Journal of Prevention (2022) 43:67–82
https://doi.org/10.1007/s10935-021-00655-y

ORIGINAL PAPER

Predicting Receipt of an Effective Dose of a Family-Centered Preventive Intervention for African American Youth

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Accepted: 22 October 2021 / Published online: 6 November 2021

Abstract

Research reveals a linear association between prevention program dose and outcomes; that is, families receive the most benefits when they attend a sufficient number of program sessions. Ensuring participants receive an effective dose of prevention is a persistent challenge for the widespread implementation of family-centered prevention programs. We investigated factors associated with an effective dose of the Strong African American Families (SAAF) substance use prevention program. Dose-related factors included socioeconomic disadvantage, caregiver depression, family disorganization, youth risk for problem behavior, and community risk. Notably, SAAF includes an ecologically appropriate curriculum and a comprehensive set of engagement procedures, which decrease the influence of these factors on attendance. The sample consisted of 252 African American youth and their caregivers from eight rural counties in South Georgia who had been randomly assigned to receive the SAAF substance use prevention program, a seven-session family skills training program. We operationalized an effective dose of SAAF, per recent research, as attendance in at least 5 of 7 sessions. Logistic structural equation modeling revealed no evidence of the tested factors reducing dose. Family disorganization, however, was associated positively with an effective dose, controlling for all other factors. Families with more disorganization were more likely to receive an effective dose of the program. Findings suggest that ecologically sensitive engagement protocols and curricula may obviate the influence of common risk factors and foster participation among those who most perceive a need for the program.

Keywords Family-centered prevention · Program dose · Barriers to attendance · Ecologically sensitive curricula

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Introduction

Underage substance use has an extensive range of negative consequences, including physical injury and impaired psychosocial development (Miller et al., 2006). Research suggests that salient factors affecting adolescent substance use originate in the family environment, particularly in parenting practices (Dishion et al., 2002). Subsequently, numerous family-based prevention programs have been developed to address adolescent substance use, the efficacy and durability of which have been well documented (Van Ryzin et al., 2015).

Ensuring that participants achieve an effective dose of prevention has emerged as a significant and persistent challenge in the widespread implementation of family-centered programs for substance use. In prevention studies, the dose of an intervention is most commonly investigated as the number of sessions attended (Rowbotham et al., 2019). An effective dose of prevention, however, represents the number of sessions required to achieve an intended effect. Studies document a linear association between program attendance and outcomes (Gorman-Smith et al., 2002; Kogan et al., 2019; Prado et al., 2006). Early research on parents' perceptions of family-centered programs suggested that parents viewed them as useful and necessary and indicated they would be interested in attending them if available (Spoth et al., 1997). Subsequent research, however, has underscored the difficulties in facilitating high levels of attendance for family-centered programming. Carefully controlled implementation trials that provide considerable resources for family engagement have reported attendance rates over 60% (e.g., Brody et al., 2006a, 2006b; Gorman-Smith et al., 2002); however, a substantial portion of families in these projects did not receive the intervention, and still others may not have experienced an effective dose of the program. Other studies, with programs implemented in community settings, have considerably lower attendance rates. For example, in a major dissemination trial, Spoth and colleagues (2007) reported attendance (defined as attending at least one of 7 sessions) of 17% in a community implementation trial. Few studies of attendance focus specifically on whether participants received an effective dose of the intervention. An effective dose constitutes a more conservative criterion for success associated with the ultimate impact of a prevention program within a community. We thus focus on investigating factors associated with the receipt of an effective dose of a prevention program in the current study.

Studies indicate that attendance in family-centered prevention is a complex, multi-factor health-related behavior influenced by characteristics of the family, the family's context, and the program itself (Spoth et al., 1997; Whittaker & Cowley, 2012). Ecological perspectives and research point to the importance of socioeconomic, community, family, and youth characteristics in understanding attendance (Bronfenbrenner, 1979; Whittaker & Cowley, 2012). Program characteristics include the use of engagement procedures and salience. Program salience is how well the curriculum aligns with the participants' social and cultural values. In this study, we examine the association of socioeconomic disadvantage, caregiver depression, family disorganization, youths' risk for problem behaviors,

and community risk with receipt of an effective dose (defined as attending at least 5 of 7 sessions) of the Strong African American Families (SAAF) alcohol use prevention program. SAAF includes multiple procedures to attenuate the influence of common risk factors (Kogan et al., 2016) and comprises a culturally- and ecologically-tailored curriculum (Brody et al., 2004).

Ecological Factors and Engagement in Family-Based Prevention Programming

Empirical research documents a range of ecological factors associated with attendance in the context of family-centered prevention (Bronfenbrenner, 1979; Kumpfer et al., 2002). *Socioeconomic disadvantage* includes poverty, low caregiver education, single-parent status, and unemployment (Baker et al., 2010). Socioeconomically disadvantaged families may find it challenging to participate in programs due to economic stress, lack of flexibility in work schedules, or resources needed to organize attendance, such as childcare or transportation. Studies suggest that economically disadvantaged families, particularly low-income single caregivers, are more likely to drop out of prevention programming (Baker et al., 2010). *Caregiver depression*, a common correlate of socioeconomic disadvantage, is also linked to perceived barriers and attendance rates in family programs (Mendez et al., 2009). Mothers may lack the energy and motivation to attend prevention programs when experiencing mental health issues such as depression.

