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Reducing Risk Behavior with Family-Centered Prevention During the Young Adult Years

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Abstract

Family-centered prevention is effective at reducing risk behavior throughout the life span and promoting healthy development. Despite research that suggests parents continue to play a significant role in the lives of their children during emerging adulthood, very few studies have examined effective family-centered strategies for preventing risk behavior in young adults. Typical prevention efforts for this age group have focused on college students and substance use prevention, with no integration of families or systems of support that may sustain the effects of the intervention. In this study, we evaluated a version of the Family Check-Up (FCU) that was adapted for young adults and their families, the Young Adult Family Check-Up (YA-FCU). Families were randomly assigned to receive the FCU or school as usual during the middle school years. Ten years later, they were offered the YA-FCU, which was adapted for families of emerging adult children. Intent-to-treat and complier average causal effect analyses were used to examine change in young adult risk behavior approximately 1 year after receiving the YA-FCU. Analyses indicated that random assignment alone or simple engagement was not associated with reductions in young adult risk behavior. However, dose-response analyses indicated that the more hours that youth and families were engaged in the YA-FCU, the greater the reductions in young adult risk behavior relative to those who did not engage or engaged very little in the intervention, resulting in a medium effect size of the YA-FCU on risk behavior.

Keywords Family intervention · Risk behavior · Emerging adulthood · Development · Prevention

The transition from adolescence to early adulthood, known as *emerging adulthood* (Arnett 2000), is a period of rapid growth in substance use, high-risk sexual behavior, antisocial behavior, partner violence, and risky driving (e.g., Stone et al. 2012). This growth in risk behavior can be attributed to a combination of biological, cultural, and behavioral factors as well as to increased stress associated with numerous transitions (Arnett 2000; Ernst et al. 2006). Ideally, these transitions provide an opportunity for young adults to develop skills needed for healthy adjustment and independent living, yet failure to successfully negotiate these changes places individuals at increased risk for poor developmental and health outcomes well into adulthood (Arnett 2006; Capaldi et al. 2007).

Although ample research has documented parental influence on adolescent substance use, few studies have examined this connection during the young adult years. Parents continue to play a significant role in the lives of their children after they leave high school by providing housing, material assistance, emotional support, and health information and by setting expectations for academic achievement and dating (Agliata and Renk 2008; Levitt et al. 2007; Wintre and Yaffe 2000). Research suggests that many of the same family processes and parenting skills that contribute to substance use during adolescence also contribute to early adult substance use (Turrisi et al. 2001; Walls et al. 2009).

Interventions to Reduce Risk in Emerging Adulthood

The majority of interventions that target emerging adults have focused on the prevention of binge drinking and have occurred in a college or university setting (for meta-analyses, see Carey et al. 2012; Samson and Tanner-Smith 2015).

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Although these interventions serve an important function, they fail to address the covariation of risk behaviors that peak during this period. Furthermore, they target a narrow population of young adults (e.g., college students) and do not focus on the family as a context for prevention. Because parents still play a significant role during this developmental period, it is remarkable that family-centered prevention and intervention seldom extends into emerging adulthood, with a few exceptions that have shown positive outcomes, including reductions in substance use (Brody et al. 2012; Turrisi et al. 2001; Wood et al. 2010).

The Family Check-Up Intervention and Young Adults

The purpose of this study was to build on family-centered preventive intervention work and adapt the Family Check-Up (FCU) for young adults and their families. The FCU, described in detail by Dishion and Stormshak (2007), is an evidence-based intervention designed to reduce youth problem behavior and improve mental health by supporting family engagement in change, and it has been associated with a range of positive outcomes for adolescents, including reductions in risk behavior, substance use, and school failure (Caruthers et al. 2014; Stormshak et al. 2009, 2010). It uses a comprehensive multimethod, multimodal approach to assess family functioning, which includes self-report and observational data collection. Assessment-driven feedback is used to motivate parents to improve parenting practices, particularly in the areas of supervision, positive parenting, and management of behavior. This feedback is provided to families through the use of a collaborative, strengths-based approach that is parent centered and focused on motivation enhancement. The comprehensive assessment and feedback are then used to inform targeted intervention that is tailored to address a family's specific needs and goals.

