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Reducing Internalizing Symptoms among High-Risk, Hispanic Adolescents: Mediators of a Preventive Family Intervention

Tatiana Perrino, **Ahnalee Brincks**, **George Howe**, **C. Hendricks Brown**, **Guillermo Prado**, and **Hilda Pantin**

Drs. Perrino, Brincks, Pantin, and Prado and are at the University of Miami Miller School of Medicine Department of Public Health Sciences in Miami, FL. Dr. Howe is at George Washington University Department of Psychology in Washington, DC. Dr. Brown is at Northwestern University Feinberg School of Medicine Department of Psychiatry and Behavioral Sciences and Department of Preventive Medicine in Chicago, IL

Abstract

Familias Unidas is a family-focused preventive intervention that has been found to reduce drug use and sexual risk behaviors among Hispanic adolescents. In some trials, Familias Unidas has also been found to be efficacious in reducing adolescent internalizing symptoms (i.e., depressive and anxiety symptoms), even though the intervention did not specifically target internalizing symptoms. This study examines potential mediators or mechanisms by which Familias Unidas influences internalizing symptoms, specifically the role of intervention-targeted improvements in parent-adolescent communication and reductions in youth externalizing behaviors. A total of 213 Hispanic eighth grade students with a history of externalizing behavior problems and their primary caregivers were recruited from the public school system. Participants, with a mean age of 13.8 years, were randomized into the Familias Unidas intervention or community practice control condition, and assessed at baseline, 6-months, 18-months, and 30-months post-baseline. A cascading mediation model was tested in which the Familias Unidas intervention was hypothesized to decrease adolescent internalizing symptoms through two mediators: improvements in parent-adolescent communication leading to decreases in externalizing behaviors. Findings show that the intervention had significant direct effects on youth internalizing symptoms at 30-months post-baseline. In addition, the cascading mediation model was supported in which the Familias Unidas intervention predicted significant improvements in parent-adolescent communication at 6-months, subsequently decreasing externalizing behaviors at 18-months, and ultimately reducing youth internalizing symptoms at 30-months post-baseline. Implications for prevention interventions are discussed.

Please address correspondence to: Tatiana Perrino, Department of Public Health Sciences, University of Miami's Miller School of Medicine, 1120 NW 14th Street (R-669), Miami, FL 33136; telephone- 305-243-8983; fax- 305-243-5577; tperrino@med.miami.edu.

Compliance with Ethical Standards Disclosure of Potential Conflicts of Interest The authors declare that they have no conflict of interest.

Ethical Approval This study was approved by the University of Miami's Human Subjects Research Board and the Miami- Dade County Schools' Research Board. All procedures performed in this study 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. This article does not contain any studies with animals performed by any of the authors.

Informed Consent Informed consent was obtained from parents of all youth in this trial. Voluntary informed assent was obtained from all youth in this trial.

Keywords

adolescent; prevention; internalizing symptoms; family; Hispanic

Externalizing behavior problems during early adolescence can cause significant school, peer and family functioning difficulties (Capaldi & Stoolmiller, 1999; Gault- Sherman, 2012; Masten et al., 2005). Externalizing problems, which can include conduct problems and aggressive behaviors, often persist into young adulthood, and are associated with greater risk of substance abuse, poor educational and occupational outcomes, and poor health outcomes (Capaldi & Stoolmiller, 1999; Reef, Diamantopoulou, van Meurs, Verhulst, & van der Ende, 2011). Youth exhibiting externalizing problems are also at elevated risk for developing internalizing symptoms and disorders, such as depression and anxiety (Burke, Loeber, Lahey, & Rathouz, 2005; Capaldi, 1992; Ingoldsby, Kohl, McMahon, Lengua & the Conduct Disorders Prevention Research Group, 2006; Patterson, Reid & Dishion, 1992; Moilanen, Shaw, & Maxwell, 2010; Teplin, Abram, McClelland, Dulcan & Mericle, 2002; Wolffe & Ollendick, 2006). Studies have found empirical evidence to support a “dual failure model” in which early behavioral and conduct problems contribute to poor social relationships and academic competence, which then increases susceptibility to depressive or internalizing symptoms (Capaldi, 1992; Moilanen et al., 2010).

This is an important consideration for interventions, and there is a need for preventive programs that can reduce externalizing symptoms among youth with conduct problems, while also reducing adolescents' subsequent risk of developing internalizing symptoms and disorders. Youth with co-occurring internalizing and externalizing problems show poorer behavioral and developmental outcomes than those with either of these problems alone (Capaldi & Stoolmiller, 1999; Marmorstein & Iacono, 2003; Wiesner, 2003; Wiesner & Kim, 2006; Youngstrom, Findling, & Calabrese, 2003). Interestingly, some prevention programs designed to reduce adolescent externalizing problems and substance abuse have also documented unanticipated, beneficial effects on youth internalizing symptoms, specifically programs focused on improving parenting and family relations (see Connell & Dishion, 2008; Perrino et al., 2015; Trudeau, Spoth, Randall, Mason, & Shin, 2012).

Yet, the mechanisms by which these preventive parenting interventions operate have not been systematically examined (Sandler, Schoenfelder, Wolchik & MacKinnon, 2011). Mediator analyses can explain how intervention-driven changes in modifiable risk and protective factors are related to later changes in youth behavioral outcomes, highlighting critical intervention targets that can avert poor behavioral outcomes (Cicchetti & Hinshaw, 2002; Collins et al., 2000; Hudson, Kendall, Coles, Robin & Webb, 2022). These analyses can inform the development of more targeted and effective interventions (Perrino et al., 2014a; Sandler et al., 2011). Randomized controlled trials of preventive intervention can provide compelling support for the causal effects of interventions on youth outcomes because they help rule out other reasons for these effects, such as genetic or environmental factors (Collins, et al., 2000; Sandler et al., 2011).

Understanding the mechanisms by which interventions operate can be a complex process. It may require the examination of multiple mediators across several time-points, sometimes

across extended periods of time. Research has sometimes identified *cascading* effects of preventive interventions across long periods of time, important because the full effects of preventive interventions on youth outcomes may take time to become evident (Bonds et al., 2010; McClain et al., 2010; Trudeau, et al., 2015; VanRyzin & Dishion, 2012).

