Long-Term Effects of Staying Connected with Your Teen® on Drug Use Frequency at Age 20

Kevin P. Haggerty,
Social Development Research Group, School of Social Work, University of Washington

Martie L. Skinner,
Social Development Research Group, School of Social Work, University of Washington

Richard F. Catalano,
Social Development Research Group, School of Social Work, University of Washington

Robert D. Abbott, and
Educational Psychology, University of Washington

Robert D. Crutchfield
Department of Sociology, University of Washington

Abstract

Drug prevention interventions frequently target early adolescents in order to stop or delay initiation of substance use. However, the prevalence and frequency of drug use escalate and then peak during emerging adulthood, making it important to determine whether drug use prevention efforts in adolescence have lasting effects into adulthood. Additionally, given differences in drug use frequency between ethnic groups, intervention effects by race should be examined when possible. This study evaluates the efficacy of a family-focused prevention program, *Staying Connected with Your Teen*®, delivered to parents and teens in 8th grade, on family stressors during 9th and 10th grade, 10th-grade drug use (as potential mediators), and drug use frequency at age 20. Families (N = 331; Black = 163, White = 168) were randomly assigned to 3 conditions; parent-adolescent group-administered (PA), self-administered with telephone support (SA), and no-treatment control (Haggerty, Skinner, MacKenzie, & Catalano, 2007).

The impact of the intervention was assessed using latent variable structural equation models. Age 20 drug use frequency was significantly higher among Whites than Blacks as expected. The PA intervention had direct effects on reducing drug use frequency for both Blacks and Whites. The SA intervention had an impact on family stressors during adolescence for Whites, but not for Blacks. Results suggest that both formats for delivery were modestly efficacious for Whites but only direct delivery was modestly efficacious for Blacks. Given the substantial savings in cost of the self-administered program over the group-administered format, improving the efficacy of self-administered programming for Blacks is recommended.

Correspondence regarding this article and requests for reprints should be directed to Kevin Haggerty, Social Development Research Group, 9725 3rd Ave. NE, Suite 401, Seattle, WA 98115. haggerty@u.washington.edu; Phone: 206-543-3188; Fax: 206-543-4507.

Keywords

substance use; prevention; emerging adults; race disparities

Introduction

This article presents a test of the long-term impact of a randomized trial of a family-based intervention, delivered in early adolescence, to prevent substance use. The frequency of drug use continues to escalate during emerging adulthood (ages 18 – 25) (Bachman et al., 2002; White, Hingson, Pan, & Yi, 2011). About a quarter of smokers and one third of new marijuana users start using after age 17, as do about 70% of cocaine users. Therefore, it is important to determine whether drug use prevention efforts during adolescence have lasting effects into early adulthood. If so, knowing the possible mediators of the intervention's impact, the best delivery format, and for whom each intervention works are also important. Given differences in drug use frequency between ethnic groups, intervention effects should be examined by race when possible.

Family Stressors Mediate Intervention Effects

There is strong evidence that parent and family prevention interventions can prevent later problem behaviors such as drug use, delinquency, and violent behavior, as well as improve family relationships through strengthening positive and reducing negative parenting behaviors (Brody, Beach, Philibert, Chen, & McBride Murry, 2009; Catalano, Berglund, Ryan, Lonczak, & Hawkins, 2004; Foxcroft & Tsertsvadze, 2011; Haggerty et al., 2007; Lundahl, Risser, & Lovejoy, 2006). Research (Catalano et al., 2012) and theory (Hawkins & Weis, 1985) focus on parenting and family functioning as common pathways to multiple problem behaviors for teens and suggest a universal prevention strategy designed to improve family functioning. These family interventions focus on communicating family guidelines for behavior; encouraging parental monitoring of behavior; providing clear, consistent, and moderate consequences; and strengthening parent/teen bonds. Developmentally, these positive parenting practices tend to decrease during an adolescent's high school years (Romer et al., 1999), making adolescence a more vulnerable period for drug use. Some family-based prevention programs have been shown to improve maladaptive family processes, for example, by improving family communication skills (Winett et al., 1993) and parenting skills (Kosterman, Hawkins, Haggerty, Spoth, & Redmond, 2001; McMahon, 1999; Webster-Stratton & Taylor, 2001).

These interventions aim to improve parenting skills and family processes because poor family functioning creates a stressful environment which is linked to problem behaviors in adolescence. Family conflict has been shown to predict drug use and antisocial behavior (Andrews & Hops, 2010; Hawkins, Catalano, & Miller, 1992; Yoshikawa, 1994). Poor family management practices also create stress, and include parent's failure to set clear expectations, failure to supervise and monitor, and excessively severe or inconsistent punishment. Children exposed to these poor practices are at increased risk for substance use and other problems (Dishion & McMahon, 1998; Gorman-Smith, Tolan, Zelli, & Huesmann, 1996; Institute of Medicine & National Research Council, 2011; Shonkoff,

Boyce, & McEwen, 2009). Furthermore, parental responses to youth positive and antisocial behaviors have been linked to problem behaviors. Rewarding antisocial behavior (permissiveness) or responding harshly put youth at increased risk for poor outcomes (Institute of Medicine & National Research Council, 2011). However, skillful problem solving and rewarding prosocial behavior can reduce antisocial behavior (Dishion, Burraston, & Li, 2003; Fletcher, Steinberg, & Williams-Wheeler, 2004; Institute of Medicine & National Research Council, 2011).

Delivering a Family-Focused Intervention

A commonly tested method of delivery of family prevention programs has been through a series of meetings or "classes" involving presentation of material by a trained instructor to a group of parents or parents and their children. This group-administered format provides opportunities for questions and answers, problem solving among participants, as well as role-play and coaching. Group-administered family-based prevention programs have been demonstrated to be a cost-effective way (Aos et al., 2011; Aos, Lieb, Mayfield, Miller, & Pennucci, 2004; Greenwood, Model, Rydell, & Chiesa, 1998) to reduce substance use initiation and the development of substance abuse, conduct disorders, delinquent behavior, and mental health problems (Bauman et al., 2001; Brody et al., 2004; Catalano, Gainey, Fleming, Haggerty, & Johnson, 1999; Haggerty et al., 2007; Kacir & Gordon, 1999; Kumpfer, Alvarado, Smith, & Bellamy, 2002; McMahon & Forehand, 2005; Prinz, Sanders, Shapiro, Whitaker, & Lutzker, 2009; Sanders, Turner, & Markie-Dadds, 2002; Spoth, Kavanagh, & Dishion, 2002; Webster-Stratton & Taylor, 2001). These programs have been demonstrated to be efficacious in reducing some problem behaviors with effect sizes typically in the .30 – .50 range; they have not been compared to other delivery formats. Issues related to recruitment and retention in group-format parenting programs threatens their ability to go to scale and make a public health impact (Whittaker & Cowley, 2012).

In addition to the evidence amassed regarding group-administered family-based prevention programs, there is growing evidence for family self-directed programs (sometimes referred to as self-administered programs). These programs overcome barriers such as transportation and childcare that interfere with parents' ability to attend meetings and could be even more cost effective if shown to be equally efficacious as group-administered programs. Bauman et al. (2000) found that use of the Family Matters program, a self-directed family program consisting of four modules delivered to adolescents and their parents with telephone follow-up, resulted in significant reductions in cigarette and alcohol use among adolescent participants compared to controls 12 months after the program was completed. Working with parents with younger children, similar successes have been noted for the Triple-P program (Markie-Dadds & Sanders, 2006; Metzler, Sanders, Rusby, & Crowley, 2012; Prinz et al., 2009). Self-directed programs offer fewer barriers yet lack the advantages of group process and facilitation which may influence implementation fidelity. Very few studies have been conducted to compare group and self-administered delivery formats of the same prevention program materials.

