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Pathways to Preventing Substance Use Among Youth in Foster Care

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Abstract

Substance use problems are highly prevalent among youth in foster care. Such problems in adolescence have long-lasting implications for subsequent adjustment throughout adulthood and even across generations. Although several programs have demonstrated positive results in reducing substance use in at-risk youth, few studies have systemically examined how such programs work for foster youth and whether they are effective for both genders. This study examined the efficacy of KEEP SAFE, a family-based and skill-focused program designed to prevent substance use and other related health risking behaviors among youth in foster care. We hypothesized that improving the caregiver—youth relationship would lead to later reductions in youths' involvement with deviant peers, which subsequently would lead to less substance use, and that this mechanism would work comparably for both genders. A sample of 259 youth (154 girls, ages 11–17 years) in foster care and their caregivers participated in a randomized controlled trial and was followed for 18 months postbaseline. Results indicated that the intervention significantly reduced substance use in foster youth at 18 months postbaseline and that the intervention influenced substance use through two processes: youths' improved quality of relationships with caregivers at 6 months postbaseline and fewer associations with deviant peers at 12 months postbaseline. This suggests that these two processes may be fruitful immediate targets in substance use prevention programs for foster youth. We also found little gender differences in direct and mediating effects of the intervention, suggesting KEEP SAFE may be effective for both genders in foster care.

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Compliance with Ethical Standards

Conflict of Interest. The authors declare that they have no conflict of interest.

Ethical Approval. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent. Informed consent was collected at each wave of assessment from participants old enough to complete, with assents being collected for younger participants. All procedures were approved by the Oregon Social Learning Center Institutional Review Board.

Keywords

caregiver; delinquent peer; intervention; foster care; substance use

Youth who have been placed in foster care are at high risk for various health-risking behaviors (Aarons et al., 2008; Keller, Salazar, & Courtney, 2010; Thompson & Auslander, 2007; Vaughn, Ollie, McMillen, Scott, & Munson, 2007). In particular, substance use problems are among the most frequently noted mental health issues for foster care-involved youth (Keller et al., 2010), with prevalence rates for alcohol abuse, drug abuse, and drug dependency at two to five times higher than their peers with no histories of foster care involvement (Pilowsky & Wu, 2006). This is alarming because such substance use problems often lead to a host of other health risking behaviors, such as risky sexual behaviors (e.g., failure to use protection, multiple sexual partners), teen pregnancy, and poor academic achievement, all of which are likely to have long-lasting effects on youths' adjustment throughout adolescence and adulthood (Kim, Pears, Leve, Chamberlain, & Smith, 2013).

Although several programs have demonstrated positive results in preventing or reducing substance use in at-risk youth, such as those in foster care (see Austin, Macgowan, & Wagner, 2005; Babowitch & Antshel, 2016 for reviews of programs), few studies have specifically examined *how* a given program worked to yield the intended outcomes. In addition, to our knowledge, few researchers have examined whether programs would be equally effective for boys and girls in foster care and whether they work through similar mediating pathways (Leve, Chamberlain, & Kim, 2015). As such, we know relatively little about whether intervention programs would be equally effective for boys and girls or whether gender-specific programs would yield better results (Leve et al., 2015). The present study sought to fill this gap by focusing on *whether* and *how* KEEP SAFE, a program designed to prevent substance use in foster youth worked—particularly investigating whether there would be gender differences in the program's mechanisms of change. Findings from this study will inform efforts to design more efficacious interventions aimed at preventing substance use in foster youth.

Vulnerability to Substance Use Among Youth Involved in Foster Care

Studies have consistently reported disturbingly high levels of substance use among youth in foster care (e.g., Johnston, O'Malley, Bachman, & Schulenberg, 2009; Kohlenberg, Nordlund, Lowin, & Treichler, 2002). For instance, one study on 15–18-year-old youth in foster care from a Midwestern area found that 40% of them reported alcohol use, 36% reported marijuana use, and 25% reported use of both substances in the past 6 months (Thompson & Auslander, 2007). Further, these youth tend to exhibit onset of substance use as early as 11–12 years (Kohlenberg et al., 2002; Thompson & Auslander, 2007), and many of them meet criteria for a substance use disorder in their life time with prevalence rates ranging from approximately 9 to 35% (Vaughn et al., 2007). Although some studies report similarly high rates of substance use among non-foster care-involved youth (e.g., Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2015), foster youth's substance use is likely to

be more detrimental given a history of family substance use and co-occurring mental health problems in these youth (Burns et al., 2004).