The present study examines such cascading, longitudinal effects of an evidence-based preventive intervention for Hispanic adolescents. *Familias Unidas* is a family-focused preventive intervention that has been found to reduce youth substance use and sexual risk behaviors among Hispanic youth (Pantin et al., 2009; Prado & Pantin, 2011; Prado et al., 2012a; 2012b). While not designed to influence internalizing problems, recent analyses from a trial with delinquent youth found that Familias Unidas also reduced youth internalizing symptoms (Perrino et al., 2015). Familias Unidas is guided by Ecodevelopmental Theory which contends that youth behavioral problems are influenced by risk and protective factors in the adolescent's social environment that mutually influence each other across youth development, including peer, school and especially family systems (Szapocznik & Coatsworth, 1999). The developmental focus is critical for understanding the processes by which the intervention works, given that youth maturational factors affect the likelihood that certain problems will be evident at different life periods (Lau, 2013; Weiss & Garber, 2003; Zahn-Waxler, Shirtcliff, & Marceau, 2008). For example, mood disorders, such as depression, are less common during childhood but become more prevalent during adolescence and young adulthood (Kessler et al., 2005).

Previous Familias Unidas studies have examined questions of moderation, or “for whom” this intervention works best. A synthesis study covering a spectrum of youth from universal to selective prevention populations, reported that among youth with lower baseline levels of parent-youth communication, improvements in communication mediated the Familias Unidas intervention's effects on youth internalizing symptoms (Perrino et al., 2014a). This highlights the importance of targeting family protective factors to reduce youth internalizing symptoms (DeVore & Ginsburg, 2005; Restifo & Bogels, 2009). However, other mediators by which the intervention might reduce youth internalizing symptoms have not yet been examined, including improvements in youth externalizing problems, or intervention-generated, cascading mediators.

Research Questions & Hypotheses

The longitudinal data collected as part of Familias Unidas interventions provide a unique opportunity to study the relationship between intervention-driven improvements in youth externalizing and internalizing problems. This paper examines the efficacy of Familias Unidas in reducing youth internalizing symptoms among Hispanic youth with a history of externalizing problems, and identifies mechanisms by which this intervention influences internalizing symptoms. There are two hypotheses: 1) that the intervention will significantly reduce internalizing symptoms compared to the community control condition (i.e., intervention main effects); and 2) that the intervention will reduce youth internalizing symptoms by improving parent-adolescent communication, which will subsequently reduce externalizing symptoms, which will ultimately reduce internalizing symptoms (i.e., the cascading mediation model). Analyses capitalize on a randomized controlled trial with four

assessment time-points to understand cascading intervention effects across time. Participants were the same age at baseline, which helps control for confounding effects of age.

Method

Sample

Participants were 213 youth, 136 boys and 77 girls, whose mean age was 13.8 (standard deviation= 0.76 years). One primary caregiver for each youth participated, a total of 27 men and 186 women with a mean age of 40.0 (SD= 6.5 years). Only 13.1% of families had annual household incomes greater than $30,000. Approximately 56% of adolescents were born in the United States. Of the 93 immigrant adolescents, countries of origin included Honduras (26.9%), Cuba (20.4%), and Nicaragua (16.1%). Of foreign-born youth, 36.6% had been living in the U.S. for less than 3 years, 45.2% between 3 to 10 years, and 18.3% for more than 10 years.

Participant Recruitment

The study recruited Hispanic youth from three public middle schools in Miami-Dade County, located within a district serving primarily urban, low-income youth (Pantin et al., 2009). At each school site, school counselors identified Hispanic eighth grade students as potential participants using the Revised Behavior Problem Checklist – RBPC (Quay & Peterson, 1993) specifically youth who had at least “mild problems” on one or more of the following three RBPC problems behavior subscales: conduct disorder, socialized aggression, or attention problems (see Measures). These were students who counselors indicated had at least a “mild problem” on at least half of the items on the RBPC subscales or a “severe problem” on at least one quarter of the items on the RBPC subscales. School counselors did not provide any student information to the study team, but sent letters home to the parents of these youth describing this prevention study. Interested parents returned a form, and subsequently received a phone call from staff who scheduled parents and youth for an in-person screening, and if eligible, a baseline assessment. At screening, informed consent and assent were obtained from parents and youth respectively. To be eligible to participate, adolescents had to: be of Hispanic immigrant origin (at least one parent born in a Spanish speaking country in the Americas), be in the 8th grade, have an adult parent or caregiver willing to participate in the study, live within the catchment areas of one of the three middle schools included in the study; and score at least 1 standard deviation above the non-clinical normed mean on at least one of the three RBPC scales specified above (administered to parents). Adolescents were excluded from the study if: their family was planning to move out of the school catchment areas during the intervention, or out of South Florida during the 3 year study; the adolescent did not assent to participate; or the parent was unable to participate in the intervention due to scheduling conflicts. Figure 1 depicts the study's participants flow: 531 families were identified as potential participants during the screening process with 318 of these either refusing (n = 74; 13.9%) or not meeting eligibility criteria (n =244; 46.0%) for reasons described in Figure 1 (Pantin et al., 2009).

Study Design & Procedures

After screening, the 213 eligible participants and one of their caregivers completed baseline, and were randomized into either the Familias Unidas intervention (n=109) or a community practice control condition (n=104). Concealment of allocation procedures were used to ensure that condition assignment was unknown before the participant was enrolled (Pantin et al., 2009). An urn randomization program balanced youth gender, years in the U.S., having initiated substance use, and having initiated sex. The latter two were key behavioral outcomes. The study used an intent-to-treat design, and was approved by the University of Miami's Human Subjects Research Board and the Miami- Dade County Schools' Research Board.

Measures

Youth and parents completed assessments at baseline, 6-months (post intervention), 18-months, and 30-months post-baseline using the Audio-CASI system (see Resnick et al., 1997), an audio-enhanced, computer-assisted self-interviewing program. Participants could choose English or Spanish. Every effort was made to keep assessors blind to intervention status, including separation of assessor and intervention staff. Participating families were compensated $20, $25, $30 and $35 for completing the baseline, 6-, 18-, and 30-months post baseline assessments, respectively. In these analyses, the parent completed all assessment measures.

Socio-demographic characteristics—Data collected included age, gender, country of birth, years in the U.S., and for youth only, their primary language spoken.