Preventing Drug Use for Black and White Youth

Blacks in the United States experience greater exposure to a variety of environmental stressors, including poverty, poor schools, unsafe neighborhoods, and racial discrimination. These stressors place greater strains on family interactions for Blacks compared to Whites (Williams & Jackson, 2005). Among Black parents, having fewer economic resources and opportunities imparts greater risk for drug use and other negative outcomes for Black youth. However, data from Monitoring the Future and the National Longitudinal Youth Survey indicate that Black youth consistently report later initiation and lower 30-day and 1-year use than White youth across all substances except marijuana (National Institute on Drug Abuse, 2003). Some evidence suggests that Black families demonstrate higher levels of setting guidelines and monitoring their children's behavior than White families (Skinner, Haggerty, & Catalano, 2009), which are strong protective factors against risk behaviors such as tobacco use, substance use, and violence for both Black and White youth (Haggerty, Skinner, McGlynn, Catalano, & Crutchfield, 2013; Skinner et al., 2009; Wallace & Muroff, 2002). Given differences in substance use prevalence and frequency, and possibly differences in parenting practices, it is possible that family-focused interventions will differentially impact Black and White families, or that the mediating mechanism of family process may operate differently in these two groups.

Program Description

Staying Connected with Your Teen® is a family-centered intervention that was offered to parents and their eighth-grade child to reduce family stressors by improving family management (guidelines, monitoring, and consistent and fair positive and negative consequences), reducing family conflict, and preventing the drop-off in parental communication and involvement that is typical during the high school years. It includes a seven-chapter, 108-page family workbook written to a 7.9 grade level of education, and a 117-minute video in 18 sections used in conjunction with each of the chapters in the family workbook. Four fictitious families are portrayed by actors, and a narrator provides background information, cues for what to look for, and emphasis of important points. Risk factors addressed by the program include family management problems, family conflict, and favorable parental attitudes toward drug use. The program is designed also to help build protection in families by helping parents provide children with opportunities to contribute to their families and to acquire the skills needed to both perform well in and take advantage of opportunities, and to use reward and recognition strategies in order to promote bonding (Catalano & Hawkins, 1996). The workbook and video used in both the group- and self-administered formats were identical. Families in both the conditions received up to $100 for their completion or participation in the program activities. Those assigned to the control condition received no intervention materials.

Families assigned to the parent and adolescent groups met for 7 consecutive weeks, covering one of the family workbook chapters per week. They also received their own copies of the program materials. The intervention groups were racially integrated, with racial makeup depending on logistical considerations, and generally reflected the demographics of the neighborhoods where the families attended the group sessions. The first, fourth, and seventh sessions were 2.5 hours long and included a light dinner; Sessions 2, 3, and 5 were 2 hours

in length. Youth attended the sessions with one or both of their parents. During the sessions, families met together during the first 30 – 40 minutes and viewed the video components of the curriculum. Then parents and teens separated into different groups to practice specific skills for about 40 – 60 minutes; they returned for the last 40 minutes to practice skills through structured family interaction tasks. Family sessions were led by two trained workshop leaders, one White and one non-White. Families were exposed to nearly all of the video segments and workbook activities during the sessions and through homework activities. Of the 118 families assigned to the PA condition, 92 (77.9%) initiated the parent and teen sessions. The mean number of sessions attended was 4.56. Childcare reimbursement and transportation (cab fare) were provided when needed. Group leaders called families each week to remind them of the upcoming session. Total actual cost per participant for this format was $728 (2005 Dollars).

Families participating in the self-administered condition were mailed program materials and had a 10-week window to complete the video and workbook activities (describe above). They received weekly phone calls from a family consultant who verified the activities families had completed during the week, motivated them to use the *Staying Connected with Your Teen®* materials with their teen, helped parents/caregivers apply the concepts to their family life, and assisted in troubleshooting issues that arose with families. Program content is described in more detail in Haggerty et al. (2007). The actual cost per participant of this format was $254 (2005 Dollars).

The original randomized trial was intended to determine (a) if there were overall effects for the intervention groups vs. the control group, (b) if the self-administered format was equally effective as the group-administered format, and (c) if either format was more effective for Whites vs. Blacks. Previously published effects were evident 2 years after the program was administered (Haggerty et al., 2007). Analyses of teen outcomes at 2-year follow-up found that both program delivery formats reduced favorable attitudes toward drug use among both Black and White youth (effect size (Cohen's d) SA d = .39, PA d = .22), and Black youth in the self-administered intervention reported significantly less violent behavior than their Black control counterparts (d = .45). Logistic regression predicting a combined outcome measure of initiation of alcohol, tobacco, drug use, and/or sexual activity found significant differences for Black teens in the SA condition compared to Black controls (OR = 0.31), indicating a threefold reduction in initiation. There was a fourfold reduction in initiation for the Black teens in the PA condition compared to Black controls (OR = 0.25). Based on these intervention effects we concluded that both formats were somewhat effective, but that the self-administered format was particularly efficacious for Blacks with regard to violent behavior and initiation of drug use and/or sex.

In this article we examine whether effects of the intervention on frequency of drug use emerge later, and how those effects might be mediated. This study tests the long-term effects of *Staying Connected with Your Teen®* administered in eighth grade (mean age 13 years) in a randomized control trial of three conditions: group- and self-administered delivery formats and a no-treatment control condition. Effects of the intervention are hypothesized to be mediated. We hypothesize that the self-administered (SA) and the parent and teen group (PA) condition reduced family stressors at ages 14 – 16 which in turn reduced drug use

frequency at age 16, and that any apparent effects of the program on drug use at age 20 were mediated through this mechanism. Further, the intervention effects and the hypothesized mediations are tested for equivalence across Black and White families.

Method

Recruitment, Randomization, Assessment, Fidelity, and Participation

Recruitment—Parents of eighth-grade students in Seattle Public Schools received a letter jointly from the investigator and from the school district research office describing the study, and the parents were later contacted by phone. This was done in 2 consecutive years. Eligibility included self-identifying the teen as Black or White on school enrollment forms, speaking English as their primary language, and planning to live in the area for at least 6 months. Figure 1 provides details. Consent was obtained at the baseline interview; therefore, all 331 families who consented were assigned to a group and interviewed.

Randomization—Families were randomly assigned to cells blocked on youth's race and gender using a random number generator in SPSS (SPSS, 2001). Recruitment of families continued until the cells were filled with the targeted number. Forty-six percent consented (55% of Blacks and 40% of Whites). Families were included if the teen and one or both parents consented. This resulted in a sample of 163 Black and 168 White families (total N = 331).