Additionally, unlike commonly noted gender differences in the prevalence, etiology, and consequences of substance use in the general population, evidence does not show similar gender differences among boys and girls who have been involved in foster care (Keller et al., 2010; Kristman-Valente & Wells, 2013). Boys and girls in foster care tend to show similarly high rates of substance use (e.g., Vaughn et al., 2007) and gender does not appear to be a significant factor in predicting substance use for foster youth (e.g., Narendorf & McMillen, 2010; Thompson & Auslander, 2007; Wall & Kohl, 2007). Substance use problems during adolescence often lead to cascades of negative outcomes, such as risky sexual behaviors (e.g., having multiple partners, having sex while intoxicated, and failure to use protection), early pregnancy, and poor educational attainment (e.g., Keller et al., 2010). In addition, given that substance use tends to peak during the transition to young adulthood (Merline, O'Malley, Schulenberg, Bachman, & Johnston, 2004) and that youth in foster care are likely to face additional challenges while transitioning out of the foster care system during this period, we urgently need preventive efforts to reduce risk for substance use before these youth with few family or community resources reach young adulthood (Narendorf & McMillen, 2010).

Mechanisms of Change: The Importance of Relationships with Caregivers and Peers

The quality of the caregiving environment, especially the relationship between caregiver and youth, has been consistently implicated in youth substance use as either a protective or risk factor (Dishion, Forgatch, Van Ryzin, & Winter, 2012). A close or supportive relationship with caregivers is negatively associated with onset and problem use of substances in normative samples (Dishion et al., 2012; Lo & Cheng, 2010). This might be particularly true for youth in the foster care system, as they tend to have difficult relationships with their caregivers due to histories of maltreatment and frequent placement changes (Newton, Litrownik, & Landsverk, 2000; Storer et al., 2014). Conversely, staying in a stable home with skilled caregivers provides youth opportunities to develop good supportive relationships, which then makes youth more comfortable seeking out help from their caregivers when needed (Guibord, Bell, Romano, & Rouillard, 2011). Studies indeed found that foster youths' perceived closeness to caregivers protected them against involvement in substance use by potentially promoting open communication (Wall & Kohl, 2007). Thus, improving caregiver–youth relationships may be an ideal immediate target in preventive intervention programs for these vulnerable youth.

Another known risk factor for youth substance use is involvement with deviant peers. Ample evidence has shown that associations with deviant peers are related to an increased risk for a wide range of negative outcomes, including substance use, in the general population (e.g., Dishion, Capaldi, & Yoerger, 1999). Youth who have been involved in foster care tend to show significant deficiencies in interpersonal skills (Koenig, Cicchetti, & Rogosch, 2004), which puts them at risk for peer rejection and deviant peer associations (Pears, Kim, & Leve,

2012). Emerging evidence also shows alterations in key neural regulatory systems in foster youth that can increase their susceptibility to deviant contexts (e.g., Pollak et al., 2010). In addition, youth in foster care appear to strongly desire emotional connection to and acceptance from peer relationships (Marmorstein et al., 2010). All of these factors make them vulnerable to deviant peer influences. Several studies demonstrate the potency of deviant peer influence in substance use among youth in foster care. For example, Thompson and Auslander (2007) found that having friends who used marijuana and other substances was one of the strongest factors associated with youth substance use. Further, other studies have indicated that peer substance use or associations with deviant peers tend to mediate the link between parent-related variables and substance use among youth in foster care (Aarons et al., 2008). Thus, decreasing the risk for deviant peer associations may be critical in preventing onset and problem use of substances in foster youth.

