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Examining the Effectiveness of the FaCES Adolescent SBIRT Intervention

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A B S T R A C T

Purpose: The Facilitating Change for Excellence in SBIRT (FaCES) is a service package for adolescent primary care that was developed based on best practices and evidence, but was empirically untested. The aim of this study is to compare the FaCES intervention to treatment as usual (TAU) for rural adolescent primary care patients.
Methods: In this modified cluster-randomized stepped wedge design, providers who completed at least 20 adolescent TAU visits received training in the FaCES package in random order. Adolescent patients (N = 1,226) waiting for appointments were continuously recruited into the study and completed a baseline assessment before their scheduled appointment and an on-line 3-month follow-up. Participants received either FaCES or TAU, depending on whether their provider had been trained in FaCES. Due to COVID-19 disruptions, only 14 of the 29 providers were trained before study recruitment activities ceased.
Results: More than 80% of the sample indicated no prior use of tobacco, alcohol, or marijuana at study entry. The Arm × Time interaction failed to reach significance for the substance use outcomes considered. In the FaCES condition, the group with no prior use had an increased probability of substance use at 3-month follow-up, while the group reporting prior use had a decreased probability of use at follow-up. Participants who reported no use at baseline had an increased probability of use at follow-up, whether they received the FaCES intervention or TAU.
Discussion: This study was unable to demonstrate the effectiveness of FaCES. Findings suggest some natural movement in substance use risk over time.

IMPLICATIONS AND CONTRIBUTION

This study found no difference in 3-month substance use outcomes for adolescent primary care patients receiving the FaCES adolescent SBIRT intervention compared with treatment as usual. Findings indicate that there is some natural movement in substance use risk over time and that transition from nonuse to use can occur fairly rapidly.

Conflicts of interest: Unrelated to the present study, J.G. is part owner of COG Analytics, LLC. Unrelated to the present study, J.G. and L.B.M. have received research funding from Indivior and are investigators on a separate study that is receiving free study medication from Indivior and Alkermes. The other authors report no conflicts of interest.
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Substance use among adolescents has many negative health impacts. Adolescents with substance use are at a higher risk for developing substance use disorder, which can lead to developmental issues, physical or psychological harm, and failure to manage regular obligations for home, work, or school [1]. Screening, Brief Intervention, and Referral to Treatment (SBIRT) is a service model targeting varying degrees of substance involvement [2]. SBIRT typically includes screening adolescents to assess the severity of substance use

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(if any) to determine an appropriate response, delivery of anticipatory guidance (AG) for those with no use to reinforce avoidance of use, brief intervention (BI) for those with substance use to educate about risks and motivate toward behavior change, and a possible referral to treatment for those with the highest risk behaviors [3].

The American Academy of Pediatrics has been advising its members of SBIRT and recommending SBIRT delivery as part of standard primary care services for the past decade [4,5] despite limited studies of SBIRT's efficacy with pediatric populations. A 2012 systematic review and meta-analysis of screening and behavioral counseling for alcohol misuse in primary care, which included some adolescents and young adults from studies conducted in college health centers in their review of controlled trials, concluded that the best evidence was for brief (10–15 minutes) multicontact interventions [6]. Studies involving adolescents/young adults who were included in this review paper demonstrated both reduced alcohol consumption and fewer heavy drinking episodes for those receiving a BI.

Although SBIRT has shown some efficacy among adolescents as a way of addressing substance use [7–13], there is still a lack of consensus regarding its overall effectiveness with adolescents [14]. Early screening and BI show promising results for reducing adolescent substance use and associated negative health impacts [11,15,16]. BIs have been shown to reduce substance use frequency in adolescents [12,17–23], or at least improve adolescent attitudes toward changing their drug use [24]. BIs delivered in community settings, like primary care clinics or schools, can bridge gaps among the community, primary care systems, and specialty substance use treatment [25]. Unfortunately, little is known regarding the potential protective benefits of health care providers delivering AG to adolescents who have not initiated substance use.