Assessment—Study participants completed surveys on laptop computers (parents and teens), and participated in structured interactions that we were videotaped in the families' homes. Families completed three structured interaction tasks: (a) a 10-minute warm-up interaction with parent(s) and the teen, (b) a 10-minute dyadic problem-solving interaction between a parent and the teen, and (c) a 5-minute dyadic recognition task during which the parent and teen complimented one another. Participants received $15 for completing surveys, and families received $50 for completing the video observations. Similar surveys and videotaped interactions were conducted at posttest (about 6 months following baseline), and 1 and 2 years following completion of the posttest. At the long-term follow-up we attempted to re-contact all 331 young adults who then ranged in age from 18 to 22 (mean 19.7 years), regardless of which year they were in the eighth grade. From the original participant pool, 301 (90.1%) completed self-administered surveys on a laptop, and provided a urine sample for drug screening. Of these, 67 were Black males, 73 Black females, 82 White males, and 79 White females. Most were currently enrolled in school (57.8%); 45.6% were employed at the time of the study; and 18% were neither employed nor attending school regularly. Participants received $50 for completing the survey. All protocols were approved by the University of Washington internal review board.

Fidelity and participation—The parent and teen group intervention was guided by a structured written curriculum. Each family session was independently observed and rated using a checklist developed for each session, noting coverage of up to 123 individual program content and process items per session. Double rating occurred in 20% of the sessions to assess inter-rater reliability. Average agreement between raters was strong

(93%). At the end of the 7 weeks, overall content covered per group ranged from 75.5% to 88.3%, with an average of 82.3%.

Family consultants for the self-administered format attended weekly meetings supervised by the intervention coordinator to provide opportunities to review cases, to promote fidelity to the standardized protocols, and to ensure that families were being contacted on a weekly basis. Of the 107 families assigned to the SA condition, 99 (92.5%) could be contacted by the family consultants and initiated the program. Mean level of reported completion of the family activities was 79% (S.D. = 29.39; median = 100%). On average, family consultants made 16.9 call attempts, resulting in 9.7 completed calls during the 10 weeks; phone calls lasted about 10.5 min per week.

Sample

There were significant differences by race on several demographic variables. Whites reported higher per capita income ($21,970 vs. $7,807 for Blacks) and parental education (61% college graduates vs. 13% for Blacks), and Blacks reported higher prevalence of single parenthood (57% vs. 24% for Whites) and more household members (5 vs. 4.2 for Whites). Some teens in each race group self-identified as mixed race/ethnicity (19.6% Black, 12.5% White, which included Latino, Native American, Asian, White, and Black), but were included in these analyses in their respective assigned group as part of the intent-to-treat design. In addition to collecting data on the teen, data were also collected from parents/caregivers. Most primary caregivers from whom data was collected were female (> 80%), with 71.6% being the adolescent's biological mother. Significantly more Blacks had another female caregiver (e.g., grandmother, aunt) as a primary caregiver than did Whites.

Measures

Family stressors is a latent construct developed from four indicators (family management, family conflict, observed reward for negative behavior, and observed reward for positive behavior) collected in 9th and 10th grade and includes self-report items from parents and youth, and ratings of videotaped parent-teen interactions. These are described below.

Family management is a mean of youth and parent reports of parent family management at 9th and 10th grade (12 and 24 months after the intervention was completed). The measure consists of six parent-reported items assessing *Parental guidelines* (rules and consequences for substance use), in which the parent indicated on a 4-point scale their agreement with statements such as "I have clear and specific rules about my teen's use of tobacco, alcohol, and illegal drugs" and "I have explained the consequences of not following my rules concerning tobacco, alcohol, and drug use to my child" (9th-grade a = .83; 10th-grade a = .80). Seven *Monitoring* items assess whether the teen believes his/her parent knows who his/her friends are, where the teen is, and what he/she is doing. Response options were on a 4-point scale: YES!, yes, no, NO! (9th-grade α = .79; 10th-grade α = .82). Two youth-reported items assess consistency of *Consequences*: "If you skipped school, would you get caught and punished?" and "If you drank beer or wine without your parent's permission, would you get caught and punished?" Responses used the same 4-point scale (9th-grade r = .15 p = .01; 10th-grade r = .24 p = .000). Each of the scores was standardized (z-score mean

= 0, S.D. = 1) and averaged. A positive score represents stronger family management, contributing to a less stressful family environment.

Family conflict was measured by both teens and parents in Grades 9 and 10 and consists of four dichotomous items from the Family Environment Scale (Moos & Moos, 1983): (a) *we fight a lot in our family, (b) family members rarely lose tempers, (c) family members often criticize each other, and (d) family members are rarely openly angry*. Items 2 and 4 were reversed and the items were summed to form an index. High scores indicate higher conflict.

Observed parenting behavior—The parenting constructs were based on items from the Social Development Model Observational Coding System (SDM-OCS; Spagnolo et al., 2002), a macro-level rating system tailored to measure constructs from the social development model (SDM; Catalano & Hawkins, 1996; Catalano et al., 2005). The protocols for the interaction tasks and SDM-OCS were informed by a variety of previously developed family coding systems (Antony, Nelson, McMahon, & Conduct Problems Prevention Research Group, 1996; Crnic & Greenberg, 1990; Dishion et al., 1987; Eyberg & Robinson, 1983; Hops et al., 1990; Kogan et al., 2012; McMahon & Estes, 1993; Melby et al., 1998; Rusby, Estes, & Dishion, 1991). Interactions were videotaped in the families' homes. Intraclass correlations indicated that inter-rater agreement was high (ICC M = .88, range .68 to .97) (Lindahl, 2001; McGraw & Wong, 1996; Skinner, MacKenzie, Haggerty, Hill, & Roberson, 2011).

Two subscales from the SDM-OCS are included: observed reward for negative behavior and observed reward for positive behavior. *Observed reward for negative behavior* consists of rating parent behaviors for being permissive, ignoring problem behaviors, reinforcing negative behavior, appearing overwhelmed, being manipulated by their teen, or not discouraging negative behavior. *Observed reward for positive behavior* consists of rating parent behavior for parental warmth, encouraging ideas, positive response to positive behavior, and responding with physical affection. The average across categories was computed and then averaged across time for Grades 9 and 10. Previously published analyses demonstrate these two constructs to be reliably measured, with invariance across race (Skinner et al., 2011; Spagnolo et al., 2002).

Drug use at 10th grade (approximately age 16) is a measure of the frequency of substance use based on heavy episodic drinking in the past 2 weeks (five drinks in a row for males, four drinks in a row for females; 0 = none, 2 = 1 or more times), marijuana use in the past month (0 = none to 3 = 3 or more times), alcohol use in the past month (0 = none to 3 = 3 or more times), and any other drug use in the past year (0 = none, 2 = 1 or more times). Frequency variables were summed across categories. This allowed us to include drug categories that were too infrequent to model separately.

Drug use frequency at age 20 is the dependent variable and is a latent construct consisting of four indicators of substance use frequency: heavy episodic drinking in the past 2 weeks (five drinks in a row for males, four drinks in a row for females), marijuana use in the past month, cigarette use in the past month, and any other illegal drug use in the past year. Response options in the survey for each indicator were ordinal, so actual counts of behavior

were not available. However, ordinal rather than continuous measures can reduce skewness and the impact of outliers--frequently a problem with low-frequency behaviors. Heavy drinking consists of five categories ranging from none (1) to 6 or more times (5). Marijuana use ranged from none (1) to 20 or more times (6). Smoking ranged from none (1) to more than a pack per day (5). Other illegal drug use ranged from none (1) to 6 or more occasions (4).

Intervention condition is represented by two dichotomous variables consisting of self-administered with phone follow-up, (SA = 1; n = 107), or the parent and teen group condition (PA = 1; n = 118). Control families were coded 0 for SA and PA (n = 106).

Attrition Analyses

At posttest, 94.7% of the sample participated in the survey. During the 1-year follow-up (9th grade), 92.5% of families were interviewed. Two-year follow-up (10th grade) yielded 92% of the sample). At age 20, 91% (n = 301) completed the survey with no completion difference by race or intervention condition.

