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Do Risky Friends Change the Efficacy of a Primary Care Brief Intervention for Adolescent Alcohol Use?

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Abstract

Purpose—To determine if peer risk (having friends who drink or approve of drinking) modifies the effects of a computer-facilitated Screening and provider Brief Advice (cSBA) intervention on adolescent alcohol use.

Methods—We assessed intervention effect using logistic regression modeling with generalized estimating equations on a sample of 2092 adolescents. Effect modification by peer risk was analyzed separately for alcohol initiation (drinking at follow-up in baseline non-drinkers) and cessation (no drinking at follow-up in baseline drinkers) by testing an interaction term (treatment condition by peer risk). Interpretation of the interaction effect was further clarified by subsequent stratification by peer risk.

Results—The intervention effect on alcohol *cessation* was significantly greater among those *with* peer risk (aRRR: Risk 1.44, 1.18–1.76 vs. No Risk 0.98, 0.41–2.36) at 3 months follow-up. There was no such finding for alcohol initiation.

Conclusions—Alcohol screening and brief provider counseling may differentially benefit adolescent drinkers with drinking friends.

Keywords

adolescent; alcohol use; prevention; peer risk

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Introduction

Alcohol use in adolescence continues to be a major public health problem. Since the late 1990s there has been a downward trend in national rates of current alcohol use (≥1 drink in the last 30 days) as well as binge drinking (≥5 drinks in a row) reported by American teenagers. In the 2011 Youth Risk Behavioral Surveillance, 38.7% of U.S. high school students endorsed current drinking and 21.9% reported binge drinking. While good news, the overall prevalence of adolescent drinking remains high as over two-thirds of teens report any lifetime drinking (70.8%) [1]. With such use there is the potential for increased morbidity related to unintentional injury, violence and sexual risk-taking. Additionally there is increased risk for developing an alcohol use disorder during adulthood, especially when drinking starts early [2]. As such, early identification and intervention can potentially do much to improve adolescent health and reduce future societal and economic costs.

With this in mind, primary care visits offer ideal opportunities for screening and intervention. Greater than three-quarters of adolescents see a primary care physician yearly, and many have trusting, longitudinal relationships with their providers [3,4]. There is substantial evidence in the literature to support the cost-effectiveness of medical office screening and brief interventions, such as brief physician advice, for problem alcohol use among adults. [5–7]. Data are also emerging to support the generalizability of such findings to younger patients. Screening tools such as the CRAFFT [8] can identify problem use in teens. When combined with brief interventions such as motivational interviewing, providers are effective at reducing alcohol use in their patients at least in the short-term [9, 10]. Harris and colleagues found reduced rates of alcohol use at 3 months follow up with only 5 minutes of time devoted to screening and intervention [10]. Given such findings, the American Academy of Pediatrics recommends that pediatric providers incorporate substance use (SU) screening, brief intervention and referral to treatment (SBIRT) into their regular practice [11].

The effectiveness of such interventions may, however, be impacted by the many other social factors that can influence adolescent substance use behaviors [12]. Some of the factors shown to be influential in shaping adolescent SU behaviors include parent and family dynamics, community environment and peers [13–21]. The role of peers is especially important as adolescence is characterized by a growing independence from parents and greater affinity to peers. Studies have shown that peers are involved in the initiation, progression and maintenance of adolescent alcohol and other SU behaviors [22–24]. Peer effects have been found to operate in two primary ways. First, teens show a tendency to choose to affiliate with peers who have similar SU behaviors to them [25]. Burk et al. found that adolescents with similar SU behaviors will initiate relationships within existing peer networks (peer clustering) [24]. Additionally once within a peer group a teen's SU behaviors can change due to the influence of group norms and expectations [19]. The importance of peer influence on adolescent drinking is recognized in the recently issued National Institute on Alcohol Abuse and Alcoholism's (NIAAA) Alcohol Screening and Brief Intervention for Youth Guide [26, 27] which recommends that providers ask all patients if any of their friends drink ("Do you have any friends who drank beer, wine or any drink containing alcohol in the past year?"), in order to identify current and future drinking risk.

