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Intervention Effects on Health-Risking Sexual Behavior Among Girls in Foster Care: The Role of Placement Disruption and Tobacco and Marijuana Use

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Abstract

The present study examined the effects of the Middle School Success intervention (MSS), a program to promote healthy adjustment in foster girls, on their health-risking sexual behavior, using a randomized controlled trial (RCT) design. As hypothesized, girls in the intervention condition ($n = 48$) showed significantly lower levels of health-risking sexual behavior than did girls in the control condition ($n = 52$) at 36 months postbaseline. Further path analysis indicated that this intervention effect was fully mediated through its effects on girls' tobacco and marijuana use. Findings highlight the importance of providing preventive intervention services to foster girls during early adolescence.

Keywords

foster care; girls; tobacco and marijuana use; health-risking sexual behavior; adolescent; intervention

Recently, there have been growing concerns regarding adolescent foster girls' increased risk for health-risking behaviors, including substance use, delinquency, depression, suicidality, and sexual behavior (e.g., Courtney & Dworsky, 2006; Leslie et al., 2010; Leve & Chamberlain, 2007; Pecora et al., 2003). These health-risking behaviors often cluster and appear to be responsible for health disparities for youth in foster care during adolescence and young adulthood (Leslie et al., 2010). Although studies of adolescent girls in foster care are limited, given that these girls often have limited psychological and economical resources, difficulties due to such problem behaviors may be particularly challenging for them (Kerr, Leve, & Chamberlain, 2009). Accordingly, early prevention before problem behaviors emerge may be key in keeping foster girls from developing negative trajectories of problem behaviors across adolescence and young adulthood. The present study examined the effects of the Middle School Success intervention (MSS) (Chamberlain, Leve, & Smith, 2006), developed for girls in foster care, on their health-risking sexual behavior at 36 months postbaseline, focusing on the mediating role of placement disruption and tobacco and marijuana use. The MSS program was designed to promote healthy adjustment in adolescent girls in foster care during the transition to middle school with its emphasis on preventing substance use, delinquency, health-risking sexual behaviors, and related problems. A prior report using the present sample indicated significant effects of the MSS intervention on placement stability (more stability) and substance use (less substance use)

(Kim & Leve, 2011). In the present study, we examined whether such significant intervention effects would be extended to reduce health-risking sexual behavior.

Health-Risking Sexual Behavior Among Girls in Foster Care

The elevated rates of health-risking sexual behavior for girls in foster care pose a major public health concern. Both regional studies and national surveys have indicated that adolescent girls who have been involved in foster care are significantly more likely to engage in health-risking sexual behaviors, such as having more sexually permissive attitudes, early onset of sexual intercourse, having sexual partners with risky characteristics (e.g., substance use and delinquency), and having sexual intercourse with multiple partners, compared to their normative peers (Carpenter, Clyman, Davidson, & Steiner, 2001; Courtney et al., 2005; Courtney & Dworsky, 2006; Gotbaum, 2005; Taussig, 2002; Wilson & Widom, 2009). Based on the National Survey of Child and Adolescent Well-being (NSCAW) study, James, Montgomery, Leslie, and Zhang (2009) found that the rate of sexual intercourse among foster youth at the age of 15 was comparable to those reported for 9th to 12th graders in other national normative adolescent samples such as the Add Health Study and the CDC's Youth Risk Behavior Surveillance Survey (YRBSS). This suggests higher rates of sexual activities among foster youth at younger ages. Furthermore, James and colleagues found that approximately 41% of the foster youth who were sexually active reported initiating consensual intercourse at age 13 years or younger. This rate is equivalent to 20.4% when the entire sample in the study ($N = 877$) was considered, which is strikingly higher than 8.3% of the 9th to 12th graders who reported the onset of sexual intercourse at age 13 or younger in the YRBSS study (James et al., 2009).