The Present Study

The present study examined the efficacy of the KEEP SAFE program for boys and girls who have been involved in the foster care system (ages 11–17 years), focusing on *whether* and *how* the intervention worked. In addition, we examined whether there were gender differences in the mechanisms of change leading to the intended intervention outcome. The KEEP SAFE program is a family-based and skill-focused program, specifically aimed at preventing delinquent behaviors, substance use, and risky sexual behaviors among foster youth (Kim & Leve, 2011). KEEP SAFE is based on the premise that improving the caregiving environment plays a key role in preventing and reducing problem behaviors in youth in foster care (Kim & Leve, 2011). Thus, the program focuses on two components—enhancing the caregiving environment (e.g., reducing placement changes, improving the caregiver–youth relationship and caregivers’ parenting skills) and increasing promotive factors (e.g., increasing prosocial behaviors, eschewing involvement with deviant peers) that are known to prevent the development of problem behaviors in foster youth (e.g., Chamberlain et al., 2008; Price et al., 2008). In the present study, we first examined mean differences in substance use between the KEEP SAFE condition and the Service-As-Usual (SAU) control condition at 18 months postbaseline. Given prior work on KEEP SAFE’s effects on substance use among early adolescent girls in foster care (Kim & Leve, 2011), we hypothesized that youth in the KEEP SAFE condition would show significantly lower levels of substance use than would youth in the control condition. We also hypothesized that the KEEP SAFE program would reduce substance use at 18 months postbaseline through the improved relationship with caregivers reflected in the level of closeness and open communication measured at 6 months postbaseline, which in turn would reduce associations with deviant peers at 12 months postbaseline. The temporal order of the variables would allow us to test the hypothesized mediation path prospectively. We also examined whether there would be gender differences in the mediation path. Given the findings on the limited role of gender in substance use among foster youth, we expected that there would not be significant gender differences in direct and indirect effects of KEEP SAFE.

Method

Participants

We recruited 259 youths and their foster parents from the San Diego County Department of Health and Human Services child welfare system between 2006 and 2009 for a randomized controlled trial (RCT) to examine the efficacy of the KEEP SAFE program. To be eligible for study participation, youths had to be in either a kin or non-kin foster care placement for a minimum of 30 days; ages 11–17 years; and physically and mentally able to complete the assessment. The county child welfare data system was reviewed on a quarterly basis to identify eligible children and foster families. If foster parents and youth agreed to participate, they were provided with a detailed project description, along with a consent form and a *Participant's Bill of Rights*. Once consent to participate was obtained, the participants were randomized either to the KEEP SAFE or to the SAU group by asking foster parents to select one of two sealed envelopes that identified their intervention status (KEEP SAFE or SAU). Our Institutional Review Board approved all procedures.

Of 1,160 youths who were identified for screening, 533 initially met criteria for inclusion, and 259 (49%) agreed to participate and completed the baseline assessment. The most common reasons for declining to participate were that the foster parents and/or youth were either “too busy” or “not interested.” Additionally, some families were excluded because their eligibility status changed, they could not be reached, or they declined to participate after the initial contact. 117 families were randomly assigned to the KEEP SAFE intervention condition, and 142 families were assigned to the SAU condition (a detailed CONSORT flowchart of the participants is available online). Of the 259 youths, 154 were girls (59.5%), and the mean age was 14.3 years ($SD = 1.5$) at baseline. 15.6% of them were European American, 22.6% African American, 47.1% Hispanic, 3.1% American Indian, 2.3% Asian American/Pacific Islander, and 9.3% multiple races. This reflects the ethnic composition of the region (Annie E. Casey Foundation, 2015). A total of 64.9% of the youth were with non-kin foster caregivers (vs. kin), and on average they experienced placement changes 2.87 times ($SD = 3.10$) prior to the study. The mean age of caregivers was 48.4 years ($SD = 11.9$). There were no significant differences between the two groups in demographic characteristics as well as in any of the study variables at baseline.

Participation in the KEEP SAFE program counted toward the foster parents' state licensing requirement. This requirement was typically fulfilled by participation in approved parenting courses offered by local agencies. Foster parents and youth in both groups continued to receive all services ordinarily provided by San Diego child welfare caseworkers, including parenting training and support groups and monitoring during regular monthly contacts and referrals to services (e.g., group, individual, or family therapy). No attempt was made to influence the type or amount of services given to the foster parents and youth in both groups.

Study Design and Procedures

Data collection procedures—The youth and their caregivers completed a 1.5–2 hr assessment including semi structured interviews and questionnaires at baseline (Time 1 [T1]) prior to the start of the KEEP SAFE program, 6 months postbaseline (Time 2 [T2]), 12

months postbaseline (Time 3 [T3]), and 18 months postbaseline (Time 4 [T4]). Retention rates were 91%, 80%, and 72% at T2, T3, and T4, respectively. There were no significant differences in the attrition rates between the two groups.