Facilitating change for excellence in Screening, Brief Intervention, and Referral to Treatment

The Facilitating Change for Excellence in SBIRT (FaCES) [3] Change Package Intervention was developed by a team of national adolescent SBIRT experts, coordinated by the National Council for Behavioral Health as part of their Conrad N. Hilton Foundation grant. FaCES was developed upon best evidence and practice in the field of adolescent SBIRT, including the use of a standardized, validated screening instrument with the scope and structure of the BI guided by the patient's screening response. FaCES was intended to assist with the implementation of substance use screening using a universal screening approach with pediatric patients being seen in primary care settings, and included the S2BI (Screening to Brief Intervention) screening instrument, with graduated provider responses including the following: AG (prevention for youth reporting no use), abbreviated BI (ABI; for low-risk youth reporting substance use "once or twice" in the past year), or full BI (for moderate-to-high risk youth reporting use "monthly" or "weekly or more" in the past year). AG is commonly with pediatric healthcare patients to encourage the adoption of healthy choices and disease and risk prevention messaging [26–30]. BIs consisted of a structured, goal-oriented exchange drawing from motivational interviewing techniques and included the following: raising the subject and engaging the patient in conversation, confirming the screening results and exploring reported use in more detail, personalizing additional information and dispelling misinformation, and addressing readiness and negotiating change [31,32].

Although the purpose of developing the FaCES change package was to enhance adolescent SBIRT adoption in primary care settings drawing from best practices in the field, the FaCES intervention, itself, was untested. In response, the current study compared the effectiveness of the FaCES adolescent SBIRT intervention to treatment as usual (TAU) with adolescent patients in rural federally qualified health centers, using a variation of a stepped wedge, cluster-randomized trial.

Methods

This study was approved by the Friends Research Institute Institutional Review Board and the Western Institutional Review Board. The study was registered at ClinicalTrials.gov (NCT 02599818).

Setting: rural Federally Qualified Health Centers

Two Federally Qualified Health Centers (FQHCs), one in New Mexico (in Grant and Hidalgo Counties) and another in Tennessee (in Hardin and McNairy Counties), participated in the trial.

Provider randomization

The study design was inspired by a modified cluster-randomized stepped wedge design. All providers with an adolescent caseload from the participating clinics were eligible to be trained to deliver FaCES, with the training sequence determined at random. Randomization occurred at the provider level, with providers eligible for randomization to FaCES training once research data had been collected for at least 20 TAU visits. Providers were randomized in blocks of 3–4 by clinic location, depending on the number of eligible providers in each successive block. A total of 14 providers [four Pediatricians, two Doctors of Osteopathic Medicine, three Nurse Practitioners (NPs), and five Physician Assistants (PAs)] were randomized and received training during the study period. An additional 15 providers were never trained and saw patients exclusively as TAU providers. Starting in March 2020, COVID-19-related changes in clinic accessibility and services being offered created extenuating circumstances negatively impacting the ability to randomize and train the remaining providers, as well as requiring the cessation of participant recruitment.

Provider training was delivered one-on-one via televideo conference by one of two expert trainers from the National Council on Behavioral Health. The training, developed from the FaCES Change Package SBIRT intervention, consisted of six modules covering the screening instrument and provider responses based on risk level, including assessing readiness and negotiating changes as part of a BI, and determining the need for and coordinating a referral to treatment. Overall, there were five training cohorts over 18 months (September 2018 to March 2020).

Participants

A total of 1,132 adolescent primary care patients were recruited between April 2018 and September 2020, of whom

13 were dropped (eight because the adolescent declined participation at the clinic encounter and five because the provider chose not to deliver the intervention). In recognition that adolescence is a period during which the onset of new substance use can occur quickly, participants could re-enroll in the trial 12 months after their initial enrollment. Of the remaining 1,119, 107 re-enrolled producing an analytic sample of 1,226. The following were the inclusion criteria: (1) ages 12–17 years, inclusive; (2) registered patient at one of the participating FQHCs; and (3) able and willing to provide informed assent. The following were the exclusion criteria: (1) inability to comprehend the assent form and (2) parent/guardian declined consent.

Recruitment

Adolescent patients waiting for appointments in the participating clinics were approached by a study research assistant to determine interest in participation and obtain verbal parental consent. If the patient was interested in participating, the research assistant met with the patient in a private room to determine eligibility and complete the written informed assent process, including an assent quiz which needed to be passed with 100% accuracy and could be taken up to three times. Participants then completed the study locator form and their baseline assessment and were given their study compensation before being returned to the waiting area or examination room for their scheduled appointment. Participants received either the FaCES intervention or TAU, depending on whether the provider they were scheduled to see had been trained to deliver the intervention. Participants received a $10 gift card for completing the baseline in-person assessment and a $20 gift code for completing the 3-month follow-up on-line assessment.