Research on adolescents in the general population has consistently indicated that such early initiation of sexual activity is significantly related to a higher number of different sexual partners, increased risk of STIs, and unintended pregnancy during adolescence (Bingham & Crockett, 1996; Garber, Little, Hilsman, & Weaver, 1998; Zimmer-Gembeck & Collins, 2008). In addition, health-risking sexual behaviors often lead to negative trajectories of mental health problems, school dropout, STD/HIV infections, early parenting, and dating violence, all of which further compromise opportunities for healthy adjustment in adulthood (James et al., 2009; Keller, Salazar, & Courtney, 2010; Pecora, 2010). It has been proposed that high rates of maladaptive sexual behaviors among youth in foster care may be attributable to low self-esteem and low self-efficacy resulting from childhood abuse and neglect (Kim & Cicchetti, 2006) and could be viewed as part of a broader syndrome of antisocial, destructive, and risk-taking behavior (Donovan & Jessor, 1985) that is linked to childhood maltreatment (Kaufman & Widom, 1999). While the increased risks and potential consequences of health-risking sexual behavior among foster youth in general have been well established in recent surveys, relatively little is known about prevalence rates of and pathways to health-risking sexual behaviors among early adolescent girls in foster care.

The Role of Tobacco and Marijuana Use in Health-Risking Sexual Behavior Among Girls in Foster Care

Findings from studies of adolescents in the general population have shown that early onset of substance use is related to early sexual initiation, unprotected sex, having multiple and casual sexual partners, being drunk or high during sex, and teen pregnancy (Bensley, Fenwyk, & Simmons, 2000; Berenson, Wiemann, & McCombs, 2001; Santelli, Robin, Brener, & Lowry, 2001). For instance, Tubman, Windle, and Windle (1996) found that early initiation of substance use and antisocial behavior was significantly and positively related to subsequent levels of risky sexual behaviors among mid adolescents (i.e., high school sophomores). This suggests a potential mediating role of substance use for increased risks of

health-risking sexual behavior among at-risk youth. Systematic examinations of the role that substance use plays in increased risks of health-risking sexual behavior among foster girls are rare, however, despite the early onset and high prevalence rates of substance use among adolescents who have been involved in foster care (Costello, Erkanli, Federman, & Angold, 1999; Jonson-Reid, Scott, McMillen, & Edmond 2007; Thompson & Auslander, 2007). A survey of youth (12–17 years of age) who were in foster care in the State of the Washington found that the mean age of first alcohol and marijuana use was 11.5 years and 12.2 years, respectively (Kohlenberg, Nordlund, Lowin, & Treichler, 2002). This indicates that youth in foster care might initiate substance and sexual activities at about the same time in early adolescence (before age 13) (Deardorff, Gonzales, Christopher, Roosa, & Millsap, 2005) and thus the mediating role of substance use may not be significant for girls in foster care. Alternatively, it is possible that similar to other at-risk youth, substance use may be significant as a mediator that leads to greater risks of health-risking sexual behavior for girls in foster care. A nuanced understanding of unique linkages between substance use and health-risking sexual behavior is needed to better inform intervention or prevention approaches for girls in foster care.

The Role of Placement Disruptions for Girls in Foster Care

While problems with emotional adjustment among youth in foster care have been associated with the maltreatment that children experience prior to entry into the system, evidence has suggested that frequent placement changes while they are in the foster care system also are responsible for increased rates of problem behaviors (Barth, Weigensberg, Fisher, Fetrow, & Green, 2008; Fisher, Kim, & Pears, 2009; Rubin et al., 2004; Rubin, O'Reilly, Luan, & Localio, 2007). Based on data from the state of Washington, DiGiuseppe and Christakis (2003) found that half of children in foster care experience at least one placement change during an average 2 year stay in the system, with 20% reporting at least three placement changes in less than one year. Placement instability is directly linked to adjustment problems, including school failure and a host of other problem behaviors such as substance use and health-risking sexual behavior, even after controlling for initial levels of problem behavior (e.g., Price et al., 2008). This may be in part due to the fact that frequent placement changes disrupt the establishment of a consistent learning environment and the development of supportive relationships with teachers, peers, and parent figures (Aarons et al., 2010; Newton, Litrownik, & Landsverk, 2000; Pilowsky, 1995; Samuels, 2008).