Results

Measurement Model Tests

To more precisely account for measurement error and avoid the potential of Type II error bias from using change scores, a latent construct approach is used to analyze the intervention effects. Methodologists have suggested that using latent constructs with correlated error terms more precisely accounts for measurement error, and this is particularly useful when measured indicators are only modestly correlated (Bollen, 1989; Lord, 1965; Singer & Willett, 2003). Multiple measures of family stress and drug use frequency were modeled as latent constructs. Mplus (version 6.1, L. K. Muthén & Muthén, 2010) was used to conduct multiple-group confirmatory factor analysis (MGCFA; Bontempo & Hofer, 2006; B. O. Muthén, 1989) to assess measurement equivalence across Black and White study participants and across randomly assigned condition. These tests directly compare factor loadings and intercepts/thresholds between groups. Missing data were handled with maximum likelihood estimation which yields less biased parameter estimates for data assumed to be missing at random (Schafer & Graham, 2002).

Multiple-group confirmatory factor analysis (MGCFA) for Blacks and Whites was conducted to test for measurement invariance. The initial MGCFA did not support measurement invariance. Stepwise freeing of equality constraints resulted in a partially invariant measurement solution (X^2 241.22 df = 194 p = .01; RMSEA = .03; CFI = .94; TLI = .94). Table 1 provides the unstandardized and standardized estimates and standard errors for each indicator. The measurement model was not significantly different between Whites and Blacks ($\chi2$ 17.12 df = 20 p = .65) when allowing the following intercepts and thresholds to vary by race. The intercept and loadings for family conflict were significantly higher for the Black than the White sample. The thresholds for binge drinking and other drug use were significantly higher for the White than the Black sample. The intercept for family management was higher for Blacks than Whites. All other intercepts and loadings were

constrained to be equal across groups. All indicators contributed significantly to the overall variance of the latent factors ($p < .001$), and the model achieved acceptable fit to the data (χ^2 70.77 *df* (48), $p = .02$; CFI = .96; TLI = .95; RMSEA = .05). These results suggest partially invariant measurement equality across race.

MGCFA for intervention group—Multiple-group confirmatory factor analysis was conducted between the three intervention conditions (control, SA, PA). As anticipated, the derivatives difference test revealed no significant difference (χ^2 421.88 $\chi^2/df = p = .607$), indicating the measurement model was invariant between the three groups. Overall, the fully constrained measurement model fit the data well enough to proceed (χ^2 421.88 *df* (323), $p = .0002$; CFI = 86; TLI = .87; RMSEA = .037).

Structural Model Tests

The structural model tests for direct and indirect effects of both intervention formats compared to controls on the overall frequency of problem substance use at age 20. Multiple-group structural equation models (MGSEM) were used to estimate whether there is race moderation of the impact of each mode of the intervention on family stressors in 9th and 10th grade and drug use frequency at age 20. Also examined in this model is the potential race moderation of the impact of family stressors in 9th and 10th grade on age 16 and age 20 drug use. Analyses involved three steps: (a) MGSEM with all path coefficients allowed to differ between race groups with estimates for model fit (unconstrained). (b) MGSEM with all path coefficients constrained to be equal across race with estimates for model fit and a derivatives differences test (difftest) comparing the fit of the two models using the difftest function in Mplus. This allows a comparison of the model fit between the two racial groups and indicates whether the structural relationships between Blacks and Whites are significantly different. (c) If the difftest was significant in the fully constrained model, we estimated models by freeing the constraints on path coefficients one at a time (in a stepwise fashion based on modification indices) until the difftest indicated that the difference between groups was not significant. We compared the fit of MGSEM with all path coefficients allowed to differ between race groups to MGSEM with all path coefficients constrained to be equal across race using a derivatives differences test. This test indicated a significant difference in model fit for Blacks and Whites (χ^2 26.27, *df* (10), $p = .0034$). Stepwise freeing of equality constraints resulted in a partially constrained model (Figure 2) that fit the data adequately (χ^2 118.37, *df* (93), $p = .10$; CFI = .97; TLI = .96; RMSEA .04, difftest $p = .$ 12) by freeing the paths from SA to family stressors (χ^2 18.72 *df* (9), $p = .03$), and the path from family stressors to drug use frequency (χ^2 21.62 *df* (9), $p = .01$). The results of this model indicate that the path coefficients for direct effects of both intervention formats were not different for Blacks and Whites. The PA intervention had a small, but significant direct effect on young adult drug use frequency. Although the path coefficient from SA to age 20 drug use frequency appears of higher magnitude than the path for PA, the standard error of the estimate was higher and the path did not reach significance. The PA intervention also had a significant mediated effect through family stressors for both Blacks and Whites. For Whites, the SA condition had a trend-level indirect effect through family stressors ($\beta = -.21$, SE .12, $p = .08$) and age 16 drug use ($\beta = -.06$, SE .03, $p = .09$), and combined with nonsignificant direct effects produced a significant total effect (total effect $\beta = -.37$ $p = .04$).

The indirect effects of the SA intervention were not significant for Blacks, although the indirect path from SA to family stressors to age 16 drug use to drug use frequency at age 20 trended toward significance ($\beta = -.06$. SE .04, $p = .09$). Combined with direct effects, the total effects of the SA intervention for Blacks was not significant.

For the PA intervention, in addition to the direct path for both Blacks and Whites on drug use frequency, the indirect paths which partially mediated the effects for Whites included PA to family stressors to drug use frequency at age 20 ($\beta = -.20$, $p = .06$), and PA to family stressors to drug use at age 16 to drug use frequency at age 20 ($\beta = -.06$ $p = .06$), which together achieved a combined indirect effect which was significant (indirect effect $= -.25$ $p = .04$, total effect $= -.29$ $p = .02$). For Blacks, only the indirect path from PA to family stressors to drug use at age 16 to drug use frequency at age 20 ($\beta = -.59$, $p = .06$) trended toward significance. Overall, the model accounted for 50% of the variance in drug use frequency for Whites and only 15% of the variance for Blacks.

Discussion

When including family stressors and prior drug use (at age 16) in the model (Figure 2), there was a direct effect of the PA condition on both family stressors and drug use frequency 6 years following the intervention for both Black and White youth. The direct effect of the SA intervention on drug use frequency was not significant, but there were some significant mediated effects through the impact of the program on family stressors for Whites only.

The overall significant effect of the PA intervention on family stressors and drug use frequency for both Blacks and Whites is an important finding. While only a few family-centered prevention interventions have conducted long-term follow-up studies (Heinrichs & Jensen-Doss, 2010; Mason, Kosterman, Hawkins, Haggerty, & Spoth, 2003; Spoth, Redmond, Shin, & Azevedo, 2004), these findings add evidence to the potential of relatively brief family interventions to influence outcomes years later. The lack of a more robust effect of the SA intervention for Blacks stands in contrast to earlier findings (Haggerty et al., 2007). This may be in part due to the fact that drug use is being measured differently; in the earlier measure, alcohol, tobacco, marijuana, other illegal drug use initiation, and sex initiation were a combined measure. Here we examine only drug use frequency.