Family disorganization is another potential challenge for consistent attendance. Family disorganization refers to a lack of consensus among members, dysfunctional structural and social roles, and heightened conflict or aggression (Repetti et al., 2002). Disorganized family environments are characterized by a lack of routines and predictability, in which caregivers struggle to monitor and supervise their children (Matheny et al., 1995). Some researchers hypothesize that family disorganization acts as a barrier to participation due to a lack of routines and the collective efficacy required to schedule attendance and attend regularly (Perrino et al., 2001). Family disorganization also may impede attendance because caregivers in such families are hesitant to participate in group workshops where their family dynamics may be on display (Whittaker & Cowley, 2012). Findings in this regard, however, are mixed. Some studies have shown that caregivers who report difficulty managing their families are more likely to attend because they anticipate receiving greater benefits from a program that helps address these issues (Fleming et al., 2015; Gorman-Smith et al., 2002; Prado et al., 2006).

Youth at-risk status for problem behavior constitutes another potential predictor of attendance issues (Brody et al., 2006a, 2006b). Risk factors for problem behavior include youths' engagement in risky behavior, poor self-control, and risky peer affiliations (Brody et al., 2006a, 2006b). Frick and colleagues (2004) found associations among youth anger, problem behavior, and conduct problems. Youth who are at risk for problem behavior may refuse to attend a program, and caregivers may have difficulty managing their youths' behavior (Brody et al., 2006a, 2006b). Again, the findings are mixed. Some research suggests that caregivers of at-risk children

may perceive the intervention as more useful and thus be more likely to attend (Haggerty et al., 2002; Prado et al., 2006).

The last factor considered, residence in *risky communities*, includes residing in communities with limited resources and high crime levels. Community risks are barriers to participation in prevention programs due to the lack of transportation or unsafe travel options. Heinrichs and colleagues (2005) found that parents were less likely to participate in a prevention program if their child's preschool was located in a neighborhood with a high number of social problems.

Program Characteristics, Attendance, and the Strong African American Families Program

Given the challenges of providing and receiving an effective dose of prevention, researchers have underscored the need for (a) implementing strategies designed to make programming more accessible (Barrera et al., 2017; Kogan et al., 2016); and (b) developing engaging, culturally responsive curricula, particularly for members of diverse ethnic groups (Barrera et al., 2017). Well-designed programs specify implementation processes that include extensive engagement protocols to facilitate attendance (Gonzales et al., 2012; Kogan et al., 2016). Engagement protocols may include providing childcare, family meals, transportation, an accessible location for the program, and lay community facilitators. Engaging, interactive, and ecologically relevant curricula can also promote attendance (Bronfenbrenner, 1979; Kumpfer et al., 2002).

The implementers of prevention programs increasingly consider their applicability to diverse communities (Dishion & Stormshak, 2007). Researchers have developed several evidence-based programs focused on designated racial/ethnic or cultural groups (Brody et al., 2004; Coatsworth et al., 2002; Gonzales et al., 2012). Increases in the use of engagement protocols and salient curricula could attenuate the influence of risk factors associated with low attendance. Conversely, in the context of a program that attends to attendance-related challenges, "risk" factors may promote attendance, as participants believe the program is more needed and relevant to their lives.

We investigated the influence of attendance-related factors in the context of a recent trial of an evidence-based intervention. The Strong African American Families (SAAF) is a family-centered preventive intervention designed to deter substance use among rural African American adolescents. SAAF's highly interactive curriculum was designed to be ecologically sensitive and salient for rural African Americans (Brody et al., 2004). The recruitment, engagement, and implementation protocols developed for SAAF were designed to encourage high participation rates in rural African American communities (Kogan et al., 2016). Participation in SAAF is associated with an increase in positive parenting practices and a decrease in youth's substance use compared to families in a control condition (Brody et al., 2004, 2006a, 2006b). Moreover, a community effectiveness trial of SAAF found significant effects on reducing youth substance use vulnerability (Kogan et al., 2016).

Summary

We investigated the extent to which multiple factors in the ecology of the family were useful in understanding program dose in a prevention context where high levels of engagement procedures were implemented, and an ecologically tailored curriculum was used. To that end, we investigated if socioeconomic disadvantage, caregiver depression, family disorganization, youth risk, and community risk predicted completion of an effective dose of programming (attending at least 5 of the 7 sessions). Past research on the association of many of these factors with dose is inconsistent. Some factors such as family disorganization and youth risk may act as risk factors for dose in some studies and promotive factors in others. It is possible that when program characteristics effectively facilitate an effective dose, program characteristics attenuate ecological risk factors or may even promote attendance as caregivers experience greater motivation, and the program has greater salience. Further, research that examines traditional risk factors related to program attendance, such as socioeconomic status and caregiver depression, is needed within the context of ecologically relevant programs with strong engagement procedures. We thus made no directional hypotheses in our study.