The YA-FCU targets parent–young adult relationships to prevent the escalation of substance abuse and other high-risk behaviors while simultaneously enhancing protective factors, such as strengthening parent–youth relationships and communication, encouraging healthy romantic and peer relationships, and promoting the development of healthy young adult autonomy. This intervention also identifies ways to support the young adult in adaptive behaviors linked with goal attainment and positive outcomes during the transition to adulthood. The YA-FCU creates a feedback structure that embraces the family system as a contextually important influence on motivation and behavioral change, yet also recognizes the developmental need for autonomy and young adults' capacity to be a change agent.

Study Purpose and Hypotheses

The purpose of this study was to examine the efficacy of the YA-FCU in a sample of emerging adults for reducing risk behavior during this developmental period. Given that increased risk behavior is common during this developmental period and that risky behavior increases in such a broad range of domains, it can be difficult to determine how to measure "risk" behavior and to implement and evaluate prevention programs. For example, marijuana use during emerging adulthood (ages 18–25 years) occurs in 37% of the population, and this rate is rising, especially in states with new marijuana laws that decriminalize use (Johnston et al. 2016; Kerr et al. 2017). Similarly, the average young adult drinks alcohol regularly, and as such, reducing drinking episodes may not be a realistic target of prevention efforts. However, binge drinking increases during the young adult years until ages 29–30 and is associated with a range of other risk behaviors, including driving while intoxicated and sexual assault, which suggests that prevention efforts should be targeting high-risk use, such as binge drinking, rather than overall use (Patrick et al. 2017). These statistics illuminate the difficulties associated with assessing behaviors that constitute risk during emerging adulthood and identifying the effects of prevention efforts on any one risk behavior. As such, we calculated a risk index for young adults that incorporated a range of high-risk behavior at this age, including assessment of high rates of marijuana use, binge drinking, risky sexual behavior, and vocational risk (Stormshak et al. 2018). We predicted that participation in the YA-FCU at ages 19–20 would be associated with lower levels of risk behavior 1 year later.

In addition to using intention-to-treat (ITT) analyses, we also conducted dose-response analyses related to total risk. Dose-response effects of prevention programs on risk outcomes are mixed, with some research suggesting higher doses lead to better outcomes, and other research suggesting the opposite effect (Ferrer-Wreder et al. 2010; Marsiglia et al. 2011). One reason for these mixed findings is that higher doses, especially in adaptive designs, may be related to higher levels of baseline risk. However, using only an ITT approach to analyses can mask outcomes and oversimplify results, ignoring those participants who did not adhere to the intervention and underestimating treatment effects (Hernán and Hernández-Diaz 2012). ITT can also mask heterogeneity in response to intervention. Controlling for baseline risk, we predicted that young adults and parents who engaged in the intervention with higher levels of dosage, suggesting motivation to change, would have greater reductions in risk.

Method

Participants

Young adult participants were originally recruited during middle school and followed annually into high school. At recruitment, all sixth grade students in three middle schools were recruited (80% of population). In total, 593 participants were recruited from two cohorts. Participants were assessed in the young adult years at an average age of 20 (Wave 1) and again at age 21.5 (Wave 2). The sample was 49% female, with 36% reporting European American, 15% African American, 18% Hispanic/Latino, and 19% biracial. Families were overallocated to treatment condition at a ratio of 3:2 to better address within-group implementation processes, including dosage (65% were randomly assigned to the intervention condition, and 35% were assigned to the "school as usual" or control condition). Overallocation retains randomization of sample characteristics across conditions (Dumville et al. 2006; Kang et al. 2008) with no threats of selection bias under conditions of equal attrition. No group differences were observed on key study variables by group, nor were there differential rates of attrition.

Procedure

Approximately 1 year following high school completion, the students and their parents were contacted for follow-up. This longitudinal study has maintained a high degree of retention, with 74% of the original sample participating at emerging adulthood (EA) Wave 1 ($N = 441$) and 70% at EA Wave 2 ($N = 415$), and a 78% total retention for the young adult years (some participants completed Wave 2 but not Wave 1). The sample continued to be an at-risk sample, with an average household income of $45,000 per year (for a household of four). At Wave 1, 54% of young adults were living with their parents, 24% were attending a 4-year college, and 14% did not yet have a high school degree. Daily use of marijuana was reported by 22%, and use increased at Wave 2 to 26%, well above the national average of 4.6% (Center for Behavioral Health Statistics and Quality 2015); 48% reported multiple binge drinking episodes during which they had five or more drinks in a row. Note that this sample was collected in Oregon, where recreational cannabis use is legal.