Adolescent internalizing symptoms—The outcome of internalizing symptoms was assessed at each time-point using the Anxiety-Withdrawal Subscale of the Revised Behavior Problem Checklist (Quay & Peterson, 1993). This is an 11-item subscale measuring adolescent internalizing symptoms as reported by parents, and includes both depressive and anxiety symptoms ($\alpha = 0.90$). Each item is rated on a 3-point Likert scale ranging from 0=”no problem” 1= “mild problem”, 2=”severe problem”. Sample items are: “Depressed; always sad,” “Generally fearful; anxious.” Possible scores ranged from 0–22 with higher scores indicating higher levels of internalizing symptoms. A square root transformation of internalizing symptoms was used for this outcome as a result of non-normality (baseline skew = 0.83, baseline kurtosis = 2.91). Construct validity for the RBPC has been established, including discrimination between clinic-referred and community samples of youth (Quay & Peterson, 1993). Significant correlations between parent and youth reports of internalizing symptoms have also been shown, 0.58 for fathers and 0.67 for mothers (Thomas, Forehand, Armistead, Wierson, & Fauber, 1990). This scale has been used successfully with other samples of Hispanic youth (Perrino et al., 2014; Prado et al., 2012b). Reported norms for this scale indicate that mean (SD) scores for community youth are 4.47 (4.07) for females and 3.85 (3.66) for males, while for clinical youth are 11.12 (4.77) for females and 9.71 (4.58) for males (Quay & Peterson, 1993).

Adolescent externalizing behaviors—This variable was measured using four subscales of the Revised Behavior Problem Checklist- RBPC (Quay & Peterson, 1993): attention

problems (16 items; mean = 7.28, SD = 8.31; α = 0.93), motor excess (5 items; mean = 2.02, SD = 2.33; α = 0.83), socialized aggression (17 items; mean = 4.60, SD = 7.53; α = 0.89) and conduct disorder (22 items; mean = 10.05, SD = 11.14; α = 0.95). Item examples are: "Distractible; easily diverted from the task at hand," "Hyperactive; always on the go;" "Fights;" "Steals from people outside the home." Responses were on the same scale as internalizing symptoms, with higher scores indicating higher levels of externalizing problems. Externalizing behaviors was modeled as a latent variable with these four indicators. The fit of the baseline measurement model for externalizing was good (CFI = 0.99; RMSEA = .06). Standardized loadings were 0.91 (SE = .02) for conduct disorder, 0.70 (SE = .04) for socialized aggression, 0.82 (SE = .03) for attention problems and 0.85 (SE = .03) for motor excess.

Parent-adolescent communication—This variable was measured using the Parent–Adolescent Communication Scale (Barnes & Olson, 1985). This 20-item parent-report measure assesses the quality of parent-adolescent communication (α = 0.78). Each item is rated on a 5-point Likert scale from "1=Strongly disagree" to "5=Strongly agree". Examples of items include: "When I ask questions, I get honest answers from my child;" "I find it easy to discuss problems with my child;" "I openly show affection to my child." Possible scores ranged from 20–100 with higher scores indicating better parent-adolescent communication. This scale has been used successfully with other Hispanic adolescent samples (Prado et al., 2012b). The sample mean was 72.96 (SD = 10.49).

Intervention & Control Groups

Familias Unidas—As noted, Familias Unidas is a Hispanic-specific, family-based preventive intervention designed to reduce risk for adolescent behavior problems, substance use, and sexual risk behaviors. Hispanic-specific cultural issues are integrated into all aspects of the intervention including the underlying theoretical model, the specific content of the sessions, and the format of the intervention activities (Prado & Pantin, 2011). The program addresses experiences of acculturation, acculturative stress, and possible disconnection from social support in one's country of origin, while emphasizing Hispanic values. Guided by Ecodevelopmental Theory and drawing from culturally specific models (Coatsworth & Szapocznic, 1999), Familias Unidas aims to prevent substance use and sexual risk behaviors by improving parenting and family communication and functioning. The intended dosage for families randomized to this Familias Unidas intervention is nine 2-hour parent group sessions and ten 1-hour family visits. During the parent group sessions, parents have an opportunity to discuss risks for adolescent drug and sexual risk behavior, the importance of positive parenting (e.g., monitoring of adolescent and peers), and the role of healthy family relationships for adolescent health. During the family sessions, the parent, adolescent and family members meet as a unit with a facilitator to discuss specific family concerns, as well as practice skills learned with the support of the facilitator (e.g., family communication). Families also attended four 1-hour booster sessions during the follow-up phase, at approximately 10, 16, 22, and 28 months post baseline. Intervention facilitators were Master's and PhD-level Hispanic adults who had experience working with urban, low-income Hispanic immigrant families and who had been extensively trained and certified in Familias Unidas model of intervention. Facilitators were trained to criteria in the Familias

Unidas model based on the training manual and procedures, which included didactic, group process, roleplays, mock groups and ongoing videotaping and review of sessions by the clinical supervisor.

Community Control—Control group families were given three referrals to agencies in their catchment area serving youth with behavior problems. These families had no other contact with the study, except for assessments. Unfortunately, data regarding type or amount of services that were actually received by youth or families in the control condition were not collected.

Adherence and Fidelity

All sessions in the Familias Unidas intervention were videotaped with participants' consent. To assess adherence to the intervention, independent raters rated all of the videotaped group sessions and 25% of the family visits. Observational adherence measures were developed to identify key prescribed facilitator behaviors for each intervention session. All facilitator prescribed behaviors (e.g., established group alliances) were rated on an extensiveness/quality rating ranging from “0 =not at all/very poor” to “6 =extensively/excellent.” The average adherence rating for the intervention modules was “considerably/good” (mean= 4.98; SD= 0.18).

Retention

Participants completed a mean of 8.79 (SD=2.19; range 0–10) family visits, and a mean of 7.10 (SD=2.60; range 0–9) parent group sessions. Follow-up assessment completion was high at 6 months (101/109 for Familias Unidas; 94/104 for control), 18 months (98/109 for Familias Unidas; 87/104 for control), and at 30 months follow-ups (93/109 for Familias Unidas; 87/104 for control), with no significant differences by intervention condition at any time-points.