Given its importance in influencing adolescent SU behavior, peer context may be a significant modifier of the effectiveness of brief interventions aimed at reducing SU behaviors. Can brief provider-delivered health messages counteract the effects of having a "risky" peer group? Studies examining this question are needed to help elucidate strategies for improving effectiveness of medical office-based brief interventions for reducing alcohol use in all types of adolescents, including those at higher risk. Evidence of intervention

effectiveness, even in the presence of peer risk, would provide further support for the important role that pediatric providers can play in addressing adolescent alcohol use.

The objective of this study was to determine whether peer risk (having friends who drink or approve of drinking) moderates the effect of a computer-facilitated screening and provider brief advice intervention (cSBA) on adolescent alcohol use at 3- and 12-month follow-ups. Because of the greater interaction with, and exposure to, peers that adolescents have in their daily lives, we hypothesized that peers may exert the stronger influence, thus attenuating the effect of the brief intervention among adolescents with peer risk. We examined the impact of peer risk on cSBA effectiveness separately for the outcomes of alcohol initiation (among baseline non-drinkers) and alcohol cessation (among baseline drinkers) at follow-up, as there may be further effect modification based on the adolescent's own prior drinking experience.

Methods

The study was conducted in nine New England primary care sites from 11/2005–10/2008. Detailed methods have been previously published in Harris et al. [10] and are summarized here. The design was a before/after comparative effectiveness trial in which each site served as its own historical control. Participants were 12–18 years old patients presenting for routine care. They were recruited by trained research assistants (RAs) using identical recruitment procedures at each site. Patients reported by the PCP to be medically or emotionally unstable or to have a disability that would limit reading comprehension were excluded. Additionally patients were excluded if they were not willing and able to complete all assessments over the subsequent 12 months when asked by the RA as part of the eligibility screen. RAs obtained participant assent (<18 years) or consent (≥ 18 years) and parental consent where applicable.

During an initial 18-month Treatment as Usual (TAU) phase, providers were instructed to continue routine office practice while recruited participants completed baseline and follow-up measurements only. Following this phase a 1-hour provider training session on the cSBA intervention was conducted before initiation of the 18-month experimental phase. During the training session providers were shown a demonstration of the cSBA program, reviewed a sample provider report with recommended advice statement ("talking points") and watched a 20–minute video on provider delivered brief counseling [10]. Intervention participants completed a computer program that included a CRAFFT screen followed by immediate feedback on their risk-level and 10 pages of scientific information and true-life stories illustrating the harmful effects of substance use. The provider received a report containing the screening results and "talking points" for a 2–3 minute conversation about substance use. The experimental protocol was conducted at all participating sites. Participants received a $15 merchandise certificate for completing each assessment. The institutional review boards of Boston Children's Hospital and each participating site approved the study protocol.

Past-12-month and past-90-day alcohol use was assessed before the primary care provider visit and at 3- and 12-month follow-ups using a modified Timeline Follow-Back calendar interview [10] with the RA. Baseline peer risk was measured using a self-administered, computerized questionnaire containing the Peer Chemical Environment scale (PCES) [28]. A 4-point Likert scale was used for participant responses. Participants could respond strongly disagree, disagree, agree or strongly agree to the following items: 1) Some kids I hang around with have trouble at school due to using alcohol or drugs, 2) The kids I hang around with think it's okay for kids to drink alcohol, 3) Some kids I hang around with use alcohol or drugs before or during school and 4) Some kids I hang around with have trouble with their parents due to using alcohol or other drugs.