The analyses presented here suggest at least three areas of future research. First, it is important to further explore the relationship between family stressors during adolescence and drug use frequency in early adulthood. Where family stressors increased substance use for Whites, the relationship for Blacks was not statistically significant, suggesting that earlier family stressors were not related to drug use frequency for Black youth. This disjuncture for Blacks suggests that other mechanisms may be important to investigate. It may be that for Black youth peer and other environmental influences are more predictive of later substance use than family stressors. Second, *Staying Connected with Your Teen* had a more consistent pattern of effects for Whites than Blacks at age 20, suggesting the need for further exploration of prevention interventions that directly change opportunity structures and build supports for the transition into early adulthood, especially for Black youth. Third, although the SA format had more immediate outcomes on drug use and sex initiation and

violence, particularly for Black teens (Haggerty et al., 2007), the PA format appears to have a stronger effect (at least for Whites) at age 20, suggesting the need to better understand the proximal and distal effects of self-directed programs. The PA format included behavioral rehearsal opportunities between parents and their teens, which may explain the more sustained effect.

Testing intervention effects using latent constructs has some disadvantages, primarily that the practical implication of the effects cannot be measured directly since the outcome is not a measured variable with a meaningful scale. The comparison of groups makes standardized estimates somewhat confusing since estimates are constrained to be equal, but variances are not. This means the non-standardized coefficients are equal across groups, but the standardized coefficients (and therefore effect sizes) are not. In considering the practical impact of the intervention on frequency of substance use, we note that the direct effect of PA was equal for Whites and Blacks, statistically significant, but quite modest. The standardized direct effect was −.023 for Whites and −.026 for Blacks. However, the total indirect effects were only significant for Whites and the standardized estimate much larger (−.14). If we were to generalize across the population, this would make very little practical difference for Blacks for whom substance use is relatively infrequent to start with. For Whites, for whom substance use is more common, even a modest reduction in frequency is meaningful from a public health perspective.

The *Staying Connected with Your Teen*® intervention emphasizes the importance of reducing family stressors during adolescence to significantly reduce young adult drug use. It is not clear that reducing family stressors in adolescence alone will appreciably reduce early adult drug use frequency among Blacks for whom stressors are high and drug use is relatively low. Without question, Blacks are exposed to higher levels of ongoing stressors throughout their lives relative to Whites (Skinner et al., 2011). In spite of these obvious risk factors for drug use, Black teens and young adults fare better than their White counterparts in terms of drug use incidence and frequency. Although our measures of family stressors captured variability within and across race, there may be other forms of stressors that relate to drug use for Blacks which we did not measure. Furthermore, overall drug use is lower for Blacks than Whites, but marijuana use is equal across the race groups. Tests specifically of marijuana use may produce a different pattern of results, although examining diagnostics in the SEM to improve fit did not indicate unique effects on marijuana relative to the overall latent construct.

Strengths and Limitations

This study has a number of strengths that should be noted. First, we used a balanced sample of Black and White young adults with longitudinal data; over 90% of the original sample participated in the age 20 survey. Second, the study used multi-informant, and multiple measures, including observed measures of parent/teen interactions. This broad array of measures adds validity to the findings. We know of no other intervention trials that have combined longitudinal data from multiple reporters and used observed measures during adolescence to predict the impact of interventions on drug use frequency at age 20. The observer-rated measures are a strength of this study, but also fall short of coding moment-to-

moment interactions. They do not reveal exactly how parent's rewards for specific behaviors unfold, nor do they provide any insight into the contribution that teens make to this process. This could be important particularly since both the parents and teens engaged in the intervention and effects of the intervention may have been mediated through changes in teen communication with their parents. For instance, teens who participated in the intervention with their parents may have provided more direct and positive information about their whereabouts than did their control counterparts. This could easily have come about through the discovery that their parents needed and wanted this information.

The use of multiple-group latent construct SEM models to more precisely account for measurement error and avoid the potential of Type II error bias is also a strength of the study (Bollen, 1989; Lord, 1965; Singer & Willett, 2003). Furthermore, it allows us to test intervention effects on the overall frequency of drug use, which is what this family-focused universal intervention is designed to reduce. However, different types of substances and patterns of substance use may be differentially influenced by some interventions, and making those distinctions could be an important contribution in future tests of family-focused interventions. Despite these strengths, there are some limitations--primarily that the practical implications of the effects are more difficult to interpret since the outcome is not a measured variable with a meaningful scale. The sample size (Whites = 168, Blacks = 163) limits the number of paths that can be tested in any model and reduced power to detect effects. Additionally, these analyses were conducted at the individual level, the level of randomization, yet the PA intervention was a group-delivered intervention. The SEM cannot take into account the clustering of families within only 1 of 3 conditions. This may have artificially reduced the standard errors and thus increased Type I error.

While the model accounts for half of the variance for White young adult substance use frequency, it only accounts for 15% of the variance for Blacks. This suggests that there are other important factors influencing substance use frequency among Blacks. Evidence from Strengthening African American Families suggests that improving engagement and ownership in the intervention could improve its impact for Black teens (Kogan et al., 2012). This study points to what may be important differences in the mechanisms between Black and White families through which drug use prevention programs influence drug use behavior. The influence of family stressors on teen and age 20 drug use is strong for Whites, for whom drug use is common during early adulthood. Although Blacks may be exposed to greater environmental stressors, family functioning remains high. Furthermore, there is a need to explore the impact of more concurrent events, including stressful life experiences, daily hassles, family formation, employment, and education, as they may be mediators of intervention effects and potential risk and protective factors for concurrent and future drug use.

Our primary conclusion is that the *Staying Connected with Your Teen*® intervention had significant but modest effects in reducing the frequency of early adult drug use among Whites in both a group- and self-administered format. For Blacks, the intervention was less powerful and only the group-administered format produced significant reductions in drug use frequency, suggesting the need to improve self-administered programming for Blacks given the substantial savings in cost of delivery over the group-administered format.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

References

Andrews, JA.; Hops, H. The influence of peers on substance use. In: Scheier, LM., editor. Handbook of drug use etiology: Theory, methods, and empirical findings. Washington, DC: American Psychological Association; 2010. p. 403-420.

Antony J, Nelson D, McMahon RJ. Conduct Problems Prevention Research Group. Observer impressions. 1996 Retrieved from http://www.fasttrackproject.org.

Aos, S.; Lee, S.; Drake, E.; Pennucci, A.; Klima, T.; Miller, M.; Burley, M. Return on investment: Evidence-based options to improve statewide outcomes - July 2011 update. #11-07-1201. Olympia: Washington State Institute for Public Policy; 2011.

Aos, S.; Lieb, R.; Mayfield, J.; Miller, M.; Pennucci, A. Benefits and costs of prevention and early intervention programs for youth. Olympia: Washington State Institute for Public Policy; 2004.

Bachman, JG.; O'Malley, PM.; Schulenberg, JE.; Johnston, LD.; Bryant, AL.; Merline, AC. The decline of substance use in young adulthood: Changes in social activities, roles, and beliefs. Mahwah, NJ: Lawrence Erlbaum Associates; 2002.

Bauman KE, Ennett ST, Foshee VA, Pemberton M, King TS, Koch GG. Influence of a family-directed program on adolescent cigarette and alcohol cessation. Prevention Science. 2000; 1:227–237. [PubMed: 11523750]

Bauman KE, Foshee VA, Ennett ST, Pemberton M, Hicks KA, King TS, Koch GG. The influence of a family program on adolescent tobacco and alcohol use. American Journal of Public Health. 2001; 91:604–610. [PubMed: 11291373]

Bollen, KA. Structural equations with latent variables. Oxford: John Wiley & Sons; 1989.