Treatment arms

Facilitating change for excellence in Screening, Brief Intervention, and Referral to Treatment intervention. Participants were considered to be in the treatment arm based on the training status of their provider (TAU = provider not yet trained; FaCES = provider completed training on the FaCES package). If the adolescent was scheduled to see a FaCES-trained provider, research staff would give the provider a summary of the S2BI screening results specifying substances endorsed ahead of the visit. Providers then delivered the intervention and documented its delivery on a services summary form. The form included space for notes, whether a change plan/follow-up plan or referral to treatment were made, and if a parent was present during the review of screening results. As part of the FaCES training (described above), providers were trained to provide different responses based on the S2BI results, which triaged participants into a risk level: (1) No Use (no past year use of a substance, for which providers would deliver AG); (2) Low Risk (using a substance "once or twice" in the past year, for which providers would deliver ABI); or (3) High Risk (using a substance monthly or more in the past year, for which providers would deliver a full BI).

Treatment as usual. For adolescent participants who saw a TAU provider, research staff had no contact with the provider and gave the provider no study-related information.

Assessments

Participants were assessed at baseline and 3 months to determine their self-reported use of alcohol, tobacco, marijuana, and other substances using the following measures.

Screening to Brief Intervention. The S2BI is a brief screening tool assessing past year substance use and classifying respondents into risk categories. The S2BI had been shown to have excellent sensitivity and specificity for identifying moderate and severe alcohol and cannabis use disorders in adolescent primary care patients [33].

Alcohol, Smoking, and Substance Involvement Screening Test. The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) [34] is a widely used assessment tool to detect and manage substance use and related problems in primary and general medical care settings. The ASSIST has demonstrated good internal consistency and concurrent validity with the CRAFFT (the CRAFFT screener is an acronym for the first letters of the keywords in the screen's six questions), another widely used adolescent screening instrument, and can accurately identify alcohol, tobacco, and cannabis use disorders in adolescents [35].

Demographics. Participant age, gender, race, and ethnicity were collected at baseline.

Analyses

Due to the preponderant number of zeroes in ASSIST scores, we recoded the alcohol, tobacco, and marijuana frequency scores into binary scales of nonuse (0) versus use (1). In addition, we created a binary "Any Use" scale with use (1) indicating a score of 1 on tobacco, alcohol, and/or marijuana use, and 0 otherwise.

Bivariate statistics (χ^2 tests of independence for categorical variables, *t*-tests for continuous variables) were used to assess baseline differences. A generalized linear mixed model was used to assess outcome differences. We originally planned a more elaborate multilevel modeling strategy, but scaled back this approach in light of recruitment challenges and resulting small cell sizes. The statistical model varied depending on the research question of interest. Complete details regarding the statistical models can be found in the Notes to each of the tables that summarize the pertinent findings. Interpretation of findings for categorical predictors focused on the least squares means (Ms) and their respective standard errors (SEs) which can be considered model-derived predicted probabilities of occurrence of the binary event outcome, while interpretation for continuous predictors focused on the unstandardized regression coefficient (*b*) and its associated adjusted odds ratio (aOR). All analyses were performed with SAS version 9.4M6.

Three inferential analyses were conducted to answer three discrete but overlapping questions. In the preplanned analysis, the FaCES arm (n = 288) was compared to the TAU arm (n = 938). The second analysis compared the AG group (n = 221) to the combined ABI (n = 45) and BI (n = 21) groups [Combined BI (CBI)]. The third analysis compared the AG (n = 160) and TAU (*n* = 521) groups in the subsample of cases who reported no substance use at study entry. In all three of these analyses, the main focus was on the respective treatment group (FaCES vs. TAU; CBI vs. AG; AG vs. TAU, respectively) × Time (baseline vs.

Table 1
Baseline demographics and substance use (N = 1,226)