Methods

Study Sample

We investigated factors associated with dose among the experimental group ($N=252$ families) of participants in a randomized prevention trial of SAAF (total trial $N=472$). The developers of SAAF implemented this efficacy trial between the years 2011–2018 (Kogan et al., 2019). We recruited primary caregiver-youth dyads from eight rural counties in Georgia. We obtained from schools in these counties lists of African American 5th-grade students. We recruited participants from the list in random order. Recruitment began with an introductory letter. Community liaisons made follow-up phone calls to families. Eligibility requirements included having a child in the family that was 11 years of age at baseline and self-identified as African American or Black. If families had multiple primary caregivers wishing to participate, data were only collected from the one who spent the most time with the youth. If youth had siblings in the 5th grade, we selected the youngest youth to avoid confounds associated with multiple youth participants from the same family. Of the 825 families screened for eligibility, 625 were eligible to participate; of these, we enrolled 472 in the trial (a 76% recruitment rate). The primary reasons for non-participation were lack of time or interest. Of the 472 enrolled in the trial, we randomized 252 to receive the SAAF program and comprise the analytic sample for this study.

Participant families had an average of 2.7 children. More than half of the child participants were female (53.6%). Of the caregivers, 88.6% were the child's biological parents, and 94.4% were female. Regarding educational attainment, 16% of caregivers had less than a high school education; 72% had completed high school, trade

school, or obtained a GED; 7.2% had a bachelor's degree, and the remaining 4.8% had some graduate school training or a graduate degree. On average, caregivers were 37.2 years old, and youth were 11.3 years old at baseline. All caregivers and youth self-identified as African American or Black.

Procedures

After enrollment and a baseline assessment, we assigned participants randomly to SAAF or a no-treatment control group (Kogan et al., 2019). All families took part in a baseline assessment prior to random assignment. African American research staff made home visits to collect baseline data using audio computer-assisted self-interviews on laptop computers. Caregivers and children completed the surveys in separate areas of the home to provide privacy. We obtained written informed parental consent, parental consent for their youth to participate, and assent from youth. Home visits lasted approximately 90 min. Caregivers received $100 and youth $40 for completing the assessment. All study protocols were approved by the University of Georgia's Internal Review Board.

Program Information

Longitudinal research with rural African American youths and their families informed the intervention's session content (Brody et al., 2004), and community partnerships and focus groups of stakeholders informed its delivery format (Brody et al., 2004). Implementers used pre-intervention home visits to provide an opportunity to engage families, show a promotional video, and answer questions about the program prior to the first session. SAAF consisted of one 2-hour program session per week for seven weeks. African American community members served as program facilitators to increase the credibility of the program and the trust among participants. A community facility hosted the program, and we provided meals at each session. We also offered on-site childcare and transportation to families. For each session attended, families received $25. We considered a session attended if either the caregiver or child participated, however in 96% of cases, both the caregiver and child attended. Although it was preferred that sessions were attended in order, if a session was missed, we encouraged participants to continue attendance at the next session. Makeup sessions were offered after the conclusion of the program. Makeup sessions were included in the attendance count.

Measures

Dose

The session facilitators recorded families' attendance at each of the seven sessions. We operationalized *dose* as either an effective dose (completing at least 5 of the 7 sessions) or an incomplete dose (completing less than 5 sessions, or 0–4 sessions). We modeled dose as dichotomous with cutoffs based on the results of a complier

average causal effect analysis (CACE) on SAAF. Kogan and colleagues (2019) reported that SAAF effectively reduced youth participant alcohol use. The CACE analysis suggested a medium-sized effect when participants attended at least five of the seven sessions (Kogan et al., 2019).

Socioeconomic Disadvantage

We assessed *socioeconomic disadvantage* with the caregiver at baseline via a risk index based on four dichotomous variables: family poverty based on federal guidelines, caregiver unemployment, receipt of Temporary Assistance for Needy Families (TANF), and caregiver education level less than high school graduation. We assigned a score of 1 to each of those variables that were present. We summed the scores to form the index, which ranged from 0 to 4 factors. Previous research has used similar indices to assess socioeconomic disadvantage in previous research (Kogan et al., 2015).

Caregiver Depressive Symptoms

We measured *caregiver depressive symptoms* at baseline using the Center for Epidemiologic Studies Depression (CES-D) Scale (Radloff, 1977). We provided caregivers with a list of 20 statements (e.g., "How often were you bothered by things that usually don't bother you?") and asked how often they occurred over the past week. The response scale ranged from 0 (*not at all*) to 3 (*a lot*). We summed items to create a total depressive symptoms score, and the Cronbach's alpha in our study was 0.88. For adults, the CES-D cutoff score for elevated depressive symptoms is above or equal to 16 (Radloff, 1977).

Youth Risk

Youth risk was measured using assessments of youth self-reported *anger*, *affiliation with risky peers*, *self-control*, and *antisocial behavior* at baseline. We measured *anger* in youth with an 8-item scale Youth Hostility Scale (Joe et al., 2002; $\alpha = 0.86$). Youth rated their agreement with statements like, "Your temper gets you into fights or other trouble." The response scale ranged from 0 (*strongly disagree*) to 4 (*strongly agree*), and we summed the items. Higher scores on this scale indicated higher levels of anger. Youth also completed the 9-item *peer behavior* scale developed for the SAAF-STEPS trial ($\alpha = 0.77$). Youth answered questions regarding their close friend's risky activities. We summed the items, and examples of the items included "How many of your close friends have drunk a lot of alcohol, enough to get drunk?" The response scale ranged from 0 (*none of them)* to 3 (*all of them*). Higher scores indicated higher levels of affiliation with risky peers. We measured *poor self-control* in youth using a 15-item Self-Control Scale (Wills, 1986; $\alpha = 0.80$). Youth were given a list of statements. An example item included, "I often do things without stopping to think." The response scale ranged from 1 (*not true at all*) to 4 (*pretty true*). Items were summed, and a higher score indicated a higher level of poor self-control. We measured *problem behavior* in youth using the 9-item Youth Problem