Data Analytic Plan—All analyses were done in Mplus 7.0 (Muthen & Muthen, 1998–2012). Preliminary analyses included exploration of the distributions of each variable and testing for baseline differences across treatment condition. Age and gender were included as control variables for internalizing and externalizing variables for all analyses, given that age and gender are significantly associated with these variables (Zahn-Waxler, Shirtcliff, & Marceau, 2008). These variables were also mean centered. Structural equation modeling was used to test both hypotheses. For Hypothesis 1, we utilized multiple regression analysis, and examined differential effects of the intervention on internalizing symptoms at the 30-month follow-up. For the cascading mediator analysis in Hypothesis 2, we tested for the presence of an indirect effect of the treatment condition on internalizing through family communication and externalizing. Model fit criteria included a Standardized Root Mean Squared Residual (SRMR) value less than 0.06 and a Comparative Fit Index (CFI) value greater than 0.95 (Hu & Bentler, 1999). Tests of mediation were done using the product of coefficients with bootstrap standard errors with 1000 draws, providing better statistical power, more accurate confidence intervals, and less reliance on multivariate normality compared with the Sobel test (MacKinnon, Lockwood, & Williams, 2004; Taylor, MacKinnon, & Tein, 2008). Results are reported using 95% confidence intervals (CI). Mplus

uses Full Information Maximum Likelihood to handle missing data, a method that makes use of all available data points without dropping participants.

Results

Descriptive Analyses

At baseline, adolescents' mean level of internalizing symptoms on the RBPC scale was 6.55 (SD = 5.35). This mean falls closer to norms for community youth (i.e., 4.47 for females, 3.85 for males) than clinical youth (11.12 for females, 9.71 for males) (Quay & Peterson, 1993). At the 30 month follow-up the mean level of internalizing symptoms was 3.40 (SD = 4.37). When broken down by condition, the 30 month follow-up mean for the control group was 4.04 (SD = 4.47) and for the Familias Unidas group was 2.82 (SD = 4.22).

Comparability of Conditions at Baseline

Table 1 shows no significant differences in baseline means for the key study variables across treatment condition. Means, standard deviations and correlations for baseline variables are in Table 2. A square root transformation of the internalizing measure adjusted for positive skew.

Intervention Main Effects Analyses

The intervention's effects on 30-month internalizing symptoms controlling for baseline internalizing, age and gender was negative and significant (B = −0.36, SE = 0.17, 95% CI: −0.69, −0.03), providing evidence that the Familias Unidas intervention has a moderate, beneficial impact on distal internalizing symptom outcomes (β= 0.31; Cohen, 1988). For intervention participants, the mean level of internalizing symptoms decreased from 6.18 (SD = 5.58) at baseline to 2.82 (SD = 4.20) at 30 months post-baseline. Control participants also decreased in internalizing symptoms from 6.93 (SD = 5.05) at baseline to 4.04 (SD = 4.44) at 30 months post-baseline, representing a significant difference (mean difference = 1.21, SE = 0.66, p = .03).

Cascading Mediation Model Analyses

Analyses support the hypothesized cascading mediation model. The estimated cascading mediation model is found in Figure 2, with parameter estimates in Table 3. Baseline levels of mediators and the outcome variable were included to strengthen causal assumptions and prevent falsely inflated parameter estimates. Parameter estimates were obtained using full information maximum likelihood, which includes all available data. Model fit was good (SRMR = 0.06; CFI = 0.96). As shown in the figure, each mediating pathway was statistically significant. First, the direct effect of intervention condition on 6-month parent-adolescent communication, controlling for baseline communication, was positive and significant (B = 4.13, p = .002), suggesting intervention participants experienced greater improvements in parent-adolescent communication compared to controls. Second, the direct effect of 6-month parent-adolescent communication on 18-month externalizing, controlling for baseline externalizing, was negative and significant (B = −0.30, p < .001). Finally, the direct effect of 18-month externalizing symptoms on 30-month internalizing symptoms, controlling for baseline internalizing, was positive and significant (B = 0.06, p < .001). The

overall indirect effect through both mediators was statistically significant (B = −0.07, SE = 0.03, CI: −0.13, −0.01). The relationship between intervention condition and 30-month internalizing symptoms was negative and significant (B = −0.32, p = .03), but smaller in magnitude than the total effect from Hypothesis 1, suggesting partial mediation.

This model has strong temporal sequencing such that the intervention precedes the measure of family communication, which precedes the externalizing symptoms measure, which precedes the internalizing symptoms measure. Yet, the use of baseline covariates of each construct at each time point results in an overlap in the temporal periods across the constructs. For instance, the measure of 18-month externalizing symptoms controlling for baseline externalizing symptoms includes the 6-month time period where family communication was measured. This may compromise the interpretation of the causal paths. A more stringent test of the sequential mediation is to use more proximal covariates for each construct, specifically, the 6-month externalizing measure as covariate for the 18-month externalizing measure, and the 18-month internalizing measure as covariate for the 30-month internalizing measure. The fit of this model was also adequate (CFI = .950, SRMR = .14). As before, all mediation model paths are in the expected direction and remain statistically significant (see Table 3). The test of the indirect effect was not statistically significant (B = −0.01, p = .11); however, the joint significance of this model's mediating paths provides evidence of a mediated intervention effect on internalizing symptoms through family communication and externalizing symptoms (Taylor et al., 2008).

Post-hoc Analyses

Several alternative mediation models were explored. Most importantly, a model in which the causal order of internalizing and externalizing was reversed showed non-significant paths in the cascading mediator model. In addition, the 6-month parent-adolescent communication score did not influence the 18-month internalizing symptoms score. Thus, the direction of the mediating sequence we hypothesized was supported by these data. Refinements of the cascading mediator model resulted in non-significant direct effects from intervention to 18-month externalizing symptoms and from 6-month parent-adolescent communication to 30-month internalizing symptoms. Tests of models positing baseline externalizing and baseline internalizing symptoms as potential moderators of the treatment effect on 6-month parent-adolescent communication also resulted in non-significant interactions, further supporting the cascading model for the entire sample rather than sub-groups of youth. Finally, we created an outcome variable that combined the four indicators of 30-month externalizing and the single indicator of 30-month internalizing symptoms into a latent construct representing the co-occurrence of these related symptoms (model fit: SRMR = 0.02; CFI = 0.98). However, this latent construct was not significantly predicted by 6-month parent-adolescent communication, thus no mediation was present.