	Total sample (N = 1,226)	Arm: Single enrollment subsample (n = 1,119)			Enrollment subsamples		
		FaCES (n = 217)	Treatment as usual (n = 902)	p value	Single enrollment (n = 1,119)	Re-enrollment (n = 107)	p value
State, n (%)				.064			.595
New Mexico	603 (49)	95 (17)	458 (83)		553 (92)	50 (8)	
Tennessee	623 (51)	122 (22)	444 (78)		566 (91)	57 (9)	
Site, n (%)				.060			.070
Hidalgo County, NM	154 (13)	17 (12)	129 (88)		146 (95)	8 (5)	
Grant County, NM	449 (37)	78 (19)	329 (81)		407 (91)	42 (9)	
McNairy County, TN	303 (25)	59 (22)	209 (78)		268 (88)	35 (12)	
Hardin County, TN	320 (26)	63 (21)	235 (79)		299 (93)	22 (7)	
Demographics							
Age, mean (SD)	14.4 (1.7)	14.1 (1.8)	14.5 (1.7)	.003	14.4 (1.7)	14.9 (1.4)	.007
Sex, n (%)				.728			.200
Female	637 (52)	114 (20)	461 (80)		575 (90)	62 (10)	
Male	587 (48)	103 (19)	499 (81)		542 (92)	45 (8)	
Other	1 (1)	0	1 (100)		1 (100)	0	
Refused	1 (1)	0	1 (100)		1 (100)	0	
Race, n (%)				.983			.671
American Indian or Alaskan Native	61 (5)	11 (19)	47 (81)		58 (95)	3 (5)	
Native Hawaiian or Other Pacific Islander	3 (1)	1 (33)	2 (67)		3 (100)	0	
Asian	7 (1)	1 (14)	6 (86)		7 (100)	0	
Black or African American	28 (2)	5 (20)	20 (80)		25 (89)	3 (11)	
White	816 (67)	146 (20)	595 (80)		741 (91)	75 (9)	
More than one race	126 (10)	22 (19)	95 (81)		117 (93)	9 (7)	
Unknown/Refused to answer	185 (15)	31 (18)	137 (82)		160 (91)	17 (9)	
Latinx status, n (%)				.146			.492
Latinx	450 (37)	71 (17)	343 (83)		414 (92)	36 (8)	
Non-Latinx	711 (58)	133 (21)	512 (79)		645 (91)	66 (9)	
Unknown/Refused to answer	65 (5)	13 (22)	47 (78)		60 (92)	5 (8)	
Substance use							
S2BI, n (%)							
Tobacco				.972			.488
Never	997 (81)	176 (19)	739 (81)		915 (92)	82 (8)	
Once or twice	118 (10)	21 (20)	84 (80)		105 (89)	13 (11)	
Monthly	39 (3)	8 (22)	28 (78)		36 (92)	3 (8)	
Weekly or more	72 (6)	12 (19)	51 (81)		63 (88)	9 (12)	
Alcohol				.252			.130
Never	985 (80)	185 (21)	716 (79)		901 (91)	84 (9)	
Once or twice	186 (15)	26 (15)	146 (85)		172 (92)	14 (8)	
Monthly	43 (4)	5 (14)	30 (86)		35 (81)	8 (19)	
Weekly or more	12 (1)	1 (9)	10 (91)		11 (92)	1 (8)	
Marijuana				.225			.290
Never	1,036 (84)	191 (20)	754 (80)		945 (91)	91 (9)	
Once or twice	110 (9)	15 (14)	89 (86)		104 (95)	6 (5)	
Monthly	31 (3)	2 (8)	24 (92)		26 (84)	5 (16)	
Weekly or more	49 (4)	9 (20)	35 (80)		44 (90)	5 (10)	
Risk level				.195			.529
No use	856 (70)	620 (79)	162 (21)		782 (91)	74 (9)	
Low risk	213 (17)	167 (85)	30 (15)		197 (92)	16 (8)	
High risk	157 (13)	115 (82)	25 (18)		140 (89)	17 (11)	
ASSIST Lifetime Score, mean (SD)	2.4 (3.8)	1.9 (1.5)	2.5 (2.2)	.071	2.4 (3.7)	2.7 (4.5)	.337
ASSIST Lifetime Binary				.096			.515
No lifetime use of any substance	751 (61)	143 (21)	533 (79)		682 (91)	69 (9)	
Lifetime use of one or more substances	475 (39)	74 (17)	363 (83)		437 (92)	38 (8)	

The S2BI Tobacco, Alcohol, and Marijuana scores ranged from 0 to 2, inclusive (0 = "Never," 1 = "Once or Twice," 2 = "Monthly"). Other substance use on the S2BI was rare or nonexistent. Risk level was the maximum risk level on the S2BI for any substance. The ASSIST Lifetime Score is the score in response to Q1 ("In your life, which of the following substances have you ever used") with a theoretical range of scores between 0 and 30, inclusive. Bivariate statistics (χ^2 tests of independence for categorical variables, t-tests for continuous variables) were used to assess differences between the Arms at first study enrollment for all participants, and Enrollment differences, comparing the data at second enrollment for the Re-Enrollment subsample to data for the subsample with only one enrollment (i.e., Single Enrollment). The analysis for Sex omitted the two participants who did not indicate male or female. The analysis for Race combined the categories American Indian or Alaskan Native, Asian, Native Hawaiian or Other Pacific Islander, and Blank or African American. The analysis for Latinx Status combined non-Latinx and Unknown/Refused to Answer. Percentages for the Total Sample are the respective column percentages. Percentages for the Arm: Single Enrollment and Enrollment Subsamples are the respective row percentages. Percentages do not necessarily sum to 100% due to rounding.