Bontempo, DE.; Hofer, SM. Assessing factorial invariance in cross-sectional and longitudinal studies. In: Ong, AD.; van Dulmen, M., editors. Oxford handbook of methods in positive psychology. New York: Oxford University Press; 2006. p. 153-175.

Brody GH, Beach SRH, Philibert RA, Chen Y-f, McBride Murry V. Prevention effects moderate the association of 5-HTTLPR and youth risk behavior initiation: Gene × environment hypotheses tested via a randomized prevention design. Child Development. 2009; 80:645–661. [PubMed: 19489894]

Brody GH, McBride Murry V, Gerrard M, Gibbons FX, Molgaard V, McNair L, Neubaum-Carlan E. The Strong African American Families Program: Translating research into prevention programming. Child Development. 2004; 75:900–917. [PubMed: 15144493]

Catalano RF, Berglund ML, Ryan JAM, Lonczak HS, Hawkins JD. Positive youth development in the United States: Research findings on evaluations of positive youth development programs. The Annals of the American Academy of Political and Social Science. 2004; 591:98–124.

Catalano RF, Fagan AA, Gavin LE, Greenberg MT, Irwin CE, Ross DA, Shek DTL. Worldwide application of the prevention science research base in adolescent health. The Lancet. 2012; 379:1653–1664.

Catalano RF, Gainey RR, Fleming CB, Haggerty KP, Johnson NO. An experimental intervention with families of substance abusers: One-year follow-up of the Focus on Families project. Addiction. 1999; 94:241–254. [PubMed: 10396792]

Catalano, RF.; Hawkins, JD. The social development model: A theory of antisocial behavior. In: Hawkins, JD., editor. Delinquency and crime: Current theories. New York: Cambridge University Press; 1996. p. 149-197.

Catalano, RF.; Park, J.; Harachi, TW.; Haggerty, KP.; Abbott, RD.; Hawkins, JD. Mediating the effects of poverty, gender, individual characteristics, and external constraints on antisocial behavior: A test of the social development model and implications for developmental life-course theory. In: Farrington, DP., editor. Advances in criminological theory: Vol. 14. Integrated developmental and life-course theories of offending. New Brunswick, NJ: Transaction; 2005. p. 93-123.

Crnic KA, Greenberg MT. Minor parenting stresses with young children. Child Development. 1990; 61:1628–1637. [PubMed: 2245752]

Dishion, TJ.; Burraston, B.; Li, F. Family management practices: Research design and measurement issues. In: Sloboda, Z.; Bukowski, W., editors. Handbook for drug abuse prevention: Theory, science, and practice. New York: Kluwer; 2003. p. 587-607.

Dishion TJ, Gardner K, Patterson GR, Reid J, Spyrou S, Thibodeaux S. The Family Process Code: A multidimentional system for observing family interactions. 1987 Dec 7. Retrieved from http://www.oslc.org/resources/codemanuals/familyprocesscode.pdf.

Dishion TJ, McMahon RJ. Parental monitoring and the prevention of child and adolescent problem behavior: A conceptual and empirical formulation. Clinical Child and Family Psychology Review. 1998; 1:61–75. [PubMed: 11324078]

Eyberg SM, Robinson EA. Dyadic Parent-Child Interaction Coding System (DPICS): A manual. Psychological Documents. 1983; 13(2) Ms. No. 2582.

Fletcher AC, Steinberg L, Williams-Wheeler M. Parental influences on adolescent problem behavior: Revisiting Stattin and Kerr. Child Development. 2004; 75:781–796. [PubMed: 15144486]

Foxcroft DR, Tsertsvadze A. Universal family-based prevention programs for alcohol misuse in young people. Cochrane Database of Systematic Reviews. 2011; 9:CD009308. [PubMed: 21901733]

Gorman-Smith D, Tolan PH, Zelli A, Huesmann L. The relation of family functioning to violence among inner-city minority youths. Journal of Family Psychology. 1996; 10:115–129.

Greenwood, PW.; Model, KE.; Rydell, CP.; Chiesa, J. Diverting children from a life of crime: Measuring costs and benefits. Santa Monica: Rand Corporation; 1998.

Haggerty KP, Skinner ML, MacKenzie EP, Catalano RF. A randomized trial of Parents Who Care: Effects on key outcomes at 24-month follow-up. Prevention Science. 2007; 8:249–260. [PubMed: 17987388]

Haggerty KP, Skinner ML, McGlynn A, Catalano RF, Crutchfield RD. Parent and peer predictors of violent behavior of Black and White teens. Violence & Victims. 2013; 28:145–160. [PubMed: 23520837]

Hawkins JD, Catalano RF, Miller JY. Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance-abuse prevention. Psychological Bulletin. 1992; 112:64–105. [PubMed: 1529040]

Hawkins JD, Weis JG. The social development model: An integrated approach to delinquency prevention. Journal of Primary Prevention. 1985; 6:73–97. [PubMed: 24271382]

Heinrichs N, Jensen-Doss A. The effects of incentives on families' long-term outcome in a parenting program. Journal of Clinical Child and Adolescent Psychology. 2010; 39:705–712. [PubMed: 20706922]

Hops, H.; Biglan, A.; Tolman, A.; Sherman, L.; Arthur, J.; Warner, P.; Osteen, V. Living in Familial Environments (LIFE) coding system: Training/procedures and reference manual for coders (Rev. ed.). Eugene, OR: Oregon Research Institute; 1990.

Institute of Medicine, National Research Council. The science of adolescent risk-taking: Workshop report. Washington, DC: The National Academies Press; 2011.

Kacir CD, Gordon DA. Parenting adolescents wisely: The effectiveness of an interactive videodisk parent training program in Appalachia. Child and Family Behavior Therapy. 1999; 21:1–22.

Kogan SM, Brody GH, Molgaard VK, Grange CM, Oliver DAH, Anderson TN, Sperr MC. The Strong African American Families–Teen Trial: Rationale, design, engagement processes, and family-specific effects. Prevention Science. 2012; 13:206–217. [PubMed: 22124939]

Kosterman R, Hawkins JD, Haggerty KP, Spoth R, Redmond C. Preparing for the Drug Free Years: Session-specific effects of a universal parent-training intervention with rural families. Journal of Drug Education. 2001; 31:47–68. [PubMed: 11338965]

Kumpfer KL, Alvarado R, Smith P, Bellamy N. Cultural sensitivity and adaptation in family-based prevention interventions. Prevention Science. 2002; 3:241–246. [PubMed: 12387558]

Lindahl, KM. Methodological issues in family observational research. In: Kerig, PK.; Lindahl, KM., editors. Family observational coding systems. Mahwah, NJ: Lawrence Erlbaum Associates; 2001. p. 23-32.

Lord FM. A strong true-score theory, with applications. Psychometrika. 1965; 30:239–270. [PubMed: 5216215]

Lundahl B, Risser HJ, Lovejoy MC. A meta-analysis of parent training: Moderators and follow-up effects. Clinical Psychology Review. 2006; 26:86–104. [PubMed: 16280191]

Markie-Dadds C, Sanders MR. Self-directed Triple P (Positive Parenting Program) for mothers with children at-risk of developing conduct problems. Behavioural and Cognitive Psychotherapy. 2006; 34:259–275.

Mason WA, Kosterman R, Hawkins JD, Haggerty KP, Spoth RL. Reducing adolescents' growth in substance use and delinquency: Randomized trial effects of a preventive parent-training intervention. Prevention Science. 2003; 4:203–312. [PubMed: 12940470]

McGraw KO, Wong SP. Forming inferences about some intraclass correlation coefficients. Psychological Methods. 1996; 1:30–46.