Intervention protocol—The KEEP SAFE program consists of a 24-session parent group and 20 sessions of individual youth-skills coaching. Youth-skills coaching began after the parents had been in the group for approximately 1 month to allow caregivers to learn foundational skills to support the youth at home.

KEEP SAFE parent groups: Caregivers participated in 24 weekly KEEP SAFE sessions that included training, supervision, and support in behavior management methods to increase the stability of the caregiving environment, promote positive relationships with the youth, and reduce the youth's problem behaviors. Each of the 90-minute sessions consisted of 3–10 foster parents, led by a trained facilitator and co-facilitator team in community recreation centers or churches. Facilitators conducted the sessions in English or Spanish, with materials and handouts available in both languages. Session topics mapped onto promotive and risk factors known to be developmentally relevant and malleable targets for behavior change (Chamberlain, 2003). The caregiver curriculum primarily focused on increasing positive reinforcement; consistent use of non-harsh discipline methods, such as privilege removal over short time spans; and teaching parents the importance of close monitoring of the youth's whereabouts and peer associations.

Facilitators integrated curriculum content into group discussions and illustrated primary concepts via role plays. Caregivers received weekly home practice assignments to help them implement the behavioral skills taught in the group sessions. To maintain caregiver involvement, KEEP SAFE provided: (a) childcare, using qualified and licensed individuals so caregivers could bring younger children; (b) credit for the yearly foster care licensing requirement; (c) \$15 per session as reimbursement for traveling expenses; (d) refreshments; and (e) make-up sessions.

KEEP SAFE youth skills: Youth participated in 20 individual weekly 90-minute sessions with a trained skills coach. Based on previous work (Chamberlain, 2003), the manualized skills coach component draws on other interventions for youth in foster care that stress development of social competence, substance use prevention, and avoidance of health risking behaviors (Hansen, 1996; Becker & Barth, 2000). Skills coaches had bachelor degrees in psychology or social work and were selected based on their level of interpersonal skills, prior experience with youth, and ability to work with ethnically diverse populations. Skills coaches were trained on curriculum content and intervention strategies over two days. Training included (a) strategies for youth to avoid drugs and risky sexual behavior, (b) developing individualized plans and goals for school and career, (c) role playing refusal skills with peers, (d) providing information on adolescent health and development, (e) role playing and discussing strategies for increasing personal safety, and (f) modeling problem solving friendship skills. Skills coaching sessions were conducted individually rather than in a group format because youth in foster care are at high risk for problem behaviors and are likely to be particularly susceptible to potential iatrogenic effects caused by associating with each other in group meetings (Dishion, Capaldi, & Yoerger, 1999).

Session attendance: Attendance was documented for all weekly foster parent group and make-up sessions and individual youth skills coaching sessions. Attendance rates in weekly sessions were high: 84% of the caregivers completed 80% or more of sessions, and 62% of the youth attended 80% or more of the skills coaching sessions.

Intervention staff supervision: Parent group facilitators video recorded each weekly session. A member of the KEEP SAFE developer team watched each recording and provided the facilitators with weekly supervision and feedback to ensure that the curriculum was delivered as intended and that caregivers were engaged in the material. Skills coaches attended weekly group sessions with a clinical supervisor to practice session content and discuss youth progress.

SAU group: As was noted above, caregivers and youth in the SAU group received all services ordinarily provided by the San Diego child welfare system. We did not make any attempts to influence the type or amount of services given to the caregivers and youth.

Measures

Treatment status—The youth in the SAU condition were coded as 0, whereas the youth in the KEEP SAFE condition were coded as 1.

Relationship with the caregiver at T2—During the in-person interview at 6 months postbaseline, the youth were asked about their closeness to and communication with their caregiver. Items include how close they feel to the caregiver, how much they tell the caregiver about what they did on a daily basis, how much they share what they think and feel with the caregiver, and how comfortable they would be talking about sensitive topics such as sex with the caregiver (Leve, Chamberlain, & Reid, 2005). The response scale ranged from 1 (e.g., not at all close) to 10 (e.g., extremely close). The 4 items were averaged to create an indicator of the relationship with caregivers, with higher scores representing more positive caregiver–youth relationships (Cronbach’s alpha was .79).