ASSIST = alcohol, smoking and substance involvement screening test; FaCES = facilitating change for excellence in SBIRT; S2BI = screening to brief intervention tool; SD = standard deviation.

Table 2
Tests of significance and *p* values for the four outcome measures comparing the FaCES and treatment as usual arms (N = 1,225)

	Outcome							
	Any substance		Tobacco		Alcohol		Marijuana	
	Test statistic	*p* value	Test statistic	*p* value	Test statistic	*p* value	Test statistic	*p* value
Effect								
Arm × Time	$F(1, 1,127) = 0.1$	.730	$F(1, 1,150) = 0.2$	.880	$F(1, 1,142) = 1.0$	.311	$F(1, 1,150) = 1.6$	.206
Arm	$F(1, 1,049) = 2.6$	.113	$F(1, 573) = 0.1$	.743	$F(1, 938) = 0.9$	.341	$F(1, 738) = 5.6$	.018
State	$F(1, 22) = 0.0$	.913	$F(1, 23) = 10.5$	.004	$F(1, 21) = 0.7$	.426	$F(1, 24) = 7.6$	.011
Enrollment	$F(1, 890) = 5.4$	.022	$F(1, 562) = 5.6$	.019	$F(1, 522) = 2.5$	.118	$F(1, 794) = 1.4$	.236
Assessment time point	$F(1, 1,118) = 0.6$	.439	$F(1, 965) = 0.6$	.430	$F(1, 1,146) = 4.5$	.034	$F(1, 1,152) = 0.8$	.377
Provider (State)	Variance estimate = 0.13	Wald 95% CB: 0.06–0.53	Variance estimate = 0.09	Wald 95% CB: 0.03–1.00	Variance estimate = 0.16	Wald 95% CB: 0.07–0.77	Variance estimate = 0.07	Wald 95% CB: 0.02–1.41
	$z = 1.88$	.029	$z = 1.31$	.094	$z = 1.77$	.039	$z = 1.14$	.127

Data were analyzed using a generalized linear mixed model with "between-subject" fixed effects for Arm (FaCES vs. TAU) and State (NM vs. TN), "within-subject" fixed effects for Enrollment (First vs. Second), Assessment Time Point (baseline vs. 3-month follow-up), and the Arm × Time interaction, a random effect for Provider nested within State, a Huynh-Feldt error structure, denominator degrees of freedom estimated by the improved Kenward-Roger method, and assuming a binomial distribution for each of the four outcomes. Data were missing for these four outcomes for one participant. See text for details regarding development of Any, Tobacco, Alcohol, and Marijuana Use scores.
CB = confidence bounds; FaCES = Facilitating Change for Excellence in SBIRT; TAU = treatment as usual.

3-month follow-up) interaction, which would indicate differential change from baseline.

Results

Participants

The sample was almost evenly split among participants from New Mexico and Tennessee, with the two Tennessee counties seeing similar numbers of participants, while the New Mexico counties showed a marked difference in the number of participants entering the study (Table 1).

The total sample was approximately 14 years of age (range of 12–17, inclusive), evenly split between females and males, majority White, with a sizeable proportion of the sample indicating Latinx ethnicity. In terms of substance use, more than 80% of the sample indicated no prior use of tobacco, alcohol, or marijuana at study entry, with 70% of the sample indicating no use of all three substances.

In terms of differences within the total sample, participant age at study entry was the only background or substance use characteristic on which the FaCES and TAU arms differed, with the mean in the TAU arm slightly higher than the mean in the FaCES arm, and the mean of the Re-Enrollment group slightly higher than the mean of the Single Enrollment group.