Studies have consistently indicated that one of the main reasons for a failed foster placement is the inability of foster parents to manage behavior problems (Brown & Bednar, 2006; Holland & Gorey, 2004; James, 2004). For instance, Chamberlain and colleagues (2006) found that increases in the daily rate of child behavior problems reported by foster parents were significantly related to placement disruptions within the subsequent 12 months. Using a 10 minute telephone assessment with caregivers over 3 days (Parent Daily Report (PDR) (Chamberlain & Reid, 1987), in which caregivers were asked to rate whether the youth showed a number of overt and covert behaviors in the past 24 hours, the authors found that when youth had an average of 6 problem behaviors or more per day, each additional problem behavior increased the risk for placement disruption within the next 12 months by 25%. Therefore, interventions to prevent placement disruption by directly targeting caregivers' parenting skills are highly relevant to the goal of healthy adjustment in foster girls.

The Present Study

Most of the promising intervention programs for youth in foster care or girls who are at-risk for delinquent behaviors have focused on teenagers or young children (e.g., Bywater et al.,

2011; Chamberlain, Leve, & DeGarmo, 2007; Farmer, Burns, Wagner, Murray, & Southerland, 2010; Linares, Montalto, Li, & Oza, 2006; Zeanah et al., 2001). The MSS program is unique in that it focuses on (a) early adolescent girls in foster care during the transition to middle school, a critical period that has been linked to the initiation and escalation of problem behaviors, (b) improving placement stability by improving parenting skills, and (c) preventing health-risking behaviors by promoting prosocial skills and self-efficiency (Chamberlain et al., 2006). The purpose of the present study was two-fold. First, we examined rates of health-risking sexual behavior among foster girls at 36 months postbaseline and evaluated intervention effects of the MSS. We hypothesized that girls who were randomly assigned to the MSS condition would show significantly lower levels of health-risking sexual behavior, compared to girls assigned to the control condition. Next, we examined whether previously found MSS effects on placement stability and tobacco and marijuana use (Kim & Leve, 2011) would be extended to influence girls' health-risking sexual behavior at 36 months postbaseline. We hypothesized that the MSS would have direct and indirect effects on health-risking sexual behavior through positive effects on the girls' placement stability and lower levels of tobacco and marijuana use.

Method

Sample

The present sample included participants in a randomized controlled trial of the MSS intervention, which was designed to prevent the onset of health-risking behaviors in early adolescent girls in foster care (Chamberlain et al., 2006). A total of 145 girls who met two study criteria, (a) in relative or nonrelative foster care in one of two counties containing major metropolitan areas in the Pacific Northwest and (b) in their final year of elementary school, were referred through the child welfare system. Of these 145 girls, 27 girls refused to participate (either the girl, her caregiver, or her caseworker did not agree to the girls' participation), and an additional 18 girls were excluded because their eligibility status changed by the time they were contacted by the study staff for recruitment (e.g., moved out of the state, were pending reunification or adoption, or were in an incorrect grade level). The resulting 100 girls and their caregivers agreed to participate and were randomly assigned to the intervention condition ($n = 48$) or to a foster care services-as-usual control condition ($n = 52$, Chamberlain et al., 2006). Caseworkers and the foster caregivers provided informed consent, and the girls provided assent prior to participation. Both girls and caregivers were compensated for participating. All procedures for the study were approved by our institution's Institutional Review Board.