Those originally assigned to the intervention condition in middle school were invited to participate in a family intervention during emerging adulthood. As with the original FCU, families could choose whether to receive the intervention or simply provide data for the longitudinal study. Of the 386 families randomly assigned to the intervention group in middle school, 134 young adults and parents participated in the YA-FCU, or 34.7% of those randomly assigned to the intervention group. One hundred thirty-eight families were

retained at this age, but did not participate in the intervention. The majority of participants completed the intervention with their parent(s) or primary caretaker ($n = 101$; 75% of the intervention group). The remaining 25% completed the intervention alone for various reasons (e.g., no parent available, scheduling difficulties). Those who participated with a family member did not differ from those who participated alone in Wave 1 risk scores ($F = 2.72$; $p = 0.10$). Furthermore, those who participated in the YA-FCU did not differ from those who did not participate at this wave by sex, race, or substance use (all ps = n.s).

Intervention Protocol

The YA-FCU included an initial interview, a videotaped family interaction task, and a feedback session led by a trained family consultant. The videotaped interaction task was based on prior protocol for videotaped interactions as part of the FCU intervention and included a series of prompts for young adults and parents to discuss developmentally relevant content, such as financial and housing issues, interpersonal relationships, and substance use. The first hour of the feedback session focused on providing feedback to the family, and the second hour focused on providing individual feedback to the young adult. In the family feedback discussion, the family consultant met with the young adult and his or her parent(s) to discuss feedback based on the videotaped family interaction tasks. Feedback results were generated using norm-referenced data across three main categories: daily living, relationships, and health and behavior. A summary of the family strengths was discussed in the context of goals for the young adult. The parent's role in supporting goal attainment was highlighted, along with stressors or barriers associated with these goals, such as lack of financial resources and contextual stressors.

After the family feedback discussion, the young adult received confidential, norm-referenced feedback from the family consultant. The consultant used motivational interviewing and provided norm-referenced feedback about five categories of health and risk, including substance use, risk behavior, sexual and dating behavior, coping skills, and physical and emotional health. The consultant's goal was to precipitate change behavior and reduce overall risk behavior in the sample. The family consultant and young adult collaborated to create a plan for progress, with goals based on the young adult's priorities and motivations, and the consultant offered a list of options for next steps, including additional resources specific to feedback results and motivation to achieve goals.

Measures

Parents and young adults were asked to complete a survey that included the Young Adult Risk Scale (YARS). The YARS was adapted from an earlier instrument developed by colleagues at

the Oregon Research Institute (Metzler et al. 1998) and from the Child and Family Center Youth Questionnaire (Child and Family Center 2001), which had been used to assess risk behavior at earlier waves of this longitudinal study. Surveys mailed to young adults assessed academic and vocational achievement, social/emotional well-being, family relationships and parent involvement, peer relationships, dating and sexual relationships, and behavior problems, such as substance use and high-risk sexual behavior. Approximately 1 year later, all young adults were invited to complete follow-up questionnaires. Correlations between study variables and descriptive statistics are presented in Table 1.

The young adult risk construct was measured with a summative risk score indexing participants from low to high risk using items selected to assess markers of a problematic transition to young adulthood. Dichotomous items were used or computed to indicate *yes* or *no* whether a risk marker was present. For example, an original yes–no substance use item was *In the past month did you go to work or school high on illicit drugs?* An example of a computed item was recoding a Likert-type response of 0 (*never*) to 5 (*10 or more times*) to 0 (*not occurred*) and 1 (*occurred*) for the item, *In the past month how often did you have 5 or more alcoholic drinks in a row?*

On the basis of their face validity, 44 marker items were selected from key domains of young adulthood. For example, under *vocational* risk, we selected items indicating unemployment, dropped out of school, and never having held a paying job. For *alcohol*, *marijuana*, and *illicit drug* risk, items were selected indicating use, abuse or addictive use, or interference with normative functioning. Other domains included *sexual behavior* risk (e.g., unprotected sex, sex while under the influence) and *socio-emotional* and behavioral risk, indexed by clinical cut scores for internalizing and externalizing on the Achenbach Adult Self-Report measure (Achenbach and Rescorla 2003).