Behavior scale developed for the SAAF-STEPS trial (α = 0.82). Youth answered questions such as, "I go places that my [CAREGIVER] does NOT allow me to go." The response scale ranged from 1 (*not true at all*) to 4 (*very true*), and we summed the items. Higher scores on the problem behavior scale indicated higher levels of youth problem behavior.

Family Disorganization

Family disorganization was measured using three caregiver-reported scales at baseline. We measured *chaotic home environment* using a 16-item self-report survey (Matheny et al., 1995). The survey asked caregivers to rate statements such as, "There is often a fuss going on at our home," as false (0) or true (1) for their household (α = 0.77). We summed these items to create a chaotic home environment score, and higher values indicated a more chaotic home environment. Caregivers reported on *Inconsistency in household routines and discipline,* indexed with a 7-item measure developed for this project. This measure included items such as, "When I am stressed out, I don't enforce house rules." The response set ranged from 1 (*not at all true*) to 4 (*very true*), and we summed items for a total score. Higher total scores indicated more inconsistency in household routines and discipline. Cronbach's alpha was 0.63. We measured *caregiver knowledge regarding their child's activities* with the 7-item Knowledge Subscale from the Knowledge, Monitoring and Solicitation Questionnaire (Lionetti et al., 2016; α = 0.73). Caregivers rated their agreement with statements such as, "I know what my child does with their free time." Possible responses ranged from 1 (*not at all true*) to 4 (*very true*). We reverse-coded the responses so that a response of one indicated very true and a four indicated not at all true. This measure was reverse-scored so that higher values indicated low levels of caregiver knowledge.

Community Risk

C*ommunity risk* was measured at baseline using caregivers' reports on subscales of the Community Resources and Problems measure (Forehand et al., 2000). The *Community Child Resources subscale* included 7 items (α = 0.82). We asked caregivers how good or poor their community was in terms of a list of resources. Example resources for the Community Child Resources subscale included "After school programs" and "Childcare for working parents." The *Community Agency Resources* subscale included 4 items (α = 0.90). Example resources included "Agencies to help with money problems" and "Agencies to help with food and clothing." The response scale for these subscales ranged from 0 (*very poor*) to 4 (*very good*). We reverse coded the resources subscales, and items were summed, so higher numbers indicate lower levels of resources. For the 8-item *Community Child-Related Risk* subscale (α = 0.89), caregivers responded to a list of risks (e.g., "Teen Pregnancy," "Unsupervised Children," "Gangs") and were asked how prevalent they were in their neighborhood on a response scale ranging from 0 (*not a problem*) to 3 (*a big problem*). Items were summed, and higher scores indicated more youth risk.

Controls

We modeled *youth sex* as a control variable (1 = male, 0 = female). Research suggests there may be differences in the way caregivers react to problem behaviors within the family based on their child's sex (Endendijk et al., 2017).

Analysis Plan

We investigated factors associated with an effective dose of SAAF with logistic structural equation modeling (SEM) as implemented in Mplus 8.0 (Muthén & Muthén, 1998–2017). We determined the sample size a priori based on the aims of the randomized trial. We conducted a post hoc power analysis to examine if sufficient power was present to detect dose effects implemented in Mplus 8.0 (Thoemmes et al., 2010; Muthén & Muthén, 1998–2017). We considered a model with three latent variables (youth risk, community risk, and family disorganization), three observed variables (youth sex, socioeconomic disadvantage, and caregiver depression), and one dichotomous outcome (dose) with data missing at random (MAR). With a sample size of 252, power was above 0.85 ($p < 0.05$) to detect an effect size as small as 0.03. Missing data due to skipped survey items was minimal (< 2% per variable). We managed missing data with full information likelihood estimation. Latent variables are variables that are not directly observed but are detected by their effects on observed variables (Brown, 2015). We constructed family disorganization, community risk, and child risk latent variables. Prior to testing associations, we examined the latent variable measurement model with confirmatory factor analysis (CFA). CFA is used to construct and validate the latent variables (Brown, 2015).

Results

Table 1 presents correlations among study variables and their means, standard deviations, and scale range. Approximately 33% of participants attended all seven sessions, 19% attended six sessions, and 10% attended five sessions (62% received an effective dose). Approximately 20% attended zero sessions, and 18% attended between 1 and 4 sessions.

CFA of the measurement model for family disorganization, youth risk for problem behavior, and community risk demonstrated an acceptable fit to the data $\chi^2(32) = 51.70$, $p = 0.015$, CFI = 0.95, RMSEA = 0.05. All factor loadings were significant, exceeded 0.38, and loaded in the expected directions.