McMahon, RJ. Parent training. In: Rus, SW.; Ollendick, TH., editors. Handbook of psychotherapies with children and families. New York: Plenum; 1999. p. 153-180.

McMahon, RJ.; Estes, AM. Fast Track parent-child interaction task: Observational data collection manuals. Seattle: University of Washington; 1993.

McMahon, RJ.; Forehand, RL. Helping the noncompliant child: Family based treatment for oppositional behavior. 2nd ed.. New York: Guilford Press; 2005.

Melby, JN.; Conger, RD.; Book, R.; Rueter, M.; Lucy, L.; Repinski, D. The Iowa Family Interaction Rating Scales. 5th ed.. Ames: Institute for Social and Behavioral Research, Iowa State University; 1998.

Metzler CW, Sanders MR, Rusby JC, Crowley RN. Using consumer preference information to increase the reach and impact of media-based parenting interventions in a public health approach to parenting support. Behavior Therapy. 2012; 43:257–270. [PubMed: 22440064]

Moos, R.; Moos, B. Clinical applications of the Family Environment Scale. In: Filsinger, E., editor. A sourcebook of marriage and family assessment. Beverly Hills, CA: Sage; 1983. p. 253-273.

Muthén BO. Latent variable modeling in heterogeneous populations. Psychometrica. 1989; 54:557–585.

Muthén, LK.; Muthén, BO. Mplus user's guide. 6th ed.. Los Angeles: Muthén & Muthén; 2010.

National Institute on Drug Abuse. Drug use among racial/ethnic minorities. Washington, DC: U.S. Department of Health and Human Services; 2003. *revised (NIH Publication No.03-3888)*

Prinz RJ, Sanders MR, Shapiro CJ, Whitaker DJ, Lutzker JR. Population-based prevention of child maltreatment: The U.S. Triple P System Population Trial. Prevention Science. 2009; 10:1–12. [PubMed: 19160053]

Romer D, Stanton B, Galbraith J, Feigelman S, Black MM, Li X. Parental influence on adolescent sexual behavior in high-poverty settings. Archives of Pediatrics and Adolescent Medicine. 1999; 153:1055–1062. [PubMed: 10520613]

Rusby JC, Estes A, Dishion TJ. Manual for the Interpersonal Process Code. 1991 Sep. Retrieved from http://www.oslc.org.

Sanders MR, Turner KMT, Markie-Dadds C. The development and dissemination of the Triple P-Positive Parenting Program: A multilevel, evidence-based system of parenting and family support. Prevention Science. 2002; 3:173–189. [PubMed: 12387553]

Schafer JL, Graham JW. Missing data: Our view of the state of the art. Psychological Methods. 2002; 7:147–177. [PubMed: 12090408]

Shonkoff JP, Boyce WT, McEwen BS. Neuroscience, molecular biology, and the childhood roots of health disparities: Building a new framework for health promotion and disease prevention. Journal of the American Medical Association. 2009; 301:2252–2259. [PubMed: 19491187]

Singer, JD.; Willett, JB. Applied longitudinal data analysis: Modeling change and event occurrence. New York: Oxford University Press; 2003.

Skinner ML, Haggerty KP, Catalano RF. Parental and peer influences on teen smoking: Are European and African American families different? Nicotine & Tobacco Research. 2009; 11:558–563. [PubMed: 19351778]

Skinner ML, MacKenzie EP, Haggerty KP, Hill KG, Roberson KC. Observed parenting behavior with teens: Measurement invariance and predictive validity across race. Cultural Diversity and Ethnic Minority Psychology. 2011; 17:252–260. [PubMed: 21787057]

Spagnolo, B.; DeLoach, CM.; Haggerty, KP.; Hill, K.; Weaver-Randall, K.; Catalano, RF.; Hawkins, JD. The Social Development Model Observational Coding System. Seattle, WA: University of Washington, Social Development Research Group; 2002.

Spoth R, Redmond C, Shin C, Azevedo K. Brief family intervention effects on adolescent substance initiation: School-level growth curve analyses 6 years following baseline. Journal of Consulting and Clinical Psychology. 2004; 72:535–542. [PubMed: 15279537]

Spoth RL, Kavanagh KA, Dishion TJ. Family-centered preventive intervention science: Toward benefits to larger populations of children, youth, and families. Prevention Science. 2002; 3:145–152. [PubMed: 12387551]

SPSS Inc. SPSS (Version 10.0). Chicago, IL: SPSS Incorporated; 2001.

Wallace JM, Muroff JR. Preventing substance abuse among African American children and youth: Race differences in risk factors exposure and vulnerability. Journal of Primary Prevention. 2002; 22:235–261.

Webster-Stratton C, Taylor T. Nipping early risk factors in the bud: Preventing substance abuse, delinquency, and violence in adolescence through interventions targeted at young children (0 to 8 Years). Prevention Science. 2001; 2:165–192. [PubMed: 11678292]

White AM, Hingson RW, Pan IJ, Yi HY. Hospitalizations for alcohol and drug overdoses in young adults ages 18–24 in the United States, 1999–2008: Results from the Nationwide Inpatient Sample. Journal of Studies on Alcohol and Drugs. 2011; 72:774–786. [PubMed: 21906505]

Whittaker KA, Cowley S. An effective programme is not enough: A review of factors associated with poor attendance and engagement with parenting support programmes. Children & Society. 2012; 26:138–149.

Williams DR, Jackson PB. Social sources of racial disparities in health. Health Affairs. 2005; 24:325–334. [PubMed: 15757915]

Winett RA, Anderson ES, Moore JF, Taylor CD, Hook RJ, Webster DA, Mundy LL. Efficacy of a home-based human immunodeficiency virus prevention video program for teens and parents. Health Education Quarterly. 1993; 20:555–567. [PubMed: 8307772]