The mean age of the girls was 11.54 years ($SD = 0.48$) at baseline. Sixty three percent of girls were European American, followed by 14% multiracial, 10% Latino, 4% African American, and another 4% Native American. According to child welfare records, the girls were first placed in foster care at 7.63 years ($SD = 3.14$) on average and had spent approximately 2.90 years ($SD = 2.25$) in foster care prior to study entry. More than half of the girls had at least one reported incident of physical abuse and/or sexual abuse, and over 90% had at least one reported incident of neglect. Approximately 32% of girls experienced all three types of maltreatment. The number of placement changes ranged from 1 to 20 at baseline with a mean of 4.29 ($SD = 3.32$). Sixty-eight percent of the girls were in nonrelative foster homes, and 32% were in relative foster homes at baseline. The girls in the intervention and control condition were comparable in terms of their demographic characteristics (e.g., ethnicity, caregiver's income), maltreatment history (the type and level), and foster care experiences (number of placement changes and type of care) at baseline. One exception was that the girls in the intervention condition experienced slightly higher levels of mean severity in neglect than those in the control condition ($t(95) = -2.65, p = .01$). However,

neglect was not related to any of the outcome measures in the study and was not significant when included in the model. Therefore, neglect was not included in the final path model.

The girls and their caregivers completed a baseline (T1) assessment and follow up assessments at 6 months (T2), 12 months (T3), and 24 months (T4) postbaseline. Then, the girls only participated in a 36 month (T5) postbaseline assessment. The retention rates were consistently high across the study period, ranging from 90 to 98%. The assessments included a structured in-person interview and questionnaires for each girl and her caregiver, an interview with the girl's caseworkers, and the collection of child welfare records. Assessments lasted approximately 2 hours and were conducted by trained interviewers who were blind to the participants' condition assignment.

MSS Intervention

Overview—The MSS has two components: (a) six sessions of group-based caregiver management training for the foster parents and (b) six sessions of group-based skill-building sessions for the girls (Chamberlain et al., 2006). Approximately seven participants in each group met twice a week for 3 weeks. One facilitator and one co-facilitator led the caregiver sessions. One facilitator and three assistants led the girl sessions to allow a high staff-to-girl ratio (1:2) for individualized attention, one-on-one modeling/practicing of new skills, and frequent reinforcement of positive behaviors. In addition to the summer group sessions, follow-up intervention services (i.e., ongoing training and support) were provided to the caregivers and girls in the intervention group once a week for two hours (foster parent meeting; one-on-one session for girls) during the first year of middle school. All of the group sessions were videotaped and reviewed during the weekly meetings. Feedback was provided to the interventionists to maintain the fidelity of the clinical model (Chamberlain et al., 2006; Smith, Leve, & Chamberlain, in press).

Intervention structure and curriculum for caregivers—The summer group sessions for the caregivers emphasized establishing and maintaining stability in the foster home, preparing girls for the start of middle school, and preventing early adjustment problems during the transition to middle school. The curriculum for the caregiver sessions focused on developing a behavioral reinforcement system to encourage adaptive behaviors across home, school, and community settings. Guided by prior studies of foster youth (Chamberlain, 2003), the group facilitators conducted a 10-min phone interview with caregivers about the girl's behavioral and emotional problem behaviors and the types of discipline and supervision used during the past 24 hr using the Parent Daily Report (PDR; Chamberlain & Reid, 1987). The PDR data were then used to connect the planned curriculum to the daily challenges the foster parents were facing. Foster parents were encouraged to apply new skills provided through weekly home practice assignments. On average, participants completed 5.62 of the 6 summer sessions ($SD = .99$). The interventionist either went to the families' home to deliver the content in person or delivered the content via a telephone call when a participant missed a session. Weekly follow-up sessions, as a group, were provided for the caregivers during the following school year. Caregivers attended 20 weekly follow-up sessions on average ($SD = 10.4$).