Discussion

Previous studies have established that family-based preventive interventions for youth, such as Familias Unidas, can have noteworthy effects on youth across time (Bonds et al. 2010; Connell & Dishion, 2008; NRC/ IOM, 2009; Perrino et al., 2015; Sandler, et al., 2014;

Trudeau, et al., 2012; Trudeau et al., 2015). The current analyses add to this literature, showing that the Familias Unidas intervention reduced internalizing symptoms among Hispanic adolescents at risk due to having initially high levels of externalizing problems. While symptom levels decreased for both intervention and control groups, the reductions by intervention youth were larger and the difference was statistically significant, illustrates a preventive effect. This unanticipated intervention effect on internalizing symptoms, combined with previous findings that Familias Unidas reduces youth drug use and sexual risk behavior (Pantin et al., 2009; Prado et al., 2012a; 2012b), demonstrates the intervention's impact across several dimensions of health. This is consistent with emerging findings from other preventive interventions for youth that have shown effects on internalizing symptoms without directly targeting these symptoms (see Connell & Dishion, 2008; Trudeau, et al., 2012). Reductions in internalizing symptoms are particularly consequential given that youth showing externalizing problems are susceptible to developing internalizing disorders and to poorer long-term outcomes as a whole (Burke et al., 2005; Teplin et al., 2002; Wiesner, 2003; Wiesner & Kim, 2006; Wolffe & Ollendick, 2006).

Yet, the present study's findings also identify *mechanisms* by which this intervention reduced this high-risk group's internalizing symptoms. The mediation analyses indicate that Familias Unidas potentiates a cascading series of changes, first improving parent-adolescent communication at 6-month follow-up, which subsequently reduced externalizing problems at 18-month follow-up, and ultimately reduced youth internalizing symptoms at 30-month follow-up. Non-overlapping time-points provide a rigorous test of the mediation hypothesis strengthening causal assumptions. Research supports the importance of enhancing parent-youth communication and relationships as a vehicle for improving adolescent health (Perrino et al., 2014a; Prado et al., 2007; Prado et al., 2012b; Zhou, Sandler, Millsap, Wolchik, & Dawson-McClure, 2008). The present study builds on this work by showing that for youth at risk due to externalizing behavior problems, improvements in family communication can reduce youth internalizing symptoms by first reducing their externalizing problems. Intervention-driven improvements in family factors may prevent a trajectory consistent to that described in the “dual failure model” (Capaldi, 1992; Masten et al., 2005; Moilanen et al., 2010), where externalizing problems contribute to social and academic problems, and then internalizing symptoms.

The cascading mediator model's stability is underscored by the fact that alternative models with different sequencing of intervention mechanisms showed non-significant mediation paths, suggesting these other models did not depict plausible intervention processes. For instance, a model hypothesizing that improvements in parent-adolescent communication would subsequently improve youth internalizing symptoms, ultimately improving externalizing symptoms, was not supported. A third model testing whether improvements in parent-adolescent communication influenced a subsequent latent variable made up of *both* internalizing and externalizing symptoms was not supported either, indicating that parent-adolescent communication improvements do not *simultaneously* influence a higher-order variable comprised of both adolescent internalizing and externalizing symptoms.

Important developmental factors may be at play in these findings and the fact that participants were of similar ages at baseline permits control of potential developmental

confounds. At baseline, participants were approximately 13–14 years old, while at the end of the study they were approximately 15–16 years old. Although the psychiatric epidemiology literature indicates that externalizing and impulse control disorders (e.g., conduct and oppositional defiant disorder) tend to have an early median age of onset, specifically 11 years of age, the onset of internalizing disorders is often later; for example, the median age of onset for major depressive disorder, dysthymia, and generalized anxiety disorder is in the early 30s (Kessler et al., 2005). The effects of this intervention on internalizing symptoms may not be evident until later in adolescence when mood disorder symptoms are more likely to manifest.

This study has limitations. First, the internalizing symptoms variable was assessed using parent reports of youth symptoms with the RBPC (Quay & Peterson, 1993). While parent reports of youth symptoms have been critiqued as indirect, previous research using the RBPC has found that parent reports and youth self-reports about internalizing symptoms are strongly correlated (Thomas et al., 1990). Additionally, since all measures in this study were parent-report, a common method bias may have influenced parameter estimates. A second limitation is that findings may not be generalizable to youth beyond Hispanics with elevated externalizing symptoms. The generalizability of the findings is also limited because the sample is comprised of at-risk youth with elevated externalizing symptoms, and that an appreciable proportion did not meet eligibility criteria. These cascading intervention findings might not be evident were the intervention delivered to a universal sample or youth exhibiting different risk factors for internalizing disorders, such as elevated internalizing symptoms without externalizing behaviors. Internalizing disorders such as depression are heterogeneous in their development (see Garber, 2006; Pine & Fox, 2015). Yet, findings suggest that highly vulnerable youth may benefit from the Familias Unidas intervention as they age. Finally, the study did not gather data specifying community services or interventions were actually received by participants in the community practice control condition, limiting the conclusions that can be drawn.

This is not the first study to find cascading effects of a preventive intervention on youth outcomes after the intervention ended (see Bonds et al. 2010; Trudeau et al., 2015), but it lends support for the cascading effects of interventions that strengthen family factors (Sandler et al., 2014). The study adds to our intervention knowledge base by connecting reductions in externalizing problems to subsequent improvements in internalizing symptoms for youth with behavior problems, identifying an intervention that reduces both externalizing and internalizing symptoms in these vulnerable youth. It also strengthens our knowledge of the processes by which family-based preventive interventions operate, helping us identify effective intervention components and better target interventions to youth in greatest need (Sandler et al., 2011).

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References

Barnes HL, Olson DH. Parent-adolescent communication and the circumplex model. Child Development. 1985; 56:438–447.