In order to examine possible differences between the participants who completed their 3-month follow-up assessment and those who did not, a comparison of participants who completed both assessments [893/1,119 (80%) in the Single Enrollment subsample; 84/107 (79%) in the Re-Enrollment subsample] with the baseline-assessment-only group (226/1,119, 20%; 23/107, 21%), was conducted using a generalized linear model with fixed effects for Assessment Status and Enrollment Status (Single Enrollment vs. Re-Enrollment). There was a significant effect for Assessment Status for Sex, with 25% of males and 13% of females not assessed at 3 months [$F(1, 1,221) = 13.7$, $p < .001$], and for Ethnicity, with 25% of Latinx participants and 18% of non-Latinx participants not assessed at 3 months [$F(1, 1,223) = 8.3$, $p = .004$].

Is brief intervention superior to treatment as usual?

Table 2 indicates that the Arm × Time interaction failed to reach significance for any of the four outcomes. The variance parameter estimate for Providers was significant for two of the four outcomes, Any Use and Alcohol Use, indicating there was variability in these two outcomes as it relates to Providers.

There were six other significant effects. The participants in the FaCES Arm were less likely on average to use marijuana than participants in the TAU Arm [Ms = 0.09 (SE = 0.02) vs. 0.14 (SE = 0.02)]. Tennessee participants were more likely on average to use tobacco [Ms = 0.21 (SE = 0.02) vs. 0.12 (SE = 0.02)] and less likely on average to use marijuana [Ms = 0.14 (SE = 0.02) vs. 0.09 (SE = 0.01)] than New Mexico participants. Single Enrollment participants were less likely on average to use both Any substance [Ms = 0.23 (SE = 0.02) vs. 0.30 (SE = 0.03)] and Tobacco [Ms = 0.13 (SE = 0.01) vs. 0.19 (SE = 0.03)] than Re- Enrollment participants. Significant change from baseline to follow-up emerged only for Alcohol Use, with an increasing probability of use at 3-month follow-up than at baseline [Ms = 0.15 (SE = 0.02) vs. 0.18 (SE = 0.02)].

Table 3
Tests of significance and *p* values for any use outcome measure comparing the CBI (combined abbreviated BI and full BI) group to the AG group (N = 288)

	Test statistic	*p* value
Effect		
Group × Time	$F(1, 281) = 16.4$	<.001
Group	$F(1, 293) = 124.7$	<.001
State	$F(1, 7) = 2.0$	.200
Enrollment	$F(1, 262) = 0.3$	.578
Assessment time point	$F(1, 281) = 0.2$	.677
Provider (State)	Variance estimate = 0.53 $z = 1.09$	Wald 95% CB: 0.15–12.93 .138

Data were analyzed using a generalized linear mixed model with "between-subject" fixed effects for Group (AG vs. CBI) and State (NM vs. TN), "within-subject" fixed effects for Enrollment (First vs. Second), Assessment Time Point (baseline vs. 3-month follow-up), and the Group × Time interaction, a random effect for Provider nested within State, a Huynh-Feldt error structure, denominator degrees of freedom estimated by the improved Kenward-Roger method, and assuming a binomial distribution for the outcome. The solutions failed to converge for Tobacco, Alcohol, and Marijuana Use (even restricting the error structure to variance components, or omitting the Provider and State effects). See text for details regarding development of Any, Tobacco, Alcohol, and Marijuana Use scores.
AG = anticipatory guidance; BI = brief intervention; CB = confidence bounds; CBI = combined brief intervention category.

In order to better understand the limitations to generalizability of the findings in terms of participant characteristics, the statistical model was refit with the inclusion of Age, Sex, Race, and Ethnicity as covariates to assess the extent to which the results might change were background characteristics of the participants controlled. In terms of the change from the results of the preplanned analysis, Enrollment failed to reach significance for Any Use and Tobacco Use, and State failed to reach significance for Marijuana Use. However, both Race (White vs. non-White) and Ethnicity (Latinx vs. non-Latinx) were found to be significant ($ps < .05$) for both Any Use and Marijuana Use. Examination of the means showed that Whites had a greater probability of Any Use [Ms = 0.25 (SE = 0.03) vs. 0.17 (SE = 0.02), $p < .006$] and Marijuana Use [Ms = 0.09 (SE = 0.01) vs. 0.06 (SE = 0.01), $p < .05$] than non-Whites, and that Latinx had a greater probability of Any Use [Ms = 0.24 (SE = 0.03) vs. 0.18 (SE = 0.02), $p < .05$] and Marijuana Use [Ms = 0.10 (SE = 0.02) vs. 0.06 (SE = 0.01), $p < .02$] than non-Latinx. Age was a significant predictor of all four outcomes [$b = 0.60$ (SE = 0.04), aOR = 1.83, $p < .001$ for Any Use; $b = 0.58$ (SE = 0.05), aOR = 1.78, $p < .001$ for Tobacco Use; $b = 0.57$ (SE = 0.05), aOR = 1.76, $p < .001$ for Alcohol Use; and $b = 0.64$ (SE = 0.06), aOR = 1.89, $p < .001$ for Marijuana Use], with increasing age associated with increasing probability of use.

