 (6.80)	8.01 (6.69)	---	---	---	7.78 (6.50)	7.43 (6.36)	7.99 (6.61)
TR ^d of Internalizing	1.98 (2.68)	2.41 (3.08)**	1.61 (2.20)**	2.02 (2.71)	2.46 (3.12)**	1.65 (2.24)**	1.90 (2.65)	2.20 (2.87)	1.68 (2.45)
AR of Externalizing	8.72 (6.86)	9.13 (7.21)	8.36 (6.51)	8.80 (6.90)	9.24 (7.29)	8.41 (6.51)	8.42 (6.75)	8.57 (6.46)	8.31 (6.94)
MR of Externalizing	7.88 (6.98)	8.64 (7.87)*	7.14 (5.97)*	7.94 (6.98)	8.78 (7.89)*	7.20 (5.97)*	---	---	---
FR of Externalizing	7.63 (7.22)	8.25 (8.74)	6.77 (5.99)	---	---	---	7.09 (6.85)	7.82 (7.88)	6.55 (5.95)
TR of Externalizing	4.06 (6.15)	5.09 (7.12)***	3.11 (4.97)***	4.14 (6.25)	5.18 (7.23)***	3.20 (5.05)***	3.55 (5.47)	4.00 (5.93)	3.22 (5.08)
GPA	2.44 (0.93)	2.37 (0.95)*	2.51 (0.91)*	2.42 (0.93)	2.35 (0.95)*	2.49 (0.92)*	2.50 (0.92)	2.44 (0.92)	2.54 (0.93)
School Discipline Actions	0.87 (2.26)	1.22 (2.90)**	0.56 (1.40)**	0.89 (2.30)	1.24 (2.95)**	0.58 (1.42)**	0.61 (1.75)	0.92 (2.23)*	0.46 (1.24)*
<i>Wave 3 Outcomes</i>									
Substance Use	0.89 (1.23)	1.08 (1.35)**	0.71 (1.07)**	0.89 (1.21)	1.08 (1.34)**	0.71 (1.07)**	0.81 (1.17)	0.95 (1.30)	0.71 (1.07)
AR of Internalizing	10.73 (7.70)	11.92 (8.42)**	9.70 (6.97)**	10.72 (7.64)	12.00 (8.36)**	9.64 (6.86)**	10.48 (7.69)	11.71 (8.53)*	9.58 (7.07)*
MR of Internalizing	6.60 (6.02)	6.79 (6.43)	6.41 (5.63)	6.55 (6.01)	6.73 (6.36)	6.38 (5.65)	---	---	---
FR of Internalizing	5.62 (5.97)	5.68 (7.83)	5.98 (5.83)	---	---	---	5.64 (5.80)	5.79 (6.58)	5.99 (5.70)
TR of Internalizing	2.34 (2.96)	2.74 (2.81)**	1.93 (2.97)**	2.34 (2.96)	2.73 (2.77)*	1.94 (3.00)*	2.20 (2.85)	2.74 (2.89)*	1.78 (2.66)*
AR of Externalizing	9.37 (7.64)	10.26 (7.79)*	8.51 (7.34)*	9.41 (7.68)	10.32 (7.83)*	8.60 (7.40)*	9.05 (7.42)	9.86 (8.00)	8.48 (7.11)
MR of Externalizing	6.73 (7.13)	8.04 (8.30)**	5.50 (5.69)**	6.70 (7.09)	8.01 (8.28)**	5.54 (5.70)**	---	---	---
FR of Externalizing	5.86 (7.06)	6.77 (9.39)	5.31 (6.16)	---	---	---	5.56 (6.86)	6.75 (8.01)	5.10 (6.29)
TR of Externalizing	5.60 (7.48)	6.47 (7.54)*	4.80 (7.27)*	5.57 (7.50)	6.31 (7.56)	4.85 (7.37)	5.40 (7.49)	5.91 (7.05)	4.98 (7.54)

Variable	Adolescent Sample			Mother Sample			Father Sample		
	Full (n = 516)	English (n = 241)	Spanish (n=275)	Full (n = 494)	English (n = 231)	Spanish (n=263)	Full (n = 288)	English (n = 121)	Spanish (n=167)
GPA	2.49 (0.88)	2.38 (0.91)	2.59 (0.88)	2.49 (0.88)	2.36 (0.89)	2.58 (0.88)	2.51 (0.90)	2.38 (0.88)	2.58 (0.92)
School Discipline Actions	3.00 (5.19)	3.30 (5.05)	2.82 (5.39)	3.00 (5.22)	3.18 (5.08)	2.85 (5.42)	2.97 (4.89)	3.16 (4.97)	2.92 (4.95)*

Descriptive statistics are adjusted for missing data using the FIML procedure in Mplus 5 (Muthén & Muthén, 1998-2007).