Bonds DD, Wolchik SA, Winslow E, Tein JY, Sandler IN, Millsap R. Developmental cascade effects of the New Beginnings Program on adolescent adaptation outcomes. Development and Psychopathology. 2010; 22:771–84. [PubMed: 20883581]

Burke JD, Loeber R, Lahey BB, Rathouz PJ. Developmental transition among affective and behavioral disorders in adolescent boys. Journal of Child Psychology and Psychiatry. 2005; 46:1200–10. [PubMed: 16238667]

Capaldi DM, Stoolmiller M. Co-occurrence of conduct problems and depressive symptoms in early adolescent boys: III. Prediction to young-adult adjustment. Development and Psychopathology. 1999; 11:59–84. [PubMed: 10208356]

Capaldi DM. Co-occurrence of conduct problems and depressive symptoms in early adolescent boys: II. A 2-year follow-up at grade 8. Development and Psychopathology. 1992; 4:125–144.

Ciccheti D, Hinshawm SP. Editorial- Prevention and Intervention Science: Contributions to Developmental Theory. Development and Psychopathology. 2002; 14:667–71. [PubMed: 12549698]

Cohen, J. Statistical power analysis for the behavioral sciences. Routledge Academic; 1988.

Collins WA, Maccoby EE, Steinberg L, Hetherington EM, Bornstein MH. Contemporary research on parenting: The case for nature and nurture. American Psychologist. 2000; 55:218–32. [PubMed: 10717969]

Connell AM, Dishion TJ. Reducing depression among at-risk early adolescents: Three year effects of a family-centered intervention embedded within schools. Journal of Family Psychology. 2008; 22:574–85. [PubMed: 18729671]

DeVore ER, Ginsburg KR. The protective effects of good parenting on adolescents. Current Opinions in Pediatrics. 2005; 17:46–5.

Garber J. Depression in children and adolescents: Linking risk research and prevention. American Journal of Preventive Medicine. 2006; 31:S104–125. [PubMed: 17175406]

Gault- Sherman M. It's a two-way street: the bidirectional relationship between parenting and delinquency. Journal of Youth and Adolescence. 2012; 41:121–45. [PubMed: 21431892]

Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling: A Multidisciplinary Journal. 1999; 6:1–55.

Hudson JL, Kendall PC, Coles ME, Robin JA, Webb A. The other side of the coin: Using intervention research in child anxiety disorders to inform developmental psychopathology. Development and Psychopathology. 2002; 14:819–41. [PubMed: 12549705]

Ingoldsby EM, Kohl GO, McMahon RJ, Lengua L, the Conduct Disorders Prevention Research Group. Conduct problems, depressive symptomatology and their co-occurring presentation in childhood as predictors of adjustment in early adolescence. Journal of Abnormal Child Psychology. 2006; 34:603–21. [PubMed: 16967336]

Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. Archives of General Psychiatry. 2005; 62:593–602. [PubMed: 15939837]

Lau JY. Developmental aspects of mood disorders. Current Topics in Behavioral Neuroscience. 2013; 14:15–27.

MacKinnon DP, Lockwood CM, Williams J. Confidence limits for the indirect effect: Distribution of the product and resampling methods. Multivariate Behavioral Research. 2004; 39:99–128. [PubMed: 20157642]

Marmorstein NR, Iacono WG. Major depression and conduct disorder in a twin sample: gender, functioning, and risk for future psychopathology. Journal of American Academy of Child and Adolescent Psychiatry. 2003; 42:225–233.

Masten AS, Roisman GI, Long JD, Burt KB, Obradović J, Riley JR, Tellegen A. Developmental cascades: Linking academic achievement and externalizing and internalizing symptoms over 20 years. Development and Psychology. 2005; 41:733–746.

McClain DB, Wolchik SA, Winslow E, Tein JY, Sandler IN, Millsap RE. Developmental cascade effects of the New Beginnings Program on adolescent adaptation outcomes. Development and Psychopathology. 2010; 22:771–84. [PubMed: 20883581]

Moilanen KL, Shaw DS, Maxwell KL. Developmental cascades: Externalizing, internalizing, and academic competence from middle childhood to early adolescence. Development and Psychopathology. 2010; 22:635–53. [PubMed: 20576184]

Muthén, LK.; Muthén, BO. Mplus User's Guide. Seventh Edition. Muthén & Muthén; Los Angeles, CA: 1998–2012.

National Research Council/ Institute of Medicine. Preventing mental, emotional, and behavioral disorders among young people: Progress and possibilities. In: O'Connell, Mary Ellen; Boat, Thomas; Warner, Kenneth E., editors. Committee on the Prevention of Mental Disorders and Substance Abuse among Children, Youth, and Young Adults: Research Advances and Promising Interventions; Washington, DC: National Academies Press; 2009. Board on Children, Youth, and Families, Division of Behavioral and Social Sciences and Education

Pantin H, Prado G, Lopez B, Huang S, Tapia MI, Schwartz S, Branchini J. A randomized controlled trial of Familias Unidas for Hispanic adolescents with behavior problems. Psychosomatic Medicine. 2009; 71:987–95. [PubMed: 19834053]

Patterson, GR.; Reid, J.; Dishion, T. A social interactional approach: Antisocial boys. Vol. Vol. 4. Castalia; Eugene, OR: 1992.

Perrino T, Pantin H, Prado G, Huang S, Brincks A, Howe G, Brown CH. Preventing internalizing symptoms among Hispanic adolescents: A synthesis across Familias Unidas trials. Prevention Science. 2014; 15:917–28. [PubMed: 24390684]

Perrino T, Pantin H, Huang S, Brincks A, Brown CH, Prado G. Reducing the risk of internalizing symptoms among high-risk Hispanic youth through a family intervention: A randomized controlled trial. Family Process. 2015 Epub ahead of print.

Pine DS, Fox NA. Childhood antecedents and risk for adult mental disorders. Annual Review of Psychology. 2015; 66

Prado G, Pantin H, Briones E, Schwartz S, Feaster D, Huang S, Szapocznik J. A randomized controlled trial of a parent-centered intervention in preventing substance use and HIV risk behaviors in Hispanic adolescents. Journal of Consulting & Clinical Psychology. 2007; 75:914–26. [PubMed: 18085908]

Prado G, Pantin H. Reducing substance use and HIV health disparities among Hispanic youth in the U.S.A.: The Familias Unidas program of research. Psychosocial Interventions. 2011; 20:63–73.