Association with deviant peers at T3—We used 6 items from a modified version of the general delinquency scale from the Self-Report Delinquency Scale (SRD; Elliott, Huizinga, & Ageton, 1985) to specifically assess the youth’s association with deviant peers at 12 months postbaseline. Youth were asked to rate how many of their friends were involved in delinquent acts in the past 6 months (e.g., have suggested that they do something that was against the law, gotten drunk or gotten high, and gotten arrested for things they had done). The original response scale ranged from 1 (none) to 2 (very few), 3 (some), and 4 (all). In order to reduce the skewedness, the responses were recoded with “none” as 0 and “very few” through “all” as 1 and then combined to compute the total number of items youth endorsed (Cronbach’s alpha was .83).

Substance use at T1 and T4—We used three indicators to assess the youth’s substance use at T1 and T4: tobacco, alcohol, and marijuana use. Using an open-ended format, interviewers asked the youth how many times in the past 6 months they had (a) smoked cigarettes or chewed tobacco, (b) drunk alcohol (beer, wine, or hard liquor), and (c) used

marijuana. Frequencies of all three substances were summed for the subsequent analyses. At T1, 6% of the youth reported either smoking cigarettes or chewing tobacco, 17% reported consuming any type of alcohol, and 9% reported using marijuana in the past 6 months. Overall, approximately 20% of the youth reported using at least one of the substances at baseline. At T4, 11% of the youth reported smoking cigarettes or chewing tobacco, 21% and 18% reported using alcohol and marijuana, respectively, with approximately 26% of the youth reporting using at least one of the substances in the past 6 months. We included youth substance use at T1 in the analysis as a control variable.

Age—In order to control for the possibility that intervention effects on youth substance use might be influenced by age, we included youth age at T1 in the analysis as a covariate.

Number of placement changes—Given the findings that youth placement history is one of the factors influencing their substance use, we included the total number of placement changes they experienced prior to and during the study period as a covariate. We collected placement change information from the youth at each assessment wave. On average, youth in the sample experienced placement changes 3.5 times in their lives ($SD = 3.3$, ranged 0 to 26 times).

Gender—The youth's gender was coded as 1 for boys and 2 for girls.

Data Analysis Plan

We first examined bivariate correlations and mean differences in study variables between the two groups (KEEP SAFE vs. SAU). Then, we examined *how* the intervention worked by testing the hypothesized model using a path analysis in Mplus 7.3 (Muthén & Muthén, 1998–2015). We hypothesized that the intervention would significantly increase positive caregiver–youth relationships at T2, which would reduce associations with deviant peers at T3, and subsequently prevent or reduce substance use at T4. We also tested the significance of the mediating path to examine whether the hypothesized mediators would carry intervention effects to the outcome, using bias-corrected bootstrapped confidence intervals based on 10,000 samples in Mplus (Efron & Tibshirani, 1993). Confidence intervals that do not include zero signify that the mediating effect is significantly different from zero (Preacher & Hayes, 2008). In addition, we conducted multigroup analyses in Mplus to examine whether there were gender differences in the mechanisms of change that would lead to intervention effects. Note that by taking full advantage of the longitudinal nature of our RCT, the temporal order of the variables in the model allowed us to discuss the hypothesized causal paths. Missing data ranged from 0.4% to 32.8% across study variables over time. In order to accommodate missing data and include the full intent-to-treat randomized sample ($N = 259$), we used full information maximum likelihood estimation, a built-in function in Mplus, which has been shown to provide unbiased estimates when data are missing at random (Arbuckle, 1996). Preliminary analyses indicated that there were no significant differences between the youth who completed all four waves and the 72 youth who dropped out of the study by T4 in terms of youth demographic characteristics as well as the other study variables at T1. Additionally, it was found that youth's session attendance (when coded as 1 for 80% or over vs. 0 for below 80%) was not associated with any of the study

variables. Further, the Little's MCAR test indicated that the data were missing completely at random in the present sample, $\chi^2(26, N = 259) = 32.43, p = .18$. Variables were examined for nonnormal distributions and outliers; distributions of deviant peer associations at T3 and substance use at T1 and T4 were significantly skewed and thus were log transformed in the subsequent analyses. Youth's age and the total number of placement changes were included as control variables. In the interest of parsimony, effects of these two variables on the outcome measure (substance use at T4), but not on mediating factors, were estimated in the model.