Table 2 presents the results of a series of logistic SEMs testing each factor with youth sex controlled. Socioeconomic disadvantage, caregiver depression, youth risk, and community risk were not associated significantly with dose. Family disorganization was associated positively with an effective dose of SAAF ($OR = 1.32$, $p < 0.05$). We then implemented a simultaneous multivariate model (see Table 3). Again,

Table 1 Correlations among study variables

Predictor	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) Program Dose [a]	–													
(2) SES Disadvantage	−.01	–												
(3) Caregiver Depression	.04	.25**	–											
(4) Chaotic Home Environment	.12	.50**	.50**	–										
(5) Inconsistency in Household Routines and Discipline	.13*	−.15*	.07	.40**	–									
(6) Caregiver Knowledge Regarding Child's Activities	.12*	−.02	.32**	.39**	.33**	–								
(7) Low Community Child Resources	−.06	.03	.22**	.22**	.09	.19**	–							
(8) Low Community Agency Resources	.00	−.01	.07	.07	.11	.09	.55**	–						
(9) Community Child-Related Risk	.10	.01	.23**	.12*	.10	.03	.22**	.36**	–					
(10) Youth's Anger	.10	.14*	.09	.06	−.04	.04	.08	.02	−.03	–				
(11) Youth's Low Self-Control	−.09	.07	.05	.06	-.01	.05	.07	.02	.11	.46**	–			
(12) Youth's Affiliation With Risky Peers	.02	.02	.08	.03	-.03	.02	−.04	−.04	.01	.50**	.34**	–		
(13) Youth's Problem Behavior	−.05	.15*	.17**	.13*	−.17**	.02	-.03	−.05	.00	.26**	.31**	.23**	–	
(14) Youth Sex (1 = male)	−.09	-.05	−.07	−.10	.01	.02	.04	.00	−.13*	.04	−.01	.12	.10	–
Mean	0.62[a]	2.02	15.26	2.96	12.95	11.83	11.44	9.20	10.25	8.71	32.18	2.78	14.34	0.50
SD	0.49[a]	1.24	9.73	3.19	2.57	2.70	5.50	3.71	5.57	6.50	6.96	2.62	3.34	0.50
Scale Range	0.1	0–4	0–60	0–16	7–28	7–28	0–28	0–16	0–24	0–32	15–60	0–27	9–36	0.1

[a]Program dose is coded as 1 = effective dose (5–7 sessions), 0 = incomplete dose (0–4 sessions)

**$p < 0.01$ (2-tailed). * $p < 0.05$ (2-tailed)

Table 2 Study variables associations with dose

Predictor	B	*SE*	*p*	*OR*	95% CI
SES Disadvantage	−0.014	0.072	0.845	0.980	0.824, 1.164
Caregiver Depression	0.037	0.072	0.609	1.007	0.985, 1.030
Family Disorganization	0.251	0.099	0.011	1.318	1.080, 1.610
Youth Risk	0.054	0.086	0.530	1.082	0.876, 1.336
Community Risk	0.000	0.078	.998	0.999	0.463, 2.152

Youth sex is controlled. Program dose is coded as 1 = effective dose (5–7 sessions), 0 = incomplete dose (0–4 sessions)

Table 3 Mulitvariate logistic associations with dose

Predictor	B	*SE*	*p*	*OR*	95% CI
SES Disadvantage	−0.015	0.074	0.838	0.976	0.802, 1.187
Caregiver Depression	−0.021	0.082	0.798	0.996	0.968, 1.024
Family Disorganization	0.275	0.115	0.017	1.355	1.074, 1.710
Youth Risk	−0.012	0.087	0.893	0.995	0.941, 1.053
Community Risk	−0.057	0.089	0.520	0.969	0.895, 1.049

Youth sex is controlled. Program dose is coded as 1 = effective dose (5–7 sessions), 0 = incomplete dose (0–4 sessions)

family disorganization was the only significant measure. For each unit increase in family disorganization, families were 1.3 times more likely to attend at least five program sessions, independent of all other variables.

Discussion

In the current study, we aimed to assess factors associated with dose in the context of a well-resourced prevention program. We explored attendance in a trial of the SAAF program, a culturally- and ecologically-tailored intervention with intensive engagement protocols. We did not observe associations linking the likelihood of receiving an effective dose of SAAF to socioeconomic disadvantage, caregiver depression, youth risk for problem behavior, or community risk. Family disorganization, however, positively predicted an effective dose of prevention. Those families for whom caregivers reported greater family disorganization were also more likely to attend the majority of the program sessions and thus receive an effective dose of SAAF compared to those characterized by less family disorganization. Notably, we found this attendance-promoting effect on dose despite controlling for multiple other factors in the model.

When considering family processes, it is reasonable to assume that family disorganization will predict difficulty in attending prevention programming. However, when caregivers are aware of specific problems, they may be more likely to take

action to address them. This finding is consistent with research as informed by the Health Belief Model (Rosenstock, 1974). Accordingly, when individuals perceive a clear need for intervention (susceptibility to a negative outcome), perceive that the outcome of not performing a health behavior is severe, and perceive that the benefits of participating outweigh the barriers, they will engage in health-promoting behavior (Rosenstock, 1974). Past research on prevention dose has produced mixed results regarding family processes. For example, Gorman-Smith and colleagues (2002) investigated participation among 175 families receiving Schools and Families Educating Children, a delinquency and drug use prevention program. They found that families with low levels of monitoring were more likely to participate with minimal recruitment effort (Gorman-Smith et al., 2002). The authors also found that parents with higher levels of antisocial behavior and stress were more likely to participate fully than to drop out (Gorman-Smith et al., 2002). Similarly, Prado and colleagues (2006) reported that in a family-centered HIV prevention program, youth and their families were more engaged in the program when family members reported higher rates of perceived stress. However, other studies have found no association between family risk factors and dose (Eisner & Meidert, 2011).