Prado G, Cordova D, Huang S, Estrada Y, Rosen A, Bacio GA, McCollister K. The efficacy of Familias Unidas on drug and alcohol outcomes for Hispanic delinquent youth: Main effects and interaction effects by parental stress and social support. Drug and Alcohol Dependence. 2012a; 125S:S18–25. [PubMed: 22776441]

Prado G, Pantin H, Huang S, Cordova D, Tapia M, Velazquez MR, Estrada Y. Effects of a family intervention in reducing HIV risk behaviors among high-risk Hispanic adolescents: A randomized controlled trial. Archives of Pediatrics and Adolescent Medicine. 2012b; 166:127–33. [PubMed: 21969363]

Quay, HC.; Peterson, DR. The Revised Behavior Problem Checklist: Manual. Psychological Assessment Resources; Odessa, FL: 1993.

Reef J, Diamantopoulou S, van Meurs I, Verhulst FC, van der Ende J. Developmental trajectories of child adolescent externalizing behavior and adult DSM-IV disorder: A longitudinal study. Social Psychiatry and Psychiatric Epidemiology. 2011; 46:1233–41. [PubMed: 20936464]

Resnick MD, Bearman PS, Blum RW, Bauman KE, Harris KM, Jones J, Udry JR. Protecting adolescents from harm: Findings from the National Longitudinal Study on Adolescent Health. JAMA. 1997; 278:823–32. [PubMed: 9293990]

Restifo K, Bogels S. Family processes in the development of youth depression: Translating the evidence to treatment. Clinical Psychology Review. 2009; 29:294–316. [PubMed: 19356833]

Sandler I, Schoenfelder EN, Wolchik SA, MacKinnon DP. Long-term impact of prevention programs to promote effective parenting: Lasting effects but uncertain processes. Annual Review of Psychology. 2011; 62:299–329.

Sandler I, Wolchik SA, Cruden G, Mahrer NE, Ahn S, Brincks A, Brown CH. Overview of meta-analysis of the prevention of mental health, substance use and conduct problems. Annual Review of Clinical Psychology. 2014; 10:243–73.

Szapocznik, J.; Coatsworth, JD. An ecodevelopmental framework for organizing the influences on drug abuse: a developmental model of risk and protection. In: Glantz, MD.; Hartel, CR., editors. Drug Abuse: Origins & Interventions. American Psychological Association; Washington, DC: 1999. p. 331-336.

Taylor AB, MacKinnon DP, Tein J. Tests of the three-path mediated effect. Organizational Research Methods. 2008; 11:241–269.

Teplin LA, Abram KM, McClelland GM, Dulcan MK, Mericle AA. Psychiatric disorders in youth in juvenile detention. Archives of General Psychiatry. 2002; 59:1133–43. [PubMed: 12470130]

Thomas MA, Forehand R, Armistead L, Wierson M, Fauber R. Cross-informant consistency in externalizing and internalizing problems in early adolescence. Journal of Psychopathology and Behavioral Assessment. 1990; 12:255–62.

Trudeau L, Spoth R, Randall GK, Mason WA, Shin C. Internalizing symptoms: Effects of a preventive intervention on developmental pathways from early adolescence to young adulthood. Journal of Youth and Adolescence. 2012; 41:788–801. [PubMed: 22160441]

Trudeau L, Spoth R, Mason WA, Randall GK, Redmond C, Schainker L. Effects of adolescent universal substance misuse preventive interventions on young adult depression symptoms: Mediational model. Journal of Abnormal Psychology. 2015 Epub Ahead of print.

VanRyzin MJ, Dishion TJ. The impact of a family-centered intervention on the ecology of adolescent behavior: Modeling developmental sequelae and trajectories during adolescence. Development and Psychopathology. 2012; 24:1139–55. [PubMed: 22781876]

Weiss B, Garber J. Developmental differences in the phenomenology of depression. Developmental Psychopathology. 2003; 15:403–30.

Wiesner M. A longitudinal latent variable analysis of reciprocal relations between depressive symptoms and delinquency during adolescence. Journal of Abnormal Psychology. 2003; 112:633–45. [PubMed: 14674875]

Wiesner M, Kim HK. Co-occurring delinquency and depressive symptoms of adolescent boys and girls: A dual trajectory modeling approach. Development and Psychology. 2006; 42:1220–35.

Wolffe JC, Ollendick TH. The comorbidity of conduct problems and depression in childhood and adolescence. Clinical Child and Family Psychology Review. 2006; 9:201–20. [PubMed: 17053962]

Youngstrom E, Findling R, Calabrese J. Who are the comorbid adolescents? Agreement between psychiatric diagnosis, youth, parent, and teacher report. Journal of Abnormal Child Psychology. 2003; 31:231–45. [PubMed: 12774858]

Zahn-Waxler C, Shirtcliff EA, Marceau K. Disorders of childhood and adolescence: Gender and psychopathology. Annual Review of Clinical Psychology. 2008; 4:275–303.

Zhou Q, Sandler IN, Millsap RE, Wolchik SA, Dawson- McClure SR. Mother–child relationship quality and effective discipline as mediators of the 6-year effects of the New Beginnings Program for children from divorced families. Journal of Consulting and Clinical Psychology. 2008; 76:579–94. [PubMed: 18665687]

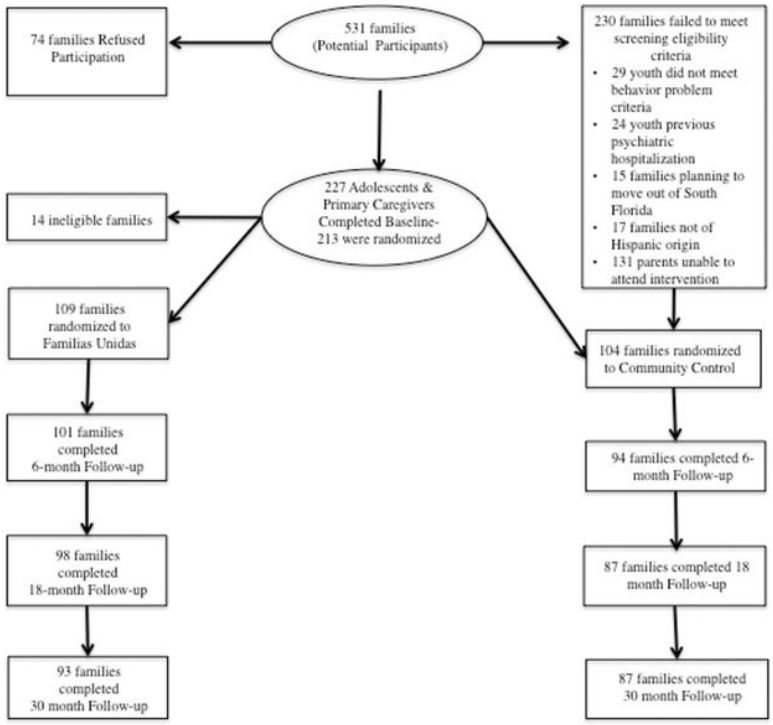

Figure 1.
Flow of participants.