The PCES is a subscale within the Personal Experience Inventory (PEI) [29], a widely-used measure designed to detect substance use problems among adolescents. The PCES has been shown to have strong internal consistency reliability (Cronbach's alpha=0.85[28]; 0.87 in the current study) and correlate well with past-year alcohol/drug use frequency for both genders (r=0.47 males, 0.49 females), and across different ethnic groups [30, 31]. Because of skewed data, we dichotomized the 4-point Likert response scale with peer risk present if a participant agreed or strongly agreed with any scale item.

We evaluated cSBA effect modification by peer risk separately for alcohol *initiation* (among those reporting no past-12-months drinking at baseline) and *cessation* (among those reporting any past-12-months drinking). To determine the intervention effect, we performed multivariable logistic regression modeling with generalized estimating equations using SUDAAN™ v.10.0 software [10] to account for clinic-based sampling, controlling for potential confounders such as participant demographics, provider and visit characteristics, and parent/sibling SU that may have accounted for differences in substance use rates at follow up. These analyses generated adjusted relative risk ratios (aRRR) comparing cSBA vs. TAU initiation/cessation rates at each follow-up. We examined effect modification by first testing an interaction term (treatment condition by peer risk) in each of our models. To clarify interpretation of the interaction effect, we also ran separate models, stratified by baseline peer risk, to compute adjusted relative risk ratios for the cSBA effect among those with peer risk and among those without.

Results

Out of 2435 eligible patients, 2096 (86%) completed baseline assessments, and 2092 had sufficient data for inclusion in this study (4 had missing peer risk data). Overall sample characteristics have been described previously [10], with follow-up retention rates of 72% and 74% at 3 and 12 months, respectively. Of the 2092 included in this study, 60% endorsed baseline peer risk. Table 1 compares the baseline demographics between TAU and cSBA groups stratified by peer risk. Compared to TAU, cSBA participants were less likely to be seen by an attending and more likely to be seen during a well visit regardless of baseline peer risk. Among those with peer risk, cSBA participants had lower rates of being female and white, and drinking in the past 90 days compared to TAU. Among those with no baseline peer risk, cSBA participants had more parents with a college degree or higher. We controlled for these group differences in subsequent analyses.

Table 2 presents the crude percentages, and adjusted relative risk ratios, for initiation (for non-drinkers at baseline) and cessation (for drinkers at baseline) of drinking by 3 and 12 months follow-up, stratified by baseline peer risk. Not surprisingly, rates of drinking initiation during follow-up were higher overall among those with baseline peer risk compared to those without. As for the intervention effect, among baseline non-drinkers, those receiving cSBA had lower crude rates of drinking *initiation* by both 3- and 12-month follow-ups compared to those receiving TAU, regardless of baseline peer risk. However, the relative risk ratios, after adjustment for covariates, met statistical significance only for past-12-month initiation rates at 12-months follow-up *among those with baseline peer risk*, with the cSBA group having a 31% lower rate of past-12-month drinking initiation than the TAU group. With some cell sizes being very small (e.g., only 3 baseline non-drinkers with no peer risk initiated drinking by 3 months), there may have been insufficient power to detect an intervention effect in the other models. There was little indication of effect modification for drinking initiation by baseline peer risk status.

For drinking *cessation*, we found a significant interaction effect only among those *with baseline peer risk* at 3-months follow-up (beta for interaction term=3.0, standard error=1.4;

adjusted Wald F = 4.6, df=1, p=0.032). Subsequent stratified models revealed a 44% higher rate of cessation (no use in past-3-months) among cSBA participants compared to TAU participants, after adjustment for potential confounders. There was no such effect among those *without* baseline peer risk. By 12-months follow-up, the cessation effect among those with baseline peer risk was extinguished.

Discussion

This study provides initial evidence that a brief primary care office based interventions can reduce teen drinking despite peer influences to the contrary. In fact, teens with friends who approve of drinking may differentially respond to a prevention intervention that requires only 2–3 minutes of the clinician's time. The majority of teens in our sample reported having friends who drank or approved of drinking. Among teenagers with peer risk there was a 44% greater rate of alcohol cessation at 3-months follow-up and a 31% lower rate of drinking initiation at 12 months follow-up.