Results

Descriptives

Bivariate correlational analyses (Table 1) indicated that youth age at T1 and the total number of placement changes youth experienced were not significantly associated with any of the study variables. Youth's gender was not significantly associated with any of the study variables except their age; girls were slightly older than boys in the present sample. The relationship with caregivers at T2 was negatively associated with the association with deviant peers at T3 and substance use both at T1 (baseline) and T4. The association with deviant peers at T3 was significantly and positively associated with youth substance use at T4.

Mean Differences by Treatment Condition

As shown in Table 1, youth in the KEEP SAFE condition reported significantly higher levels of relationship quality than youth in the SAU condition at T2, $t(204) = -2.18, p = .03$, Cohen's $d = -0.31$. Youth in the KEEP SAFE condition also reported significantly lower levels of association with deviant peers at T3 than their peers in the SAU condition, $t(185) = 2.51, p = .01$, Cohen's $d = 0.37$. The group difference was also significant for substance use at T4, with youth in the KEEP SAFE condition showing significantly lower levels of substance use than those in the SAU condition $t(172) = 2.31, p = .02$, Cohen's $d = 0.36$. There were no significant gender differences in any of the study variables (results available upon request); boys and girls exhibited similar levels of relationship quality with caregivers, association with deviant peers, and substance use.

Direct and Indirect Effects of the KEEP SAFE Intervention on Substance Use at T4

Next, we examined potential pathways through which the KEEP SAFE program influenced youth substance use at T4 (Figure 1). We also included youth age at T1 and the total number of placement changes youth experienced prior to and during the study as control variables. Additionally, we included substance use at T1 to control for its potential effects on mediating factors as well as on substance use at T4. By including T1 substance use, this model tests intervention effects on changes in substance use between T1 and T4. The path analysis indicated that the model fit the data well with $\chi^2(6, N = 259) = 3.97, p = .68$, Comparative Fit Index (CFI) of 1.00, Tucker–Lewis index (TLI) of 1.05, root-mean-square error of approximation (RMSEA) of .00 (90% Confidence Interval (CI) = .00 – .06). The intervention condition was significantly and positively associated with the relationship with caregivers at T2, suggesting that the KEEP SAFE program successfully improved the

relationship with caregivers. The youth's positive relationship with caregivers at T2 was then significantly and negatively associated with their involvement with deviant peers at T3. As hypothesized, higher levels of deviant peer associations at T3 were associated with higher levels of substance use at T4. In addition, intervention effects on deviant peer associations was significant, suggesting a significant direct intervention effect on reducing risk for involvement with delinquent peers. On the other hand, the direct intervention effect on substance use at T4 was not significant in the path model. Youth substance use at T1 negatively predicted the relationship with caregivers at T2 and positively predicted the association with deviant peers at T3. Youth age and the number of placement changes were not significantly associated with substance use at T4. The model accounted for approximately 34% of the variance in substance use at T4.

Further, we conducted significance tests to examine whether relationship with caregivers and association with deviant peers indeed mediated the significant intervention effects to substance use at T4. Results from the bias-corrected bootstrapped confidence intervals (Efron & Tibshirani, 1993) indicated that KEEP SAFE influenced youth substance use through their associations with deviant peers ($-.072$; 95% CI = $-.151 - -.013$). KEEP SAFE also significantly affected youth substance use through the quality of relationship with caregivers and associations with deviant peers ($-.014$; 95% CI = $-.041 - -.002$). These results suggest that the quality of relationships with caregivers and associations with deviant peers serve as significant mediators that link the intervention and substance use among youth in foster care.

Finally, in order to examine potential gender differences in the direct and mediating paths tested in Figure 1, we conducted multigroup analyses. First, we ran an unconstrained two-group model in which all of the paths were allowed to vary by gender. In the second model, the direct paths (i.e., from treatment condition to the relationship quality with caregivers, to the association with deviant peers, and to substance use) and the indirect paths (i.e., from the relationship quality with caregivers to the association with deviant peers and to substance use) were constrained to be equal for boys and girls. The unconstrained model fit the data well, $\chi^2(12, N = 259) = 9.39$, CFI = .100, TLI = 1.08, RMSEA = .00 (90% CI = .00 – .07). The constrained model showed a chi-square of 10.03 ($df = 17$), CFI = 1.00, TLI = 1.14, and RMSEA = .00 (90% CI = .00 – .03). The chi-square difference ($\chi^2 = .64$, $df = 5$) was not significant, suggesting that gender differences in the direct and mediating paths were not statistically significant between boys and girls.