^a AR = adolescent report

^b MR = mother report

^c FR = father report

^d TR = teacher report.

* English and Spanish subsample means differ significantly at $p < .05$

** English and Spanish subsample differ significantly at $p < .01$

*** English and Spanish subsample means differ significantly at $p < .001$.

Table 5
ANCOVA Models for Examining Intervention Effects on Wave Two Mediators

Wave 2 Mediator	I	B	L	G	IxB	IxL	LxB	IxBxL	I Effect	Sample	B Percentile	Effect Size
Parenting												
Mother Supportive Parenting	-	-	-	-	-	-	-	-	none			
Mother Positive Reinforcement	<i>ns</i>	0.77*	<i>ns</i>	<i>ns</i>	-0.13*	<i>ns</i>	-	-	IxB	Full	15 th	2.58
Mother Harsh Parenting	-0.12*	0.73*	<i>ns</i>	<i>ns</i>	-0.25*	<i>ns</i>	<i>ns</i>	0.21*	IxB	Spanish	85 th	5.33
Mother Monitoring	-0.09 [†]	0.48*	-0.13 [†]	<i>ns</i>	<i>ns</i>	<i>ns</i>	0.25*	-0.26*	IxB	English	15 th	2.19
Mother Consistent Discipline	-	-	-	-	-	-	-	-	none			
Father Supportive Parenting	0.12*	0.57*	-0.14*	<i>ns</i>	-	-	-	-	I	Full		0.46
Father Positive Reinforcement	-	-	-	-	-	-	-	-	none			
Father Harsh Parenting	-	-	-	-	-	-	-	-	none			
Father Monitoring	<i>ns</i>	0.29*	<i>ns</i>	<i>ns</i>	0.31*	<i>ns</i>	0.47*	-0.36*	IxB	Spanish	85 th	3.16
Father Consistent Discipline	0.25*	0.42*	<i>ns</i>	<i>ns</i>	<i>ns</i>	-0.24 [†]	-	-	I	Spanish		0.47
Coping Efficacy	<i>ns</i>	0.71*	<i>ns</i>	<i>ns</i>	-0.19*	<i>ns</i>	-0.31*	0.24*	IxB	Spanish	NS	
School Engagement	<i>ns</i>	0.66*	<i>ns</i>	0.14*	-0.27*	<i>ns</i>	<i>ns</i>	0.21*	IxB	Spanish	85 th	2.77
Family Cohesion	<i>ns</i>	0.43*	-0.18*	<i>ns</i>	0.12 [†]	0.18*	-	-	I	English		0.13

Note. Standardized estimates are presented for all factors. Cells containing a dash indicate that the factor was dropped from the model. Cells containing “*ns*” indicate that the factor was not statistically significant. I = Intervention; B = Baseline Mediator; L = Language; G = Adolescent Gender.

* $p < .05$.

[†] $p < .10$.

Table 6

ANCOVA Models for Examining Intervention Effects on Wave Three Outcome

Wave 3 Outcome	I	B	L	G	IxB	IxL	LxB	IxBxL	I Effect	Sample	B Percentile	Effect Size
Substance Use	<i>ns</i>	0.78*	<i>ns</i>	<i>ns</i>	-0.23*	<i>ns</i>	-	-	IxB	Full	85 th	3.65
Internalizing Symptoms												
Adolescent report	<i>ns</i>	0.57*	0.10*	0.13*	-	-	-	-	none			
Mother report	-	-	-	-	-	-	-	-	none			
Father report	-0.09 [†]	0.63*	-	-	-	-	-	-	I	Full		0.26
Teacher report	<i>ns</i>	0.49*	<i>ns</i>	0.16*	-0.22*	<i>ns</i>	-	-	IxB	Full	85 th	2.35
Externalizing Symptoms												
Adolescent report	<i>ns</i>	0.34*	0.11 [†]	<i>ns</i>	0.29*	<i>ns</i>	0.21*	-0.20*	IxB	Spanish	85 th	2.96
Mother report	-0.08*	0.70*	0.11*	0.09*	-	-	-	-	I	Full		0.32
Father report	<i>ns</i>	0.52*	<i>ns</i>	<i>ns</i>	0.24*	<i>ns</i>	-	-	IxB	Full	15 th	3.49
Teacher report	<i>ns</i>	0.63*	<i>ns</i>	-0.09*	<i>ns</i>	<i>ns</i>	<i>ns</i>	-0.26 [†]	IxB	English	15 th	3.13
GPA	<i>ns</i>	0.73*	-0.10 [†]	0.19*	-0.12 [†]	-	-	-	IxB	Full	15 th	2.97
School Disciplinary Actions	-0.14*	0.26*	<i>ns</i>	-0.11 [†]	-	-	-	-	I	Full		0.34

Note. Standardized estimates are presented for all factors. Cells containing a dash indicate that the factor was dropped from the model. Cells containing “*ns*” indicate that the factor was not statistically significant. I = Intervention; B = Baseline Outcome; L = Language; G = Adolescent Gender.