Given the pervasive influence of peer factors on substance use [14, 19, 32–34] the findings of our study are not intuitive. However, there is support in the literature for the effectiveness of brief interventions in the context of social influences. Neighbors et al. found a brief computerized normative feedback intervention was more effective among college students with "controlled orientation" that is a greater sensitivity to social/normative influences [35]. In our study drinking teens with peer risk may have started drinking because of their susceptibility to social influences. This same susceptibility may make them more responsive to the cSBA intervention which strives to change normative perceptions through personalized feedback and the bond they have with their health care provider.

It is also possible that the cSBA message delivered by PCPs was more salient for those teens with peer risk. Teenagers who endorse peer risk may have already seen the negative effects of alcohol use on their friends thus possibly making the intervention more impactful for them. It is also possible that the PCP advice given may help to increase refusal assertiveness in those adolescents with peer risk. It is known that the presence of high refusal assertiveness can serve as a buffer against substance use [33] by empowering youth to engage in more positive behaviors and resist peer pressure [24, 25]. The teenagers with peer risk may have had low refusal assertiveness skills at baseline as demonstrated by the fact that some were already drinking. Having a frank, targeted discussion with a trusted adult (i.e. PCP) may have provided them with the confidence to stop drinking resulting in higher cessation rates for the intervention group.

A few potential limitations warrant consideration. This was a non-randomized study conducted in clinics located in New England. Although potential differences between the TAU and cSBA groups were controlled for during data analysis, it is possible that there were group differences that were not taken into account. The New England location where participants were recruited may speak to the generalizability of our results to the overall U.S. adolescent population. We chose to assess for the presence of moderation by peer risk by creating separate models for multi-variable, time-series analyses. One of our models (baseline alcohol use without peer risk) had small numbers, which may have affected our ability to pick up any intervention effect. We also relied on adolescent self-report for our variables of interest. Under or over-reporting of alcohol use may have occurred. However, it has been shown that self-report is a reasonable proxy for assessing adolescent substance use [36].

Despite the limitations, this study is a compelling addition to the literature on prevention of adolescent substance use. Our findings demonstrate that screening and brief provider advice

can be a powerful tool to promote alcohol cessation among teenaged drinkers, even if they have friends who also drink. They also underscore the challenges primary care providers face when attempting to address adolescent alcohol use. Namely, the few, but significant effects we found may speak to the difficulty in achieving and sustaining behavioral change related to adolescent alcohol use. Future studies should aim to replicate our findings in larger, nationally representative samples, assess the mechanism of action by which cSBA promotes alcohol cessation, and explore whether the cSBA's beneficial effect can be extended to a teen's peers. Such studies could broaden the reach and public health benefits of brief interventions for underage drinking.

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Abbreviations

aRRR	adjusted relative risk ratio
cSBA	computer-facilitated screening and brief advice
SU	substance use
TAU	treatment as usual

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Implications and Contribution

This study provides evidence that provider advice about the health-risks of alcohol may differentially benefit adolescents with friends who drink. Future studies should explore the mechanism of action and assess effects on friends' drinking.

Table 1

Comparison of TAU vs. cSBA by baseline peer risk status (Total N=2092)