Our insignificant pathways suggest that engagement procedures and salient curricula may have attenuated the potential effects of socioeconomic status, caregiver depression, youth risk for problem behavior, and community risk factors on dose. Further, we consider it plausible that the positive association between family disorganization and dose could also be a product of SAAF's curriculum and engagement procedures. For example, *Familias Unidas* utilized strong engagement procedures, including home visits and barrier reduction protocols, and demonstrated high attendance rates (Coatsworth et al., 2002). A program that successfully attenuates barriers to access and offers an ecologically sensitive, engaging program may encourage families who are most in need of the intervention to attend. Kumpfer and colleagues (2002) compared retention rates in traditional parenting programs with those that had been culturally adapted and found that retention rates tended to increase when curricula were adapted. Studies have also investigated the effectiveness of barrier reduction. Becker and colleagues (2015) reviewed 40 family-based programs and found that the programs that reduced participant's barriers to participation had higher attendance rates when controlling for other factors. However, experimental trials that manipulate engagement-related characteristics of family-centered programs are scarce and are needed to understand the direction of influence of family factors on dosage (see Ingoldsby, 2010).

A number of study limitations are noteworthy. Due to the correlational basis of this study, findings require replication and confirmation with experimental manipulation of engagement protocols and curricula. The findings of this study are limited to a specific intervention (SAAF) and the specific population the intervention served: rural African American families. The program examined provided a number of incentives for attendance, and findings may not replicate in contexts where similar incentives are not offered. One measure of family disorganization had a relatively low Cronbach's alpha (0.63). Its use as part of a latent variable that tests only true score variance obviates this concern somewhat. As caregivers in our study were primarily mothers, research on caregiver type and dose should be explored in future

studies. Future research should consider how characteristics of the implementation, such as facilitator characteristics, might influence the family's decision to attend. Although examining facilitator effects were out of the scope of the current study, future research should consider their effect on dosage in evidence-based prevention programs. Another limitation is our use of a dichotomized outcome. This is both a strength and a limitation, as dose provides a conservative estimate of attendance. Yet, there may be variables associated with the number of sessions attended, but not with an effective dose. A further limitation was our use of a binary sex variable (male or female). Youth may not identify with these binary options, and future analysis should consider other expressions of both sex and gender.

These limitations notwithstanding, study findings suggest the importance of prevention programs that are ecologically and culturally relevant and include strong engagement protocols. As organizations continue to adopt evidence-based family-centered programs, they may benefit from including preparatory information, transportation, meals, and childcare. When the curriculum is ecologically relevant and common burdens of participation are minimized, families may develop trust for the program and increased motivation to attend.

Funding This research was supported by Award Number R01 AA021774 from the National Institute on Alcohol Abuse and Alcoholism and Award Number P30 DA027827 from the National Institute on Drug Abuse. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute on Alcohol Abuse and Alcoholism, the National Institute on Drug Abuse or the National Institutes of Health.

Declarations

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

Ethical Approval All authors have approved this manuscript and its submission to The Journal of Primary Prevention. This manuscript is not being considered by any other journal and has not been published elsewhere.

Consent to Participate We obtained written informed consent from all individual participants included in the study over 18 years of age. We obtained written informed consent from the legal guardians of participants under 18 years of age. We obtained written informed assent from participants under 18 years of age.

Informed Consent This manuscript is original research that was approved by the University of Georgia IRB. This study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments and follows established APA guidelines for informed consent.

References

Baker, C. N., Arnold, D. H., & Meagher, S. (2010). Enrollment and attendance in a parent training prevention program for conduct problems. *Prevention Science, 12*(2), 126–138. https://doi.org/10.1007/s11121-010-0187-0

Barrera, M., Berkel, C., & Castro, F. G. (2017). Directions for the advancement of culturally adapted preventive interventions: Local adaptations, engagement, and sustainability. *Prevention Science, 18*(6), 640–648. https://doi.org/10.1007/s11121-016-0705-9

Becker, K. D., Brandt, N. E., & Buckingham, S. L. (2015). Engaging youth and families in school mental health services. *Child and Adolescent Psychiatric Clinics, 24*, 385–398. https://doi.org/10.1016/j.chc.2014.11.002

Brody, G. H., Murry, V. M., Chen, Y. F., Kogan, S. M., & Brown, A. C. (2006a). Effects of family risk factors on dosage and efficacy of a family-centered preventive intervention for rural African Americans. *Prevention Science, 7*(3), 281–291. https://doi.org/10.1007/s11121-006-0032-7

Brody, G. H., Murry, V. M., Gerrard, M., Gibbons, F. X., Molgaard, V., McNair, L., Brown, A. C., Wills, T. A., Spoth, R. L., Luo, Z., Chen, Y. F., & Neubaum-Carlan, E. (2004). The strong African American families program: Translating research into prevention programming. *Child Development, 75*, 900–917. https://doi.org/10.1111/j.1467-8624.2004.00713.x

Brody, G. H., Murry, V. M., McBride, V., Kogan, S. M., Gerrard, M., Gibbons, F. X., Molgaard, V., Brown, A. C., Anderson, T., Chen, Y. F., Lou, Z., & Wills, T. A. (2006b). The strong African American families program: A cluster-randomized prevention trial of long-term effects and a mediational model. *Journal of Consulting and Clinical Psychology, 74*(2), 356. https://doi.org/10.1037/0022-006X.74.2.356

Bronfenbrenner, U. (1979). *The ecology of human development*. Harvard University Press.