Item response theory (IRT; Embretson and Reise 2013; Weiss and Yoes 1991) is a modern measurement approach that relates characteristics of items (item parameters in the model) and characteristics of an individual (their underlying latent trait ability) to the probability of endorsing a particular item (Embretson and Reise 2013; Reise and Waller 2003; Weiss and Yoes 1991). IRT was used to create a total risk score for this study. The total risk scale score involved summing the count of items endorsed, and thus scores could range from 0 to 44. The Kuder-Richardson (KR20) internal consistency alpha for dichotomous items was 0.86 at Wave 1 and 0.84 at Wave 2. The total risk scale construction had been previously validated and was associated with changes in self-regulation during the middle school years that were a function of the intervention (Stormshak et al. 2018).

Dosage Dosage was measured as the log of total hours treated during the young adult intervention phase. The observed variable ranged from 0 to 17.18 h in the intervention group, with a mean of 1.92 total hours for those receiving the intervention ($M = 1.92$, $SD = 1.54$, median = 1.75). Only one family, however, received more than 6 h (i.e., 99% of the families ranged from 0 to 5.5 h total). We therefore log transformed the total hours of treatment, which provided acceptable distributional characteristics for meeting regression assumptions (range = 0 to 2.9, $M = 0.36$, skew = 1.12, kurtosis = 0.57). Youth who engaged in the intervention with their parents had a higher dosage of treatment hours than did those who completed the intervention alone ($F = 9.80$; $p < 0.01$; 2.17 vs. 1.23 h of treatment time). Sixty-three percent of the group receiving intervention had less than 2 h of intervention, whereas 37% of the intervention group had more than 2 h of intervention. Dosage during the middle school years was measured in the same way, using a log of total hours of treatment during the earlier phase of this intervention. The average dosage during the middle school years was $M = 2.37$, $SD = 4.41$. Dosage during the middle school years was used as a covariate in outcome analyses in order to examine the independent effects of the young adult intervention on total risk scores.

Table 1 Bivariate correlations among study variables

Variable	1	2	3	4	5	6	7	8
1. Intent to treat	–							
2. Dosage hours YA	0.38**	–						
3. Dosage middle school	0.41**	0.26**	–					
4. Youth age W1	0.13**	− 0.21***	0.04	–				
5. Minority status	0.01	0.01	− 0.01	0.18**	–			
6. Biological sex (male)	0.01	− 0.03	0.04	0.05	− 0.05	–		
7. Young adult risk W1	− 0.09*	0.17**	0.00	0.05	− 0.01	− 0.00	–	
8. Young adult risk W2	− 0.00	− 0.07	− 0.00	0.00	− 0.04	0.11**	0.65***	–
M	0.65	0.23	0.46	20.00	0.64	0.51	4.08	6.43
SD	0.48	0.45	0.82	0.74	0.48	0.50	4.50	4.21

W1 Wave 1 assessment, *W2* Wave 2 assessment, *YA* young adult

***p < 0.001; **p < 0.01; *p < 0.05

Data Analytic Strategy

To evaluate the intervention impact on change in YARS during the young adult intervention period, three basic analyses were conducted: (a) a test of intent to treat (ITT) versus those assigned to control condition, (b) a dosage test based on the number of hours engaged in the intervention, and (c) a complier analysis using complier average causal effects modeling (CACE). Each analysis was conducted specified as pre–post autoregressive or analysis of covariance (ANCOVA) prediction models using structural equation modeling (SEM) in Mplus 7.4 (Muthén and Muthén 1998–2015). The general regression model was specified as the following:

$$W2\ \widehat{YARS} = \beta_0 + \beta_1(W1\ YARS) + \beta_2(ITT) + \beta_3(age)$$
$$+ \beta_4(minority) + \beta_5(sex) + e$$

in which the Wave 2 Young Adult Risk Scale (YARS) is a function of the pre–young adult intervention (Wave 1) YARS score β_1, plus the effect of ITT random assignment β_2, controlling for the effects of youth age, minority status, biological sex, and dosage during the middle school years, plus a random error term e. For the dosage analyses, the intervention effect was estimated as total number of hours engaged in services or β_2 (hours treated) coded zero for controls.

The third analysis tested the intervention impact using CACE latent mixture models. Adaptive interventions such as the FCU can be difficult to evaluate because of the wide variation in the extent to which families assigned to the intervention actually engage in the program. Although some families assigned to the FCU received all services, others received minimal or no services. ITT analyses evaluate intervention effects by comparing participants in the control group with those in the intervention group, regardless of their actual level of engagement with treatment services. As a result, ITT analyses may underestimate intervention effects.