Yoshikawa H. Prevention as cumulative protection: Effects of early family support and education on chronic delinquency and its risks. Psychological Bulletin. 1994; 115:28–54. [PubMed: 8310099]
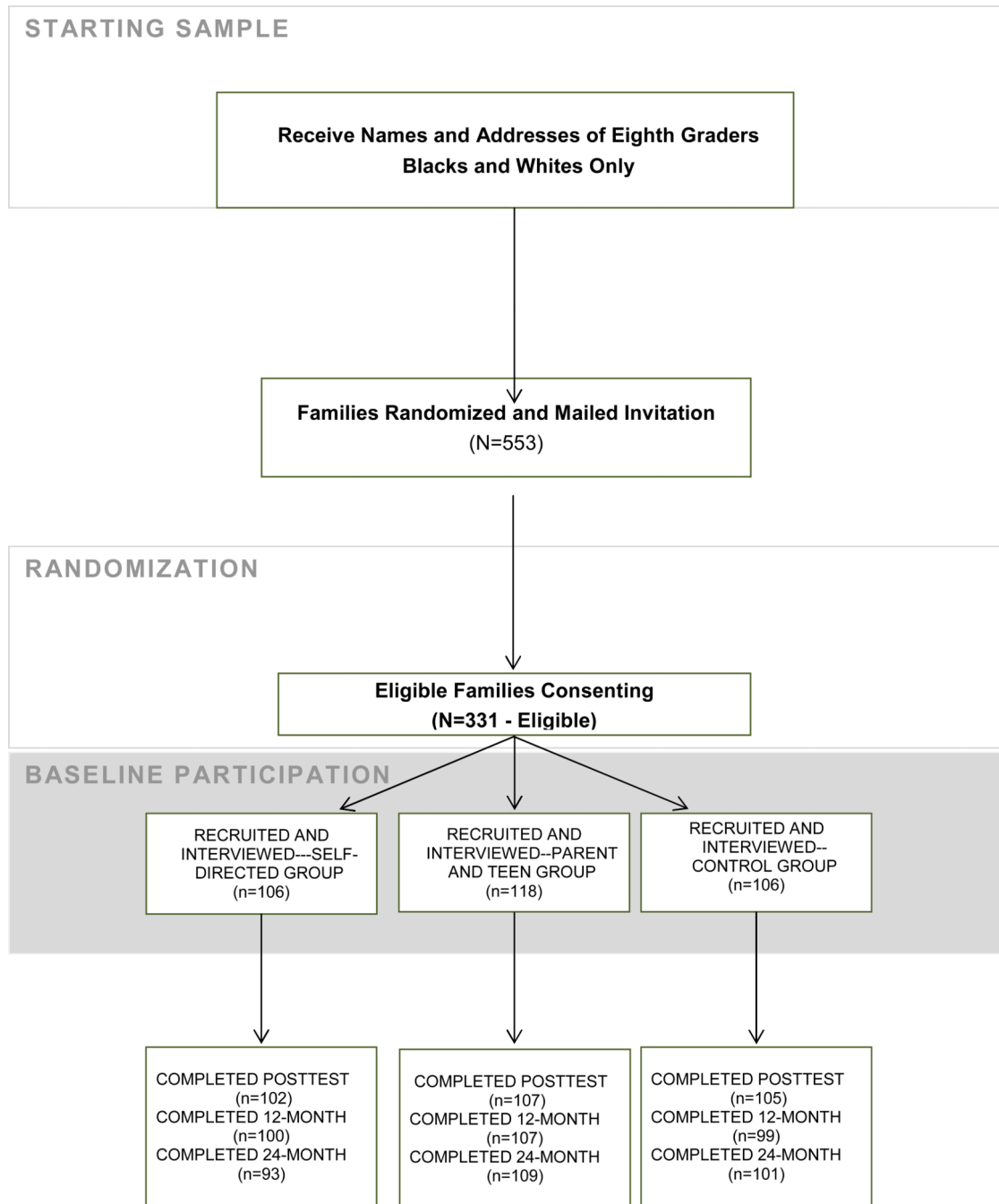
Figure 1.
Recruitment and retention for the *Staying Connected with Your Teen*® eighth-grade intervention study.
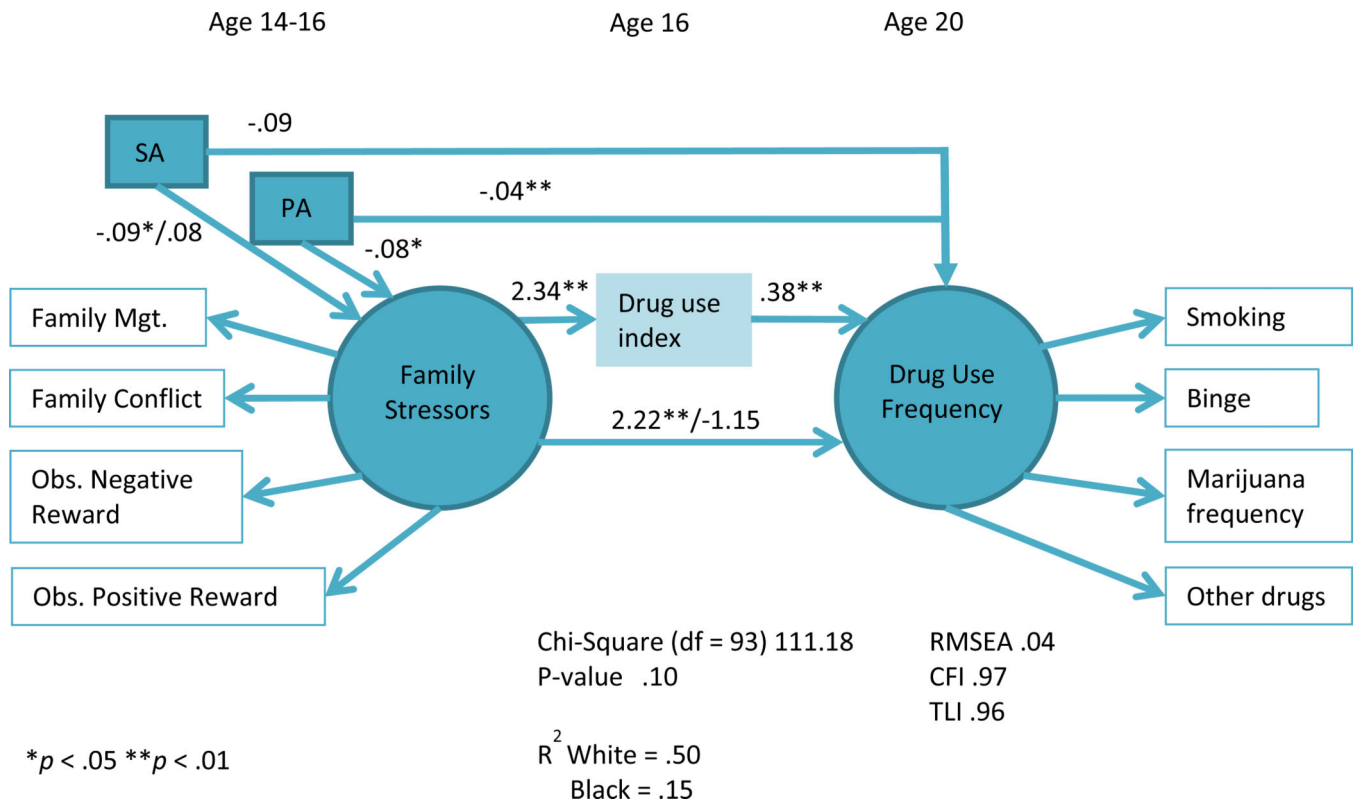
Figure 2.
Intervention effects model results.

Table 1

MGCFA Factor Loadings and Standard Errors

	Blacks				Whites			
	Estimate	SE	Stdzd B	SE	Estimate	SE	Stdzd B	SE
Drug use frequency, age 20								
Smoking	1.00	0.00	0.71**	0.07	1.00	0.00	0.86**	0.04
Binge drinking	**1.25****	**0.26**	**0.87****	**0.09**	0.67**	0.09	**0.57****	**0.07**
30-day marijuana use	0.82**	0.08	0.48**	0.07	0.82**	0.08	0.70**	0.06
Other drug use	0.94**	0.08	0.65**	0.10	0.94**	0.08	0.81**	0.05
Family stressors								
Negative reward (observed)	1.00	0.00	0.53**	0.08	1.00	0.00	0.55**	0.08
Average family conflict	**1.13****	**0.31**	**0.30****	**0.80**	3.07**	0.96	**0.51****	**0.10**
Positive reward (observed)	−1.40**	0.29	−0.61**	0.08	−1.40**	0.29	−0.59**	0.07
Positive family management	−0.76**	0.18	−.42**	0.08	−0.76**	0.18	−0.35**	0.07

**
p = < .01.

Bolded parameters were allowed to be estimated within race rather than constrained to be equal across race.