How do substance use trajectories differ for adolescents who received anticipatory guidance compared to brief intervention?

Given the relatively small sample size and the disproportionate cell sizes, statistical models failed to converge for Tobacco, Alcohol, and Marijuana Use. Table 3 provides results for the analysis of Any Use, for which a significant Group × Time effect was found. Simple main effects tests of the least squares means indicated that the probability of any use significantly increased from baseline to 3 months in the AG group [Ms = 0.03 (SE = 0.01) vs. 0.09 (SE = 0.03), $F(1, 286) = 10.1$, $p < .002$], while the probability of any use in the CBI group significantly decreased from baseline to 3-month follow-up [Ms = 0.82 (SE = 0.06) vs. 0.65 (SE = 0.09, $F(1, 269) = 6.5$, $p < .02$]. Providers did not show significant variability. Refitting the model including Age, Sex, Race, and Ethnicity as covariates did not impact the significant finding of a treatment group difference. However, Age was a significant predictor of Any Use, with the probability of use increasing with increasing age [$b = 0.54$ (SE = 0.10), aOR = 1.74, $p < .001$].

Is anticipatory guidance superior to treatment as usual for participants with no use at baseline?

For all substance use outcomes, a minimum of 93% of both groups reported no use at 3 months (Table 4). Moreover, differences between use and nonuse between the two groups (AG vs. TAU) failed to reach significance for all four outcomes.

Discussion

Despite the need to prematurely conclude study-related activities due to COVID-19, the study contributes to the literature by providing an empirical evaluation of the FaCES intervention compared with TAU in pediatric primary care settings, as well as characterizing adolescent substance use patterns among adolescent pediatric patients in rural communities. The small cell sizes in the full and ABI conditions, as well as the preponderance of participants reporting no substance use, may have also impacted the lack of observed effect at 3-month follow-up when the FaCES intervention was assessed as a whole. Given that the recommended FaCES interventions differ based on reported substance use, it is not surprising that a comparison of the full change package intervention with TAU failed to yield significant results.

Adolescents who received a BI (either abbreviated or full) reported decreased probability of substance use at 3-month follow-up, while youth who received AG reported increased probability of substance use at follow-up. However, a similar pattern was observed for adolescents in these risk groups (i.e., no use vs. any use at baseline) who received TAU. Among youth who reported no use at baseline, youth who received AG did not differ from their counterparts who received TAU, with both groups demonstrating increased probability of substance use at 3-month follow-up. These findings show that onset of substance use can occur quickly during adolescence, and thus highlight the importance of providers routinely discussing substance use with adolescent patients. Unfortunately, the small cell sizes in our intervention subgroups inhibited our ability to parse out the effects of the BI based on the length of the intervention or severity of use. Future research that includes more youth in the low risk and high risk S2BI categories may be better able to answer this question.

The potential preventative benefits of SBIRT have been largely passed over in prior research, which has focused more on the therapeutic impact of BIs. Our study sought to shed some light on the issue by examining the effects of receiving AG in response to a negative substance use screen compared with receipt of TAU. Our study did not find any difference in 3-month substance use outcomes for participants receiving either AG or TAU, with both groups reporting increased probability of substance use at follow-up, placing the potential short-term preventative effects of AG in doubt. We cannot speak to the long-term effects of receiving AG, or the potential cumulative effects to be gained by

Table 4
Cross-tabulation of nonuse versus use of any substance, tobacco, alcohol, and marijuana at 3-month follow-up in the subsample screening with no substance use at baseline in the AG group and treatment as usual arm (N = 681)

	Anticipatory guidance, n (%)		Treatment as usual, n (%)		*p* value
	No	Yes	No	Yes	
Outcome					
Any Use	149 (93%)	11 (7%)	486 (93%)	35 (7%)	.866
Tobacco Use	155 (97%)	5 (3%)	510 (98%)	11 (2%)	.556
Alcohol Use	154 (96%)	6 (4%)	499 (96%)	22 (4%)	.780
Marijuana Use	157 (98%)	3 (2%)	512 (98%)	9 (2%)	.838