* $P < .05$.

[†] $P < .10$.

Table 7

Mediation Path Models for Examining Intervention Effects on Wave Three Outcomes

Wave 3 Outcome (Reporter)	Wave 2 Mediator	Sample	Probe	a	b	c	axb
Substance Use (Adolescent report)							
Coping Efficacy	15% Mediator	Spanish		0.15 [†]	-0.19 [*]	-0.04 [*]	-0.03 [*]
Mother Positive Reinforcement	15% Mediator	Full		0.10 [*]	-0.12 [*]	-0.04 [*]	-0.01 [*]
Mother Harsh Parenting	85% Mediator	Spanish		-0.31 [*]	0.12 [*]	-0.03 [*]	-0.04 [*]
Internalizing (Mother report)							
Mother Harsh Parenting ^a	85% Mediator	Spanish		-0.31 [*]	0.14 [*]	0.06 [*]	-0.04 [*]
School Engagement	15% Mediator	Spanish		0.26 [*]	-0.13 [*]	-0.09 [†]	-0.03 [*]
Internalizing (Teacher report)							
Coping Efficacy	15% Mediator	Spanish		0.17 [*]	-0.13 [*]	-0.02 [*]	-0.02 [*]
Mother Harsh Parenting	85% Mediator	Spanish		-0.30 [*]	0.20 [*]	0.02 [*]	-0.06 [*]
School Engagement	15% Mediator	Spanish		0.25 [*]	-0.17 [*]	-0.01 [*]	-0.04 [*]
Externalizing (Adolescent report)							
School Engagement	15% Mediator	Spanish		0.24 [*]	-0.23 [*]	0.02 [*]	-0.05 [*]
School Engagement	85% Mediator	Spanish		-0.15 [*]	-0.23 [*]	0.02 [*]	0.03 [*]
Mother Monitoring	15% Mediator	English		0.18 [*]	-0.16 [*]	-0.03 [*]	-0.03 [*]
Family Cohesion	15% Outcome	English		0.23 [*]	-0.11 [†]	0.00 [*]	-0.03 [*]
Externalizing (Mother report)							
Mother Harsh Parenting	85% Mediator	Spanish		-0.36 [*]	0.14 [*]	-0.09 [*]	-0.05 [*]
Mother Harsh Parenting	15% Outcome	Spanish		-0.22 [*]	0.14 [*]	-0.06 [*]	-0.03 [*]
Externalizing (Father report)							
Father monitoring	85% Mediator	Spanish		0.23 [*]	-0.22 [*]	-0.09 [*]	-0.05 [*]
Externalizing (Teacher report)							
Mother Harsh Parenting	85% Mediator	Spanish		-0.29 [*]	0.20 [*]	0.01 [*]	-0.06 [*]

Wave 3 Outcome (Reporter)	Wave 2 Mediator	Sample	Probe	a	b	c	axb
Mother Harsh Parenting		Spanish	15% Outcome	-0.22*	0.14*	-0.06	-0.03*
Father Consistent Discipline ^b		Spanish		0.23*	0.13*	-0.16*	0.03*
School Engagement		Spanish	15% Mediator	0.25*	-0.17*	-0.04	-0.04*
GPA							
Mother Harsh Parenting		Spanish	85% Mediator	-0.29*	-0.09 [†]	0.06	0.03 [†]
Father Monitoring		Spanish	85% Mediator	0.22*	0.13*	0.14*	0.03*
School Engagement		Spanish	15% Mediator	0.24*	0.14*	0.08 [†]	0.03*
School Disciplinary Actions							
Mother Positive Reinforcement ^a		Full	15% Mediator	0.10*	-0.27*	-0.16 [†]	-0.03*

Note. Standardized estimates are presented. Columns headed a, b, c, give path coefficients for paths as in Fig. 2. The axb column gives path coefficients for mediated effects of intervention on outcome. Probe column indicates that effects are moderated by baseline mediator or outcome. Percentile indicates which end of the baseline distribution shows significance for intervention effects.

^aInitial model had poor fit so two additional paths were added to saturate model.

^bBasic mediation.

* $p < .05$.

[†] $p < .1$