CACE analysis provides a statistical basis for incorporating intervention engagement in the analysis of program effects for a randomized trial. In CACE modeling, treatment effects are examined by comparing outcomes of the intervention group with those of the control group while taking into account intervention engagement or "compliance." Researchers can examine outcomes specifically for participants who engaged in (or "complied with") the intervention and compare effects with those of a selected portion of the control group. Specifically, CACE modeling matches the intervention "nonengagers" (an observed class) with the control "nonengagers" (not observed) according to their measured characteristics. Once the control "nonengagers" are identified, then the control "engagers" class can be identified. Using this subgroup from the control condition, intervention effects can be calculated (Jo 2002; Little and Yau 1998). Whereas

compliance status of youth assigned to the YA-FCU was observed and known because we recorded whether the randomly assigned families participated or did not participate, the compliance status of the control group was unknown or latent. We have applied CACE analysis effectively to several research studies that examined intervention outcomes associated with the FCU model (Stormshak et al. 2011; Van Ryzin et al. 2012).

Finally, we tested a priori thresholds as recommended by Jo and Muthén (2001) and West and Sagarin (2000). We chose two levels of compliance status. First, we simply examined those randomly assigned to intervention at the beginning of the middle school study who were eligible and chose to engage in the YA intervention versus those who did not. Second, we examined a complier status in which we took *those engaging* in the YA intervention, using the mean number of hours treated ($M = 1.92$, $SD = 1.54$), dichotomized the sample, and looked at those above versus below this mean. Our goal was to examine whether or not high participation affected risk outcomes. Models were estimated using full information maximum likelihood (FIML; Brown et al. 2008), which uses all available information from the observed data in SEM analyses. FIML estimates are computed by maximizing the likelihood of a missing value on the basis of observed values in the data.

Results

Intent-to-Treat and Dosage Analyses

Results of the pre–post autoregressive ANCOVA model are presented in Table 2 in the form of standardized regression estimates (controlling for pretest levels of total risk). Model estimates at the top of the table are for the ITT analyses of change in the YARS risk index for those originally assigned to intervention in middle school. The primary contrast is the comparison between the 207 families assigned to the control condition versus the 386 assigned to the FCU intervention. None of the predictor variables was associated with change in YARS in the ITT model. Together with the autoregressive stability coefficient, the model explained 42% of the variance in young adult risk events.

At the bottom of Table 2 are coefficients for a dosage model estimated as the log of total hours of engagement in the FCU during the young adult intervention phase between Waves 1 and 2 when the youth were in their early 20s. The dosage model revealed a significant linear effect. The greater the number of hours engaged, the greater the decrease in the YARS total risk score ($estimand = -0.084$, $p < 0.05$), even after controlling for earlier dosage levels during the middle school years, resulting in a small effect size attributed to engagement in treatment ($r = 0.077$, $r^2 = 0.006$, $d = 0.154$). Both models are just identified regression models with perfect fit to

Table 2 Standardized regression estimates for predictors of pre–post change in young adult risk

	Estimate	SE
Intent-to-treat model		
Young Adult Risk Scale W1	0.641***	0.030
Age	− 0.020	0.039
Minority	− 0.018	0.039
Biological sex (male)	0.073	0.039
Intent to treat	0.011	0.039
R^2	0.423***	
R^2 change ITT	0.000	
Dosage model		
Young Adult Risk Scale W1	0.643***	0.030
Age	− 0.012	0.039
Minority	− 0.016	0.039
Biological sex (male)	0.072	0.039
Dosage hours middle school	0.018	0.041
Dosage hours young adult	− 0.084*	0.041
R^2	0.429**	
R^2 change dosage	0.006	

W1 Wave 1 assessment

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$

the covariance matrix, so there are no fit indices for evaluation.

CACE Complier Analyses

We use CACE analyses to account for variations in compliance with intervention activities and to examine outcomes specifically for participants who complied with the intervention (see Jo 2002; Little and Yau 1998). In CACE modeling, engagement in the intervention (also called *compliance*) is examined using mixture modeling, which permits the assessment of differential outcomes for both the intervention group and the control group while taking into account the contribution of intervention engagement (compliance) to the outcome.