Data were analyzed using a generalized linear mixed model with a "between-subject" fixed effect for Group (AG vs. TAU) and a "within-subject" fixed effects for Enrollment (First vs. Second), a Huynh-Feldt error structure for all outcomes except Marijuana for which a variance components structure was utilized (due to convergence problems), denominator degrees of freedom estimated by the improved Kenward-Roger method, and assuming a binomial distribution for each of the outcomes. Percentages for each outcome are for each Condition. See text for details regarding development of Any, Tobacco, Alcohol, and Marijuana Use scores.
AG = anticipatory guidance; TAU = treatment as usual.

normalizing this conversation between providers and adolescent patients for continued discussion in future treatment encounters. Our study hoped to explore some of these longer term, cumulative aspects of receiving AG by allowing participants to re-enroll annually. Unfortunately, the premature study termination that resulted from COVID-19 negatively impacted our ability to explore these issues. It is possible that such questions may actually be better examined using qualitative methods, and they remain ripe for future research.

Overall, the findings indicate that the likelihood of initiating any substance use increases with age. Because pediatricians often indicate that the lack of time available during visits is a major barrier to SBIRT delivery [36,37], perhaps focusing SBIRT care on older adolescents, such as those in or entering high school, may be a more feasible approach than including all adolescents in some practices. On the other hand, our findings highlight that the transition from nonuse to use can occur fairly rapidly. A review of the services summary form, completed by each trained provider after a clinic visit with a study participant, indicated that 98% of patients with no reported substance use received AG, per protocol, while only 76% of patients who reported past year substance use received a BI, with 9% of patients declining a BI. Future research may want to test ways to better engage (or re-engage) patients reluctant to discuss their substance use with their provider, especially when universal screening is conducted, as is recommended with the FaCES model. Alternatively, different types of providers, such as PAs and NPs, may have more interest in the topic and more time to discuss substance use issues with their patients than pediatricians. Although our sample did not permit a comparison of participant outcomes by type of provider, we believe mid-level providers may be an optimal group to target in future adolescent SBIRT studies, especially since rural FQHCs, like those involved in our trial, employ a large number of NPs and PAs as primary care providers.

Racial, demographic, and site differences in substance use were found in our rural sample. White and Latinx participants compared with non-Whites and non-Latinx participants, respectively, had a greater probability of reporting any substance use and marijuana use, specifically. Given the differences in sample demographics across the participating counties, these main effects may be due to acceptability or accessibility of these substances in the communities rather than racial or ethnic differences. Replicating the study in more urban or suburban communities, as well as private pediatric practices rather than FQHCs, would be helpful for further exploring substance use patterns and preparing providers for responding to the typical use in their patients.

A provider effect was found for alcohol use outcomes but not tobacco or marijuana use, indicating some variability in outcome with respect to who was delivering the intervention and for what. Approximately half of all study providers received FaCES training and, while all providers who were trained completed a robust one-on-one manualized training by a highly experienced trainer, provider enthusiasm and comfort with the topic likely varied. Because the intervention took place during a regular healthcare visit and the study team sought to disrupt the visit flow as little as possible, no audio recording or observation of the intervention was collected, with intervention content data limited to the services summary form completed by the provider following the visit to determine fidelity. Future research may wish to examine characteristics of pediatric providers who are more facile in discussing substance use or at using motivational interviewing principles with their adolescent patients to affect health change behavior.

Limitations

Study limitations include the premature study cessation due to COVID-19 which resulted in our inability to randomize all providers, a significantly reduced sample size, the sample drawing from rural FQHCs only, lower follow-up rates for males and Latinx participants compared with females and non-Latinx participants, and a limited number of participants receiving the study intervention. We initially planned to recruit a much larger number of patient participants and to train more providers. Accordingly, our original analytical plan involved multilevel modeling approaches that could account for variation at different levels (e.g., patient, provider, clinic, state). Given the challenges with participant recruitment and provider training, we scaled back our analysis plan in favor of a more simplified approach. The small number of providers trained to deliver FaCES also inhibited our ability to glean insights regarding provider characteristics and their impact on patient outcomes. Lower provider adherence to BI delivery may have also negatively impacted our ability to detect change for adolescents who reported past year substance use at baseline.

Conclusions

Findings did not support the effectiveness of the FaCES adolescent SBIRT intervention in terms of self-reported substance use outcomes relative to TAU; however, study limitations, including premature study termination and reduced sample size may have negatively influenced findings. Results suggest that there is some natural movement in substance use risk over time.

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