



MAJOR ARTICLE

Prevalence and predictors of suicidal ideation, plan, and attempts, in first-year college students with ADHD

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ABSTRACT

Objective. The present study evaluated the prevalence of past suicidal ideation (SI), plan, and attempt in college students with ADHD ($N=102$) compared to a matched control ($N=102$). Predictors of SI, plan, and attempts, were examined. **Participants.** Study participants were first year college students at a large Southeastern university who completed measures during August or September of 2014 or January of 2015. **Methods.** Measures were completed by first year students via an online survey. **Results.** Prevalence rates for SI and related behaviors were higher among the ADHD group than the matched control, with suicide attempts rates four times higher in the ADHD group (13.7% vs. 2.9%). Results showed that ADHD predicted rates of SI and suicide attempt accounting for depression and key demographic variables. **Conclusions.** Findings have implications for suicide risk assessments conducted with college students with ADHD.

ARTICLE HISTORY

Received 5 May 2018
Revised 23 August 2018
Accepted 12 November 2018

KEYWORDS

ADHD; college students; depression; suicidal behaviors; suicidal ideation

Introduction

Epidemiologic data show that 3.9% of adults living in the United States have experienced thoughts of killing themselves (suicidal ideation) in the past year¹ and suicide ranked as the tenth leading cause of death for adults in 2013.² Rates of suicidal ideation are higher among young adults (ages 18–30),² and are particularly high in the college student population. College students are faced with significantly increased academic and self-regulation demands and associated stress during the transition to college.³ Simultaneously, many students are living away from home for the first time and experience a decrease in environmental and social support, which further affects adjustment.⁴ Past-year prevalence rates for suicidal ideation in college students specifically range from 6.3% to 11%,^{5,6} and suicide ranks as the second leading cause of death in this age group.² Moreover, more than 100,000 college students in the United States report making a suicide attempt each year.⁷ Clearly, suicide is a topic of pressing concern in the college student population and it is important to understand factors that may elevate risk.

Behaviors that serve as precursors to suicide range from passive thoughts of death with no plan, to chronic episodes of active ideation and intent.⁸ Accordingly, prevalence rates differ for suicidal ideation, suicide plan, and suicide attempt in college students, such that 12% report suicidal ideation and less than 1% report making a plan or attempt.⁹ However, suicidal ideation alone is distressing, and is an indicator of risk for a suicide attempt.¹⁰ General mental health concerns, such as depression, and feelings of

hopelessness and desperation, are also risk factors for suicidal ideation and attempts in college students.^{6,9,11,12} Further, decreased social support and alcohol use are common following the transition to college and both are associated with increased suicide risk.¹³

Certain subgroups of college students may be at elevated risk for suicide. For example, students with particularly high levels of depression symptoms or those who meet criteria for major depression appear to demonstrate a greater risk for suicide,^{9,11} as do students with elevated substance use.¹³ Another group which may experience an elevated risk for suicide is college students with attention-deficit/hyperactivity disorder (ADHD). College students with ADHD demonstrate poorer adjustment to college marked by greater academic concerns, fewer meaningful relationships, and a lower quality of life.^{14–16} Further, impulsivity, a core ADHD symptom domain,¹⁷ is an established risk factor for suicide in college students¹⁸ and predicts suicide completion above and beyond other psychopathology.¹⁹ Across the lifespan, ADHD is thought to increase risk for suicide, with one meta-analysis finding a diagnosis of ADHD is associated with a 2.91 relative risk for suicide.²⁰ However, this association has not been investigated thoroughly in college students, and only one study has reported prevalence rates of suicidal ideation among college students with ADHD.²¹ The authors found elevated rates of suicidal ideation among students reporting high levels of ADHD symptoms compared to peers (32.3% vs. 10.5%) but did not gather information about history of ADHD diagnosis or assess prevalence of suicide plans or attempts.²¹

Although research to date among college students suggests that suicidal ideation, plan, and attempts may be higher among students with ADHD,^{21,22} it is unclear whether this association is unique or attributable to high rates of comorbid depression in this population.²³ A prior study reported significant associations between symptoms of depression, ADHD, suicidal ideation, and suicide attempts in a general college student sample; further, total ADHD symptoms moderated the relations between depression symptoms and suicidal ideation and attempts.²² However, another study found evidence for depression symptoms mediating the relation between ADHD and suicidal ideation in a college student sample,²¹ suggesting the increased risk for suicidal ideation may be attributable to comorbid symptoms of depression, rather than to ADHD alone. Thus, it remains unclear whether college students with ADHD experience a unique risk for suicidal ideation and behavior apart from the risk attributable to a high prevalence of depression symptoms in this population.²³ Determining whether ADHD acts as a unique risk factor is important for assessing risk in first year college students to inform prevention and intervention efforts.

Further, one of the two previous studies did not assess associations between ADHD, depression symptoms, and suicide attempts (ie, it focused on ideation)²¹ and neither assessed relations between ADHD, depression symptoms, and having a suicide plan.^{21,22} As noted above, prevalence rates for ideation, plan, and attempts in college students differ.⁹ In addition, there is evidence that predictors of ideation, plan, and attempts differ,²⁴ and it is therefore important to investigate relations between potential risk factors and suicidal ideation, plan, and attempts separately. Finally, both previous studies^{21,22} utilized continuous symptom measures of ADHD to assess risk. Colleges and universities generally make decisions about eligibility for accommodations, medication, and university counseling services based upon documentation of a prior ADHD diagnosis. Thus, in order to best inform intervention and prevention efforts, it is important to understand whether self-report of ADHD diagnosis places students at-risk for suicidal ideation, plan, or attempt.