Intervention structure and curriculum for girls—The summer group sessions were intended to prepare the girls for the middle school transition by increasing their social skills for establishing and maintaining positive relationships with peers, increasing their self-confidence, and decreasing their receptivity to initiation from deviant peers. Specifically, the curriculum for the girls' groups targeted strengthening prosocial skills; practicing sharing/cooperating with peers; increasing the accuracy of perceptions about peer norms for abstinence from substance use, sexual activity, and violence; and practicing strategies for

meeting new people, dealing with feelings of exclusion, and talking to friends and teachers about life in foster care. Each session was highly structured with specific content and directions for each activity. The group structure typically included an introduction to the session topic, role plays, and a game or activity during which girls practiced the new ability. In addition, the girls engaged in overt discussions about self-image and the personal characteristics and behaviors (e.g., being a good friend, getting good grades, and abstaining from substance use) that they wished to project as they entered middle school. During the final summer session, each girl proclaimed and solidified her goals and commitments in a small ceremony. The ceremony was designed to help the girls build confidence in who they are and who they want to become, and to build supportive ties between the girls and their foster parents by “publicizing” their goals and commitments in front of their caregivers. Participation rates mirrored those of their caregivers (Chamberlain et al., 2006; Smith et al., in press).

After the group-based summer sessions, the girls in the intervention condition also participated in weekly individual coaching sessions during the 1st year of middle school. The goal of these follow-up sessions was to provide ongoing social support and training. The individual coaching sessions continued to focus on establishing and maintaining positive peer relations, increasing knowledge of accurate norms for problem behaviors, and increasing self-competence in academic and social areas. Coaches also emphasized the risks of substance use and discussed issues around dating and partner relations. The coaches were trained and supervised to serve as role models of prosocial behaviors and confidants to discuss issues around family and peer relations (Chamberlain et al., 2006).

Control Condition

The girls and caregivers in the control condition received the usual services provided by the child welfare system, including services such as referrals to individual or family therapy, parenting classes for biological parents, and case monitoring. Child welfare caseworkers managed each case and were responsible for making all decisions on referrals to community resources, including individual and family therapy and parenting classes (Smith et al., in press).

Measures

The measures for the present study included indicators for tobacco and marijuana use and health-risking sexual behaviors from T5. In addition, girls’ placement changes (the cumulative number of changes from T1 through T3) was included. We also considered including pubertal status, given its documented association with health-risking sexual behavior (e.g., Mendle, Turkheimer, & Emery, 2007). However, approximately 96% of girls had completed menarche by the T5 assessment, and given this limited variation, pubertal status was not considered further.

Tobacco and marijuana use—Two indicators were used to assess the girls’ tobacco and marijuana use at T5. The girls were asked in the past year, how many times they had (a) smoked cigarettes or chewed tobacco and (b) used marijuana. The response scale ranged from 1 (never) through 9 (daily). Twenty-three percent of the girls reported either smoking or chewing tobacco in the past year and 24% reported using marijuana in the past year. These two indicators were combined to create a composite score of tobacco and marijuana use in foster girls for the path analysis.

Health-risking sexual behavior—Eight items from the girls’ in-person interviews were used to assess health-risking sexual behavior at T5. The girls reported on items such as touching a boy’s body above or below the waist, having sexual intercourse, having sex with

someone who they just met, or having sex with someone using drugs in the past 12 months. Positive answers to these items were totaled to represent the cumulative number of health-risking sexual behaviors. Internal reliability of the measure was .67. The frequency of the cumulative number of risky sexual acts ranged from 0 to 7, with a mean of 1.29 ($SD = 1.70$) acts in the past year.

Placement changes—Child welfare system records were collected at each assessment to determine the girls' placement changes (including the number and type of changes). For the present study, placement changes since the start of the study through T3 were summed for each girl. The number of placement changes ranged from 0 to 7 during this period and the mean was .56 ($SD = 1.14$).

Data analysis plan

Structural Equation Modeling (SEM) was conducted, using Mplus 6 (Muthén & Muthén, 1998–2010). The Little's MCAR test indicated a chi-square = .60 ($df = 1$, $p = .44$), suggesting that missingness in the present sample was completely at random. Therefore, in order to make use of the full randomized sample ($N = 100$), full information maximum likelihood (FIML) estimation was used. FIML has been shown to provide unbiased estimates when data are missing at random (Arbuckle, 1996). The composite score for tobacco and marijuana use was log transformed and the number of placement changes was square root transformed to more closely resemble a normal distribution. In order to examine whether the hypothesized indirect paths (intervention placement disruption tobacco and marijuana use health-risking sexual behavior or intervention tobacco and marijuana use health-risking sexual behavior) were significant, the significance of each of these paths was also examined using Mplus.