Brown, T. A. (2015). *Confirmatory factor analysis for applied research*. Guilford publications.

Coatsworth, J. D., Pantin, H., & Szapocznik, J. (2002). Familias unidas: A family-centered ecodevelopmental intervention to reduce risk for problem behavior among Hispanic adolescents. *Clinical Child and Family Psychology Review, 5*(2), 113–132. https://doi.org/10.1023/A:1015420503275

Dishion, T. J., Kavanagh, K., Schneiger, A., Nelson, S., & Kaufman, N. K. (2002). Preventing early adolescent substance use: A family-centered strategy for the public middle school. *Prevention Science, 3*(3), 191–201. https://doi.org/10.1023/A:1019994500301.pdf.

Dishion, T. J., & Stormshak, E. A. (2007). Intervening in children's lives: An ecological, family-centered approach to mental health care. *American Psychological Association*. https://doi.org/10.1037/11485-000

Eisner, M., & Meidert, U. (2011). Stages of parental engagement in a universal parent training program. *Journal of Primary Prevention, 32*, 83–93. https://doi.org/10.1007/s10935-011-0238-8

Endendijk, J. J., Groeneveld, M. G., van der Pol, L. D., van Berkel, S. R., Hallers-Haalboom, E. T., Bakermans-Kranenburg, M. J., & Mesman, J. (2017). Gender differences in child aggression: Relations with gender-differentiated parenting and parents' gender-role stereotypes. *Child Development, 88*(1), 299–316. https://doi.org/10.1111/cdev.12589

Fleming, C. B., Mason, W. A., Haggerty, K. P., Thompson, R. W., Fernandez, K., Casey-Goldstein, M., & Oats, R. G. (2015). Predictors of participation in parenting workshops for improving adolescent behavioral and mental health: Results from the common sense parenting trial. *The Journal of Primary Prevention, 36*(2), 105–118. https://doi.org/10.1007/s10935-015-0386-3

Forehand, R., Brody, G. H., Armistead, L., Dorsey, S., Morse, E., Morse, P. S., & Stock, M. (2000). The role of community risks and resources in the psychosocial adjustment of at-risk children: An examination across two community contexts and two informants. *Behavior Therapy, 31*(3), 395–414. https://doi.org/10.1016/S0005-7894(00)80022-2

Frick, P. J., & Morris, A. S. (2004). Temperament and developmental pathways to conduct problems. *Journal of Clinical Child and Adolescent Psychology, 33*(1), 54–68. https://doi.org/10.1207/S15374424JCCP3301_6

Gonzales, N. A., Dumka, L. E., Millsap, R. E., Gottschall, A., McClain, D. B., Wong, J. J., German, M., Mauricio, A. M., Wheeler, L., Carpentier, F. D., & Kim, S. Y. (2012). Randomized trial of a broad preventive intervention for Mexican American adolescents. *Journal of Consulting and Clinical Psychology, 80*(1), 1. https://doi.org/10.1037/a0026063

Gorman-Smith, D., Tolan, P. H., Henry, D. B., Leventhal, A., Schoeny, M., Lutovsky, K., & Quintana, E. (2002). Predictors of participation in a family-focused preventive intervention for substance use. *Psychology of Addictive Behaviors*. https://doi.org/10.1037/0893-164X.16.4S.S55

Haggerty, K. P., Fleming, C. B., Lonczak, H. S., Oxford, M. L., Harachi, T. W., & Catalano, R. F. (2002). Predictors of participation in parenting workshops. *The Journal of Primary Prevention, 22*, 375–387. https://doi.org/10.1023/A:1015227623145

Heinrichs, N., Bertram, H., Kuschel, A., & Hahlweg, K. (2005). Parent recruitment and retention in a universal prevention program for child behavior and emotional problems: Barriers to research and program participation. *Prevention Science, 6*(4), 275–286. https://doi.org/10.1007/s11121-005-0006-1

Ingoldsby, E. M. (2010). Review of interventions to improve family engagement and retention in parent and child mental health programs. *Journal of Child and Family Studies, 19*(5), 629–645. https://doi.org/10.1007/s10826-009-9350-2

Joe, G. W., Broome, K. M., Rowan-Szal, G. A., & Simpson, D. D. (2002). Measuring patient attributes and engagement in treatment. *Journal of Substance Abuse Treatment, 22*(4), 183–196. https://doi.org/10.1016/s0740-5472(02)00232-5

Kogan, S. M., Bae, D., Lei, M.-K., & Brody, G. H. (2019). Family-centered alcohol use prevention for African American adolescents: A randomized clinical trial. *Journal of Consulting and Clinical Psychology, 87*(12), 1085. https://doi.org/10.1037/ccp0000448