Results of the CACE complier models are presented in Table 3 in the form of standardized regression estimates. We chose two thresholds for defining complier status. The first, shown at the top of the table, was whether a family assigned to the intervention condition engaged in the YA intervention or whether they were nonengagers. That is, known compliance status among the 386 original intervention families was 134 engaging in the YA intervention (35%) and 252 not engaging (65%). The compliance status among the control families is based on the mixture classification estimates thereby providing an unbiased estimate of the intervention impact based on compliance to the intervention. For the top part of the table, "compliance" indicates participating in the YA-FCU.

Table 3 Standardized regression estimates for CACE complier predictors of pre–post change in young adult risk for any engagement versus mean threshold of treatment hours

CACE model YA engaged or not	Estimate	SE
Young Adult Risk Scale W1	0.726***	0.039
Age	− 0.083	0.028
Minority	− 0.001	0.042
Biological sex (male)	0.066	0.042
Dosage hours middle school	− 0.006	0.048
CACE compliers	0.102	0.076
BIC	2133.982	
Entropy	0.704	
R^2	0.560***	
R^2 change compliers	0.061	
CACE model more than and less than 2 h	**Estimate**	**SE**
Young Adult Risk Scale W1	0.505***	0.039
Age	− 0.020	0.020
Minority	0.012	0.031
Biological sex (male)	0.026	0.032
Dosage hours middle school	0.047	0.036
CACE compliers	− 0.567***	0.094
BIC	2083.650	
Entropy	0.906	
R^2	0.685***	
R^2 change compliers	0.116	

W1 Wave 1 assessment, *BIC* Bayesian information criterion

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$

Results showed no effect of engagement in the YA-FCU when estimating complier class based on no engagement compared with any engagement. However, using a complier status in which we took the mean number of hours treated (∼ 2 h), dichotomized the sample, and looked at those above versus below this mean, we found an intervention effect consistent with the dosage analyses directly above. Results in the bottom portion of Table 3 show the complier standardized effect was − 0.567, $p < 0.001$. Comparison of the explained variance between complier and noncomplier estimates indicated a medium to large effect ($r = 0.340$, $r^2 = 0.116$, $d = 0.723$). Of note is that YARS scores increased for the control complier group from Wave 1 to Wave 2, a high-risk group of young adults who received no intervention.

Among the predictors of complier classification, only one of the covariates was significant. Older youth were 2.10 times more likely ($p < 0.001$) to be in the noncomplier group (95% CI for odds ratio 1.44–3.05), and conversely, younger study participants were more likely to be in the complier class. Greater dosage of treatment during middle school was also associated with a 33% less likelihood of being a noncomplier (OR = 0.67, 95%; CI 0.51–0.88), or conversely, the more prior dosage, the more likely to be a complier in young adulthood. Both the Bayesian information criteria and the entropy

coefficients indicated that the 2-h threshold was a superior model. Entropy is an indicator for the strength and quality of classification for latent class membership.

In summary, the analyses indicated that random assignment alone or simple engagement at any level was not associated with reductions in young adult risk behavior during the intervention phase of the young adult transition period. However, both a dosage model and a CACE model indicated that the more hours engaged in the YA-FCU, the greater the reductions in young adult risk relative to those who did not engage or engaged very little in the intervention. A small effect was obtained for dosage analyses and a medium effect for complier status.

Discussion

This research examined the efficacy of a young adult intervention delivered during the early 20s to reduce risk behavior during the transition to the adult years. The YA-FCU, offered to families randomly assigned to intervention condition, involved an initial interview, videotaped family observation, and feedback session using motivational interviewing consistent with the original FCU model, but intervention targets were incorporated that were relevant to this developmental stage. Results suggest that engagement alone was not effective at reducing subsequent risk; however, a dose-response relationship suggested that young adults who engaged in the YA-FCU with 2 or more hours of intervention contact showed reductions in risk behavior from pre- to postintervention. This is particularly relevant because an increase in risk behavior occurs during this time. Parent participation was associated with higher levels of dosage and therefore indirectly with reduced risk behavior 1 year later.