Results

Correlational Analysis

Shown in Table 1 are bivariate correlations among the study variables. The intervention condition (0 = control; 1 = intervention) was negatively correlated with tobacco use, marijuana use, health-risking sexual behavior, and placement changes, with the MSS intervention condition associated with more positive outcomes across all variables. In addition, girls' tobacco and marijuana use (both separately and combined) was significantly and positively correlated with health-risking sexual behavior, and placement changes was positively correlated with tobacco and marijuana use.

Group Differences in Health-Risking Sexual Behavior

Girls in the MSS condition reported an average of .89 acts ($SD = 1.17$) of health-risking sexual behavior, while girls in the comparison condition reported an average of 1.69 acts ($SD = 2.04$) in the past year at T5 which corresponds to the last year in middle school. The group difference was significant ($t(88) = 2.28$, $p = .03$, Cohen's $d = .48$), suggesting a significant main effect of the MSS intervention on foster girls' health-risking sexual behavior. Further post-hoc analysis indicated that only 4.4% of the girls in the MSS condition, as opposed to 17.8% of the girls in the control condition, reported having sexual intercourse in the past year (chi-square = 4.05, $df = 1$, $p = .04$).

Mediating Effects of Placement Stability and Tobacco and Marijuana Use on Health-Risking Sexual Behavior

We next tested a longitudinal path model. The model with placement changes and tobacco and marijuana use as mediators fit the data very well ($\chi^2(5) = 5.37$, $p = .37$, CFI = .99, TLI

= .98, RMSEA = .03). As is shown in Figure 1, the MSS intervention condition was significantly related to placement disruptions during the first year of the study, with girls in the intervention condition having fewer placement disruptions. The number of placement disruptions was then positively related to the girls' tobacco and marijuana use at T5, although its significance was only marginal ($p = .09$). Tobacco and marijuana use was in turn positively related to the girls' health-risking sexual behavior at T5. The direct path from the intervention condition to tobacco and marijuana use remained significant in the context of the full model, suggesting a significant direct intervention effect on girls' later tobacco and marijuana use. However, significant direct intervention effects on health-risking sexual behavior become nonsignificant in the presence of tobacco and marijuana use, suggesting a pathway mediated through tobacco and marijuana use. The model accounted for 30% of the variance in health-risking sexual behavior ($p = .00$). We further examined whether the mediating path of the intervention effect to health-risking sexual behavior through placement disruption and tobacco and marijuana use was statistically significant (Muthén & Muthén, 1998–2010). Analyses revealed that the path from the intervention to tobacco and marijuana use and subsequently to health-risking sexual behavior was significant ($\beta = -.12$, $p = .04$), confirming the significant mediating role of tobacco and marijuana use in the association between the intervention and health-risking sexual behavior among girls in foster care.

Discussion

There has been a growing interest in the development of programs aimed at the prevention of health-risking behaviors among adolescent girls in foster care (Courtney et al., 2005; Courtney & Dworsky, 2006; Leve & Chamberlain, 2007), but very few evidence-based preventive intervention programs currently are available to facilitate healthy adjustment in this vulnerable segment of the population. The present study sought to contribute to the literature by examining the effects of the MSS, a preventive intervention program targeting early adolescent foster girls during the transition to middle school, on health-risking sexual behavior. In addition to main effects of the MSS, the present study also examined whether the intervention effect on health-risking sexual behavior would be mediated through its effects on increased placement stability and decreased tobacco and marijuana use. The present study has the potential to offer significant clinical implications because the findings may inform not only whether the intervention works, but also a mechanism through which the intervention works.