Kogan, S. M., Lei, M.-K., Brody, G. H., Futris, T. G., Sperr, M., & Anderson, T. (2016). Implementing family-centered prevention in rural African American communities: A randomized effectiveness trial of the strong African American families program. *Prevention Science, 17*(2), 248–258. https://doi.org/10.1007/s11121-015-0614-3

Kogan, S. M., Yu, T., Allen, K. A., & Brody, G. H. (2015). Racial microstressors, racial self-concept, and depressive symptoms among male African Americans during the transition to adulthood. *Journal of Youth and Adolescence, 44*(4), 898–909. https://doi.org/10.1007/s10964-014-0199-3

Kumpfer, K. L., Alvarado, R., Smith, P., & Bellamy, N. (2002). Cultural sensitivity and adaptation in family-based prevention interventions. *Prevention Science, 3*(3), 241–246. https://doi.org/10.1023/A:1019902902119

Lionetti, F., Keijsers, L., Dellagiulia, A., & Pastore, M. (2016). Evidence of factorial validity of parental knowledge, control and solicitation, and adolescent disclosure scales: When the ordered nature of Likert scales matters. *Frontiers in Psychology, 7*, 941. https://doi.org/10.3389/fpsyg.2016.00941

Matheny, A. P., Jr., Wachs, T. D., Ludwig, J. L., & Phillips, K. (1995). Bringing order out of chaos: Psychometric characteristics of the confusion, hubbub, and order scale. *Journal of Applied Developmental Psychology, 16*(3), 429–444. https://doi.org/10.1016/0193-3973(95)90028-4

Mendez, J. L., Carpenter, J. L., LaForett, D. R., & Cohen, J. S. (2009). Parental engagement and barriers to participation in a community-based preventive intervention. *American Journal of Community Psychology, 44*(1–2), 1–14. https://doi.org/10.1007/s10464-009-9252-x

Miller, T. R., Levy, D. T., Spicer, R. S., & Taylor, D. M. (2006). Societal costs of underage drinking. *Journal of Studies on Alcohol, 67*(4), 519–528. https://doi.org/10.15288/jsa.2006.67.519

Muthén, L., & Muthén, B. (1998-2017). Mplus. *The comprehensive modelling program for applied researchers: user's guide, 5*.

Perrino, T., Coatsworth, J. D., Briones, E., Pantin, H., & Szapocznik, J. (2001). Initial engagement in parent-centered preventive interventions: A family systems perspective. *Journal of Primary Prevention, 22*(1), 21–44. https://doi.org/10.1023/A:1011036130341

Prado, G., Pantin, H., Schwartz, S. J., Lupei, N. S., & Szapocznik, J. (2006). Predictors of engagement and retention into a parent-centered, ecodevelopmental HIV preventive intervention for Hispanic adolescents and their families. *Journal of Pediatric Psychology, 31*(9), 874–890. https://doi.org/10.1093/jpepsy/jsj046

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*(3), 385–401. https://doi.org/10.1177/014662167700100306

Repetti, R. L., Taylor, S. E., & Seeman, T. E. (2002). Risky families: Family social environments and the mental and physical health of offspring. *Psychological Bulletin, 128*(2), 330. https://doi.org/10.1037/0033-2909.128.2.330

Rosenstock, I. M. (1974). Historical origins of the health belief model. *Health Education Monographs, 2*(4), 328–335. https://doi.org/10.1177/109019818801500203

Rowbotham, S., Conte, K., & Hawe, P. (2019). Variation in the operationalisation of dose in implementation of health promotion interventions: Insights and recommendations from a scoping review. *Implementation Science, 14*(1), 1–12. https://doi.org/10.1186/s13012-019-0899-x

Spoth, R. L., Redmond, C., Kahn, J. H., & Shin, C. (1997). A prospective validation study of inclination, belief, and context predictors of family-focused prevention involvement. *Family Process, 36*(4), 403–429. https://doi.org/10.1111/j.1545-5300.1997.00403.x

Spoth, R., Redmond, C., Shin, C., Greenberg, M., Clair, S., & Feinberg, M. (2007). Substance-use outcomes at 18 months past baseline: The PROSPER community–university partnership trial. *American Journal of Preventive Medicine, 32*(5), 395–402. https://doi.org/10.1016/j.amepre.2007.01.014

Thoemmes, F., MacKinnon, D. P., & Reiser, M. R. (2010). Power analysis for complex mediational designs using Monte Carlo methods. *Structural Equation Modeling, 17*(3), 510–534. https://doi.org/10.1080/10705511.2010.489379

Van Ryzin, M. J., Kumpfer, K. L., Fosco, G. M., & Greenberg, M. T. (2015). *Family-based prevention programs for children and adolescents: Theory, research, and large-scale dissemination*. Psychology Press.

Whittaker, K. A., & Cowley, S. (2012). An effective programme is not enough: A review of factors associated with poor attendance and engagement with parenting support programmes. *Children & Society, 26*(2), 138–149. https://doi.org/10.1111/j.1099-0860.2010.00333.x

Wills, T. A. (1986). Stress and coping in early adolescence: Relationships to substance use in urban school samples. *Health Psychology, 5*(6), 503. https://doi.org/10.1037/0278-6133.5.6.503

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