The emerging adult years are associated with an increase in risk behaviors, such as substance use and risky sexual behavior. High-risk behavior at this time can lead to harmful outcomes, including lifelong substance abuse, domestic violence, sustained unemployment, and even death. Motor vehicle accidents are the leading cause of death at this age, and many are connected to substance use (CDC 2015). Thus, it is important to understand effective approaches to intervention and prevention at this age. This is in contrast to risk behavior during the middle school years, when this project began. Middle school risk behavior is rare, starts at a low base rate, and increases over time. As such, prevention efforts are aimed at reducing the growth in problem behavior during the transition to high school, with those who receive treatment demonstrating less growth in problem behavior compared with rates among a control group (Van Ryzin et al. 2012). In contrast, young adults engage in some risk behavior as part of the normative transition to adulthood, and therefore, our interest was in reducing high-risk behaviors with a brief, tailored intervention focused on adult adjustment, family relationships, and high-risk activity.

The majority of prevention programs during the young adult years focus on prevention of substance use in college student populations, are computer based, and have a modest impact on reducing substance use (Carey et al. 2009). There are notable problems with this approach. First, the programs are often delivered online to the entire student population as a primary prevention; the "at-risk" group, which would likely benefit from an approach that integrated a family component, is rarely targeted. Second, young adults who do not attend college receive scant support during the transition to adulthood. National trends suggest that living at home during the young adult years is the most common arrangement and is more likely when young adults are not attending college (Pew Research Center 2016). An intervention approach that includes parents may be the most effective for reducing long-term risk.

The YA-FCU is an adaptive, tailored intervention, and as such, dosage depends on a number of factors, including risk status and parent participation. Most young adults received the feedback session and a brief follow-up either in the form of a phone call or in-person visit, with an average dosage of 1.92 h. Those who received a higher level of dosage were more likely to participate with their parents and/or engage in follow-up services, such as continued meetings with the family consultant to check in on goals and plans. Dose-response analyses are complicated by many factors, including the sample, type of intervention, and outcome analyses. Typically, a higher dosage of intervention is linked to greater responsivity and better outcomes over time. This is particularly true of parenting interventions and substance use interventions in which level of dosage tends to be linked to skill development and therefore to more positive outcomes (Baydar et al. 2003; Conners et al. 2006). Alternatively, dosage in an adaptive, tailored intervention, such as the YA-FCU, may be associated with greater risk and problems and, hence, not necessarily related to improved outcomes. For example, when a higher dosage is delivered to those who are not making improvements, dosage becomes linked to risk and potentially to nonresponsivity to intervention (Collins et al. 2004). For some individuals, a small dose may be sufficient to improve outcomes, whereas for others, a larger dose is needed and may be associated with greater need for services (Lochman et al. 2006).

Study results suggest that dosage of the YA-FCU improved outcomes over time and was linked to reductions in risk behavior at posttest. Young adults who received a higher level of dosage were also more likely to participate in the intervention with their parents, although the majority of families did include parent participation (75%).

Results suggest that parent involvement in their young adult's goal setting, future plans, and relationships is important for long-term success. The percentage of the sample that opted to participate in the intervention was quite similar to the percentage that did so during the middle school years (49% of the retained sample vs. 42% in middle school), suggesting that young adult interventions are equally desirable to families at both periods of development.

This research has implications for the delivery of prevention programs to young adults. First, prevention programs housed in community systems that serve young adult populations, such as community colleges, would benefit from including parents. Modifying our prevention efforts to target multiple systems that influence young adult outcomes was an important step in developing effective prevention at this age. Second, identifying brief, targeted interventions that are tailored and adapted to young adults and their goals is essential in terms of intervention delivery. These brief intervention models are the most likely to be used by this population, given the limited time commitment required for participation. Last, the lack of prevention and intervention services for this age group is a significant problem. New programs and ideas for prevention with this population will be important future areas of research as we try to support well-being and healthy development during the young adult years.

There are several limitations to this research. First, young adult report was used in analyses and a total risk index was used rather than specific outcomes (e.g., drug use), which may limit interpretation of findings. Second, few community settings are available to implement the YA-FCU, and as a result, translating the findings to "real world" settings may be challenging. One possible setting is community colleges, which target a higher risk group of college students than do 4-year universities and often have robust services for supporting the mental health and well-being of emerging adults. A brief, family-centered intervention at college entry, for both community colleges and 4-year institutions, would be an ideal time and setting to implement the YA-FCU.

Compliance with Ethical Standards

Conflict of Interest There 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 obtained from all subjects, and procedures were approved by the University of Oregon IRB.

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