Findings indicated that a substantial number of the girls (60%) in the present sample reported having committed at least one sexual activity in the past year, with 11% of the girls reporting sexual intercourse. Considering the girls' young age (approximately 14 years at T5), these rates confirm foster girls' heightened vulnerability for health-risking sexual behavior during early adolescence (James et al., 2009). In addition, approximately 23% of the girls in the current study reported engaging in both tobacco and marijuana use and health-risking sexual behavior in the past year, providing evidence that the co-occurrence of multiple risk behaviors may be salient for girls in foster care (Leslie et al., 2010) starting in early adolescence. This finding supports the need for preventive intervention services for foster girls in early adolescence.

As was hypothesized, findings also indicated that foster girls in the MSS condition showed significantly lower levels of health-risking sexual behavior than girls in the control condition at 36 months postbaseline, suggesting significant intervention effects on the prevention of health-risking sexual behavior. Findings from longitudinal research have indicated that patterns of sexual activities among adolescents tend to be persistent once initiated, rather than episodic (e.g., Tubman et al., 1996), highlighting the importance of delaying

engagement in health-risking sexual behavior. In addition, as described above, health-risking sexual behavior is related to subsequent negative trajectories of emotional problems, school failures, STD/HIV infections, and early pregnancy/parenting (James et al., 2009; Keller et al., 2010). It has been suggested that existing cognitive-behavior and skill-based intervention programs may have limited effects on reducing health-risking sexual behaviors among youth in the child welfare system because they require additional attention to factors such as emotional distress and trauma, a lack of support networks, and poor self competence due to maltreatment history and placement transitions (James et al., 2009). In light of this, the significant effects of the MSS program on preventing health-risking sexual behavior are especially noteworthy.

The main effect of the intervention on health-risking sexual behavior was fully mediated through its' effect on tobacco and marijuana use. Results from the path model evidenced the potential mediating role of tobacco and marijuana use in the association between the intervention and health-risking sexual behavior. In a post hoc analysis, we additionally tested the same path model with health-risking sexual behavior as a mediator and tobacco and marijuana use as the outcome. The model did not fit the data well ($\chi^2(8) = 12.41, p = .13$, CFI = .91, TLI = .84, RMSEA = .07), providing additional support for the mediating effects of tobacco and marijuana use on health-risking sexual behavior, rather than the other way around. Nonetheless, because tobacco and marijuana use and health-risking sexual behavior were measured at the same time (T5), the directionality of influences cannot be fully disentangled and additional follow-ups are needed to examine such questions.

Our prior work has indicated that the importance of girls' prosocial skills (one of the targeted areas in the MSS program) in reducing the level of tobacco use and delinquency in foster girls (Kim & Leve, 2011); girls' improved prosocial skills at 6 months and 12 months postbaseline were significantly related to lower levels of tobacco use at 36 month postbaseline indirectly through decreased levels of internalizing and externalizing behavior at 12 months and 24 months postbaseline. Furthermore, Kim and Leve (2011) have found that such improved prosocial skills significantly mediated the MSS intervention effects on girls' delinquency at 36 months postbaseline. Although prosocial skills and delinquency were not directly examined in the present study, it is plausible that the positive intervention effects on these behaviors may also lead to lower levels of health-risking sexual behaviors. Further work is warranted to examine specific links between prosocial skills, delinquency and the development of health-risking sexual behaviors among these foster girls.

Our finding also may mean that reducing tobacco and marijuana use is an effective and direct way to decrease the potential risks for health-risking sexual behavior in foster girls. Studies have found that tobacco and marijuana use impairs decision-making processes, may increase arousal levels, and negatively affects consistent use of protections (Dausey & Desai, 2003; Logan, Cole, & Leukefeld, 2002). Furthermore, substance use has been known to lead to risky sexual behavior through deviant peers or delinquent partners (Houck et al., 2006). While the exact nature of the association between substance use and risky sexual behaviors among foster girls warrants further research, the present findings indicate that prevention programs targeting health-risking sexual behavior in foster girls can be more effective if substance use behavior is considered as a proximal antecedent risk factor.