Discussion

It is well documented that youth involved in foster care are at significantly higher risk than their non-foster counterparts for a range of health risking behaviors. Substance use is especially concerning because substance use problems among youth in foster care often have negative cascading effects on subsequent adjustment as adults, including early parenthood and poor educational attainment (Kim & Leve, 2011). As hypothesized, findings indicated that youth in the KEEP SAFE condition showed significantly lower levels of substance use than those in the SAU condition at 18 months postbaseline. In addition, youth in the KEEP SAFE condition had significantly more positive relationships with caregivers at 6 months

postbaseline (T2) and were less likely to be involved with deviant peers at 12 months postbaseline (T3) than youth in the SAU condition. These findings demonstrate significant intervention effects on the immediate targets of the KEEP SAFE program. Our findings also support the program's hypothesized mechanism of change by confirming that the intervention effects on substance use were significantly mediated through improved caregiver–youth relationships and reduced involvement with deviant peers. Furthermore, as expected, the direct and indirect effects of the program did not appear to differ by gender.

Three aspects of these findings are particularly notable. First, this study replicates significant intervention effects of the middle school version of the KEEP SAFE program (Middle School Success) on reducing substance use among early adolescent girls in foster care (Kim & Leve, 2011; Kim et al., 2013). Middle School Success takes the same family-based and skill-focused approach but is developmentally timed at the transition to middle school (see Kim & Leve, 2011 for details). By replicating these previous intervention effects in an independent, ethnically and developmentally diverse sample of foster youth of both genders, this study suggests that KEEP SAFE effects may be generalizable to a larger population of foster youth. KEEP SAFE and other intervention programs have been recently recognized as model evidence-based practices (EBPs) in delaying the onset of substance use and other associated health risking behaviors (Blueprints for Healthy Youth Development, 2015), although these programs have not been widely implemented within the child welfare system. One of the main reasons for such a lag in implementation is that policymakers are often uncertain whether program effects will be generalizable to the population they serve (Horwitz et al., 2014). Specifically, EBPs are usually shown to be effective for a given sample for a limited period of development and thus there is very little evidence that a given EBP will be effective when implemented within a system serving a wider population with heterogeneous backgrounds (Hoagwood, Burns, Kiser, Ringeisen, & Schoenwald, 2001). Therefore, these findings on KEEP SAFE's efficacy in reducing substance use among youth in foster care, replicated in an independent sample, suggest potential scalability of the KEEP SAFE program across different contexts.

Second, potential gender differences in intervention effects on target outcomes are rarely discussed in the literature (Leve et al., 2015), and our study is one of the few studies that specifically tested whether the intervention program would be equally effective for both boys and girls. The lack of gender differences in the intervention effects suggests that KEEP SAFE is likely to benefit boys as well as girls in foster care by reducing risk for involvement in substance use. In addition, the finding that the intervention reduced substance use for both genders through similar mediation paths suggests that focusing on the same risk and promotive factors in preventive intervention programs works for both boys and girls in foster care. Although the question regarding whether gender-specific programs are needed for youth in foster care warrants further research, our finding provides promising evidence that the KEEP SAFE program can be used to reduce substance use among both genders of foster youth.

Third, the finding that the intervention resulted in reduced substance use by youth in foster care through improved caregiver–youth relationships and less involvement with deviant peers suggests that targeting these two factors might be a fruitful approach in preventive

efforts to reduce risk for later substance use in these youth. This finding is in line with studies that have highlighted the importance of positive relationships with caregivers in preventing substance use in foster youth (Guibord et al., 2011; Kohlenberg et al., 2002; Wall & Kohl, 2007) as a primary context that enables caregivers to effectively nurture healthy adjustment. As shown in this study, such positive caregiver–youth relationships significantly discouraged involvement with deviant peers, one of the strongest risk factors of substance use in foster youth (Aarons et al., 2008; Thompson & Auslander, 2007). Thus, this study corroborates evidence that focusing on strengthening the relationship quality with the caregiver and discouraging associations with deviant peers can be critical in preventing onset of substance use among youth in foster care. Furthermore, given the finding that these two factors were influenced by baseline substance use and that they are also robust predictors of other subsequent problem behaviors such as risky sexual behaviors (e.g., Lansford, Dodge, Fontaine, Bates, & Pettit, 2014), targeting these two factors may have positive impacts on broader psychosocial adjustment for foster youth.