	No Peer Risk (n=827)		Peer Risk (n=1265)	
	TAU (n=407) n (%)	**cSBA (n=420) n (%)**	**TAU (n=658) n (%)**	**cSBA (n=607) n (%)**
Age (mean ± SD)*	14.9 ± 2.1	14.6 ± 1.9	16.5 ± 1.7	16.3 ± 1.7
Females	225 (55.3)	211 (50.2)	433 (65.8)*	350 (57.7)*
Race/Ethnicity				
White non-Hispanic	268 (65.8)	276 (65.7)	419 (63.7)	388 (63.9)
Two parents in home	280 (70.3)	299 (72)	422 (65.6)	421 (70.3)
Parent Education Level				
College degree or higher	174 (44.6)*	243 (59)*	276 (43.8)	279 (47.2)
Provider/Visit characteristics				
Setting				
Urban	141 (34.6)	144 (34.3)	240 (36.5)	252 (41.5)
Suburban	199 (48.9)	228 (54.3)	311 (47.3)	260 (42.8)
Rural	67 (16.5)	48 (11.4)	107 (16.3)	95 (15.6)
Provider type				
Attending	294 (73.5)*	271 (65.0)*	411 (64.3)*	340 (57)*
Resident	63 (15.7)*	62 (14.9)*	136 (21.3)*	123 (20.6)*
NP or PA	43 (10.7)*	84 (20.1)*	92 (14.4)*	133 (22.3)*
Visit type				
Well visit	352 (87.8)*	404 (96.9)*	497 (76.9)*	563 (93.7)*
First visit	41 (10.2)	43 (10.4)	73 (11.3)	62 (10.3)
Alcohol Use				
Past 90 days	18 (4.4)	9 (2.1)	214 (32.5)*	157 (25.9)*
Past 12 months	40 (9.8)	30 (7.1)	318 (48.3)	257 (42.3)

Abbreviations: TAU- treatment as usual; cSBA-computer facilitated screening and brief advice

Note: n varied for groups due to missing data: No peer risk: TAU (390–407), cSBA (412–420); Peer Risk: TAU (630–658), cSBA (591–607)

*Within analysis groups, TAU vs. cSBA patient characteristics differed at $p<0.0125$ (criterion for statistical significance after Bonferroni correction for multiple comparisons).

Table 2

Rates of self-reported alcohol initiation and cessation at 3- and 12-month follow-ups

		Any Past-90-Days Use at 3-Months Follow-up					
		Initiation[b]			**Cessation[b]**		
	N	**TAU n (%)**	**cSBA n (%)**	**aRRR[c] (95%CI)**	**TAU n (%)**	**cSBA n (%)**	**aRRR[c] (95%CI)**
No Peer Risk[a]	617	8/269 (3.0)	3/301 (1.0)	0.28 (0.06,1.30)	17/27 (63.0)	10/20 (50.0)	0.98 (0.41,2.36)
Peer Risk[a]	895	22/240 (9.2)	14/254 (5.5)	0.60 (0.29,1.26)	83/216 (38.4)	94/185 (50.8)	1.44* (1.18,1.76)
		Any Past-12-Months Use at 12-Months Follow-up					
		Initiation[b]			**Cessation[b]**		
	N	TAU n (%)	cSBA n (%)	aRRR[c] (95%CI)	TAU n (%)	cSBA n (%)	aRRR[c] (95%CI)
No Peer Risk[a]	608	21/265 (7.9)	14/298 (4.7)	0.58 (0.28,1.19)	9/25 (36)	6/20 (30)	1.22 (0.81,1.82)
Peer Risk[a]	913	71/251 (28.3)	54/273 (19.8)	0.69 (0.49,0.96)	39/215 (18.1)	39/215 (18.1)	1.05 (0.96,1.15)

notes:
Abbreviations: TAU: Treatment As Usual; cSBA: computer facilitated Screening and Brief Advice; aRRR: adjusted Relative Risk Ratios.

[a] New England logistic models adjusted for the multi-site sampling design, baseline past-12-month substance use, age, gender, parent education level, type of visit (well visit or other), perceived parent, sibling, and peer substance use, provider gender, and connectedness to provider

[b] "Initiation" models analyzed only participants reporting no past-12-month use at baseline, while "cessation" models included only those reporting any past-12-month use at baseline.

[c] Adjusted relative risk ratios with TAU as the reference group.

* $p<0.01$