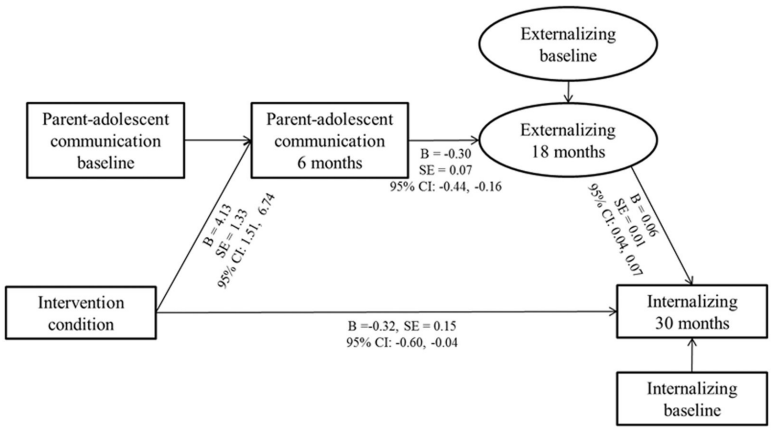

Figure 2.

Structural equation model illustrating the cascading relationship between the intervention, parent-adolescent communication, and youth externalizing and internalizing symptoms across the 4 time-points. All paths are statistically significant at $\alpha = .05$.

Table 1

Baseline comparisons by condition on socio-demographics, moderators, mediator, and outcome. All comparisons non-significant at $\alpha = .05$.

	Familias Unidas (n=109)		**Community Practice Control (n=104)**	
	N (%)	**Mean (SD)**	**N (%)**	**Mean (SD)**
% Male	68 (62.4%)		68 (65.4%)	
Mean age (SD)	13.68 (0.77)		13.86 (0.74)	
Family Income				
$0–$9,999	32 (29.4%)		32 (30.8%)	
$10,000–$19,999	42 (38.5%)		46 (44.2%)	
$20,000–$29,999	20 (18.3%)		13 (12.5%)	
> $30,000	15 (13.8%)		13 (12.5%)	
Internalizing Symptoms		6.18 (5.60)		6.93 (5.07)
Parent-Adolescent Communication		69.38 (10.66)		70.49 (10.61)
Externalizing Variables				
-Conduct Disorder		15.64 (11.35)		15.07 (10.49)
-Socialized Aggression		5.75 (6.46)		4.76 (5.44)
-Attention Problems		12.72 (8.41)		12.63 (8.45)
-Motor Excess		3.24 (2.77)		3.09 (2.75)

Table 2

Baseline Means, Standard Deviations and Correlations (N = 213)

	1	2	3	4	5	6	7
1. Conduct Disorder	---						
2. Socialized Aggression	0.660***	---					
3. Attention Problems	0.732***	0.559***	---				
4. Motor Excess	0.768***	0.575**	0.715***	---			
5. Parent-Adolescent Communication	−0.434***	−0.333***	−0.353***	−0.296***	---		
6. Internalizing	0.678***	0.532***	0.791***	0.671***	−0.338***	---	
7. Age	*− 0.13*	*0.078*	*0.027*	*0.010*	0.059	*0.093*	---
8. Gender	*− 0.061*	*− 0.057*	*− 0.148**	*− 0.152**	*− 0.076*	*− 0.094*	*− 0.102*

	1	2	3	4	5	6	7
Mean	15.36	5.27	12.68	3.16	69.92	6.55	13.77
Standard Deviation	10.92	5.99	8.41	2.75	10.62	5.35	0.76
Range of Values	0–44	0–29	0–32	0–10	43–98	0–22	12–16

*** p< .001,

** p< .01,

* p< .05

Table 3

Parameter estimates, standard errors and confidence intervals for Model 1: Main effects of Familias Unidas, Model 2: Cascading mediation model using baseline covariates, and Model 3: Cascading mediation model using proximal covariates.

	Model 1			Model 2			Model 3		
	B (SE)	**95% CI**	***p***	**B (SE)**	**95% CI**	***p***	**B (SE)**	**95% CI**	***p***
30-month internalizing									
Intervention condition	−0.36 (0.17)	−0.69, −0.03	.03	−0.32 (0.15)	−0.60, −0.04	.03	−0.34 (0.15)	−0.62, −0.05	.02
Baseline internalizing	0.33 (0.07)	0.19;,0.47	< .001	0.23 (0.06)	0.11, 0.36	< .001			
18-month externalizing				0.06 (0.01)	0.04, 0.07	< .001	0.03 (0.01)	0.01, 0.06	.01
18-month internalizing							0.28 (0.11)	0.08, 0.49	.01
age	−0.11 (0.10)	−0.31, 0.09	.26	0.03 (0.09)	−0.16, 0.22	.75	0.003 (0.10)	−0.18, 0.19	.97
gender	−0.14 (0.16)	−0.45, 0.17	.40	0.01 (0.16)	−0.29, 0.30	.97	−0.07 (0.16)	−0.38, 0.23	.64
18-month externalizing									
6-month communication				−0.30 (0.07)	−0.44, −0.16	< .001	−0.12 (0.04)	−0.20, −0.04	.01
Baseline externalizing				0.19 (0.08)	0.03, 0.32	.02			
6-month externalizing							0.09 (0.08)	−0.07, 0.26	.26
6-month communication									
Intervention condition				4.13 (1.33)	1.51, 6.74	.002	3.42 (1.22)	1.03, 5.81	.01
Baseline communication				0.44 (0.06)	0.32, 0.57	< .001	0.35 (0.07)	0.22, 0.48	< .001