There were several limitations to the study. First, although our sample was ethnically diverse, its modest sample size did not allow us to fully examine potential ethnic group differences in the intervention effects. Given the findings in the literature that suggest that ethnic minority youth in foster care tend to show different prevalence rates of and different pathways to problem behaviors (e.g., Keller et al., 2010), intervention effects found in this study may not be equally generalizable to all ethnic groups. Second, as indicated earlier, the participation rate was relatively low (49%), and retention rates of the sample were reduced (72% at T4). This may have resulted in limited variation in the data. Such retention rates are mainly due to inherent difficulties in conducting longitudinal research with a highly mobile and vulnerable population such as youth in foster care (Capaldi, Chamberlain, Fetrov, & Wilson, 1997). However, our preliminary analyses indicated that dropouts in the sample were not systematically associated with any of the study variables, including the intervention status, and thus it is unlikely that the overall findings were influenced by missingness. Third, previous studies have indicated that histories of maltreatment and foster placement (e.g., the type and severity of maltreatment, the restrictiveness or type of placements/settings) may play a significant role in predicting substance use among foster youth (e.g., Aarons et al., 2008; Thompson & Auslander, 2007). However, because of challenges in collecting detailed system data on maltreatment and placement histories for the present sample, we had to rely on youth's self-reports. Thus, we were unable to systematically evaluate the effects of these factors on intervention effects. As such, our ability to rule out potential effects of maltreatment and placement histories was limited. Additionally, findings from multigroup analysis regarding the lack of gender differences should be interpreted with caution, given the relatively modest sample size. Finally, all of the indicators in the model, including substance use, relied on youth self-reports, and thus findings should be interpreted with caution as some of the associations found in the study may be influenced by common method variance. In particular, because of the modest sample size, we used composite scores by combining all three indicators of substance use, instead of a latent variable in the interest of power. Thus, it is possible that findings were somewhat influenced by measurement errors.

Nonetheless, this study employed a fully prospective longitudinal RCT design on a highly mobile group of youth in foster care and examined intervention effects on 18-month outcomes. This study contributes to the field by demonstrating promising effects of a preventive intervention program designed to prevent substance use and other associated health risking behaviors among youth in foster care. Furthermore, this study demonstrates not only that the KEEP SAFE program worked as intended, but also identified key mechanisms of change. Understanding mechanisms of change can inform efforts to strengthen existing programs or develop new programs to reduce risk for substance use among youth in foster care. Given the heightened risk of youth in foster care for substance use and its short- and long-term consequences across adolescence and adulthood, preventive intervention efforts such as the KEEP SAFE program can help youth in foster care avoid negative developmental trajectories associated with substance use problems.

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Figure 1.

Effects of KEEP SAFE on Substance Use at 18 Months Postbaseline

Note. Values in parentheses represent standardized coefficients.* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 1**Bivariate Correlations Among Study Variables (N = 259)**

	1	2	3	4	5	6
1. Relationship with Caregivers at T2						
2. Associations with Delinquent Peers at T3	-.25**					
3. Substance use at T4	-.20*	.53***				
4. Substance use at T1	-.17*	.25**	.28***			
5. Age at T1	-.05	-.00	.09	-.03		
6. Total number of placement changes	-.12	.02	.07	.04	-.02	
7. Gender (1 = male; 2 = female) ^a	-.08	.03	-.05	-.05	.12*	-.01
SAU condition (<i>n</i> = 142)						
<i>M</i>	6.37 ^b	2.01 ^b	32.33 ^b	4.63	14.51	3.54
<i>SD</i>	2.23	1.98	126.39	26.15	1.60	2.86
KEEP SAFE condition (<i>n</i> = 117)						
<i>M</i>	7.02	1.31	6.79	5.74	14.18	3.43
<i>SD</i>	2.02	1.65	31.80	25.29	1.49	3.75

* $p < .05$.

**

 $p < .01$.

 $p < .001$.^aSAU condition included 41.5% boys and KEEP SAFE condition included 39.3% boys.^bindependent *t*-tests indicated significant group differences between the SAU and KEEP SAFE condition at $p < .05$.