It is worth noting that contrary to our hypothesis, the intervention effect was not mediated through increased placement stability, even though placement disruptions were significantly related to girls' tobacco and marijuana use in the path model. This is consistent with other findings in the literature suggesting limited associations between placement history and rates of health-risking sexual behavior in foster youth (e.g., James et al., 2009). However, the James et al. (2009) study found tendencies of higher rates of lifetime sexual intercourse,

early onset of sexual activity (i.e., at age 13 or before) and pregnancy among youth in out of home care, compared to those who stayed with biological parents (James et al., 2009). This suggests that the potential role of placement instability in foster girls' health-risking sexual behavior should not be dismissed. The lack of statistical significance of the mediation analysis in the present study may well be due to the limited variability in placement disruptions in the present sample. It is also possible that the number of placement changes construct used in the present study may not be as sensitive of an indicator as is needed to capture the complex nature of the placement stability. Alternatively, placement stability may exert an influence on foster girls' health-risking sexual behavior as a contemporaneous proximal factor, rather than a mediating factor. Future research needs to more systematically investigate the potential roles of placement stability in predicting health-risking behaviors in foster girls.

While the findings of the present study are encouraging, some limitations should be noted. First, the sample size was relatively small and the majority of the participants were Caucasian. Although the ethnic composition of the sample is representative of foster children in the region where the study was conducted, the current results need replication with more ethnically diverse samples. In addition, the present trial did not include boys and thus we were unable to examine gender differences. Although research on adolescents in the general population as well as in foster care youth have evidenced no or few gender differences in substance use, especially among younger adolescents (i.e., 8th and 10th graders) (e.g., Johnston, O'Malley, & Bachman, 1997; Taussig, Clyman, & Landsverk, 2001; Thompson & Auslander, 2007), it would be important to examine whether the intervention works in similar ways for boys in foster care. Finally, outcome measures in the present study relied on the girls' self report on a limited number of items. It is possible that the association between tobacco and marijuana use and health-risking sexual behavior is somewhat inflated due to the shared method variance. Therefore, another efficacy study with ethnically diverse boys and girls is warranted to evaluate the robustness of the present findings and to confirm the significant effects of the MSS program.

Despite these limitations, the present study uniquely focused on early adolescent girls in foster care during the transition to middle school, a vastly understudied at-risk group. Furthermore, the present study demonstrated evidence for the efficacy of the MSS program to prevent foster girls' health-risking sexual behavior. Consistent with prior work (Kim & Leve, 2011), results from the present study indicated that preventive efforts during the transition to middle school, a developmentally critical period, may have significant potential to delay the onset of tobacco and marijuana use and health-risking behaviors among girls in foster care. Together with prior findings on MSS intervention effects on internalizing and externalizing behavior at 6 months postbaseline (Smith et al., in press) and substance use at 36 months postbaseline (Kim & Leve, 2011), this study provides additional evidence of the efficacy of the MSS program for early adolescent foster girls. In addition, the present study supports the argument that preventing an antecedent problem behavior (e.g., substance use, delinquency) in foster girls may also lead to reductions in other domains of health-risking behavior (e.g., health-risking sexual behavior).

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Figure 1. Mediating effects of tobacco and marijuana use on health-risking sexual behavior in foster care girls.

Table 1

Means, standard deviations, and bivariate correlations among study variables (N = 100)

	1	2	3	4	5	6
1. Condition (0=control; 1=intervention)						
2. Tobacco use (T5)	-.22 [*]					
3. Marijuana use (T5)	-.28 ^{**}	.72 ^{***}				
4. Combined Tobacco and Marijuana use (T5)	-.26 [*]	.92 ^{***}	.92 ^{***}			
5. Health-risking sexual behavior (T5)	-.24 [*]	.61 ^{***}	.59 ^{***}	.64 ^{***}		
6. Placement changes	-.24 [*]	.23 [*]	.26 [*]	.23 [*]	.09	
Mean		1.92	1.81	1.87	1.29	.56
SD		2.13	1.88	1.84	1.70	1.14

Note.

^{*} $p < .05$,

^{**} $p < .01$,

^{***} $p < .001$