Present study

The primary aim of the current study was to evaluate prevalence rates of suicidal ideation, plan, and attempts in a sample of college students with ADHD relative to a control group matched on age, sex, and ethnicity. The use of a matched control group helps to minimize the possibility of systematic differences between students diagnosed with ADHD and students without ADHD,²⁵ allowing for a more accurate comparison of prevalence rates. A second aim was to evaluate whether ADHD diagnosis predicts suicidal ideation, plan, and attempts above and beyond depression symptoms in first-year college students controlling for sex, age, and ethnicity. The following hypotheses were proposed: a) prevalence rates of suicidal ideation, plan, and attempts will be higher among college freshmen with ADHD; b) ADHD

Table 1. Sample demographics.

Age	<i>N</i> (%)	<i>M</i>	<i>SD</i>
		18.46	0.39
Sex			
Men	233 (29.1)		
Women	569 (70.9)		
Race			
White	360 (44.9)		
Black/African American	169 (21.1)		
Hispanic/Latino	55 (6.9)		
More than one race	51 (6.4)		
Asian	158 (19.7)		
American Indian/Native Alaskan	3 (0.4)		
Native Hawaiian/other Pacific islander	6 (0.7)		
Place of residence			
Residence hall	712 (88.8)		
Off campus housing	33 (4.1)		
Lives with parents	45 (5.6)		
Other	12 (1.5)		

Note. Demographics taken from unmatched data set.

will predict suicidal ideation and past attempts over and above demographic risk factors and symptoms of depression and c) ADHD will not predict suicide plan above and beyond symptoms of depression. These hypotheses were made because although impulsivity is conceptually related to both suicidal thoughts (ideation) and actions (attempts), planning is a known deficit of college students with ADHD and in many ways requires a lack of impulsivity.²⁶

Method

Participants

Participants were part of a larger ongoing study of behavioral and emotional health at a large public urban university in the Mid-Atlantic region of the United States.²⁷ The current study used baseline data from a single cohort comprised of first-year students. Participants in the current study were comprised of students enrolled as first year college freshmen in the fall semester of 2014 who completed the surveys during either fall or spring baseline data collection period ($N=802$). Participant demographic information is summarized in Table 1. In order to assess the prevalence of suicidal behavior in college students with ADHD, a matched case-control data set was also created. Participants who reported a diagnosis of ADHD ($N=102$) were matched to control cases on sex, age, and ethnicity. The matched case-control data ($N=102$) was used for estimates of suicidal behavior.

Procedure

Incoming first year students were emailed an invitation to an online survey, available for completion from the week prior to the start of classes in the fall semester, to the 10th week in the semester. A second data collection period occurred during spring semester (between weeks 7 and 14), during which freshmen who had not previously participated were provided another opportunity to participate. Approximately 63% of all incoming freshmen completed surveys, suggesting participants in this study constitute a

representative sample of freshmen college students at this university. Participants completed informed consent online prior to completing surveys, and were compensated with \$10. All study procedures were approved by the institutional review board of the university.

Measures

Suicidal ideation, plan, and attempts

Three items assessed suicidal ideation, suicide plan, and suicide attempt. Items included “Have you ever thought about killing yourself” to assess suicidal ideation; “Did you have a plan” to assess suicide plan and “Have you ever tried to kill yourself” to assess suicide attempt. Three response choices were available to participants: “yes,” “no,” and “prefer not to answer.” Participants were prompted to answer the suicide plan item only after responding “yes” to the suicidal ideation item. Measuring suicidal ideation, plan, and attempts using similarly phrased questions in an online survey is a commonly used approach.^{28,29}

Symptom checklist-90 (SCL)

The SCL is a self-report measure that broadly assesses psychopathology. The current study used the depression subscale, which included four items assessing symptoms of depression. On a five point scale (1 = *not at all* to 5 = *extremely*), participants indicated how troublesome symptoms had been in the last 30 days. Examples of items include “feeling blue/sad” and “no interest in things.” The depression subscale demonstrates evidence of predictive validity,^{30,31} and internal reliability was adequate (Cronbach’s alpha of .87) in the present sample.

ADHD status

Participant diagnostic status was assessed using a single item. Participants responded to the question “Have you ever been diagnosed with ADD/ADHD” by indicating either “yes” or “no.” Self-report of diagnostic status via online survey is a widely-used approach.^{15,32} This question resulted in a prevalence rate consistent with those expected in a college-age sample (9.5%).

Demographics questionnaire

Participants completed a demographics questionnaire. Relevant questions to the present study included sex and race/ethnicity. See Table 1 for participant demographics.

Analytic plan

A matched control group was used to address the first aim of the study; this methodology reduces the possibility of pre-existing systematic differences influencing the prevalence estimates of suicidal ideation, plan, and attempts. Pearson chi-square tests of independence were calculated to compare the frequency of past suicidal ideation, plan, and attempts in college freshmen with ADHD compared to a matched

Table 2. Prevalence of ideation, plan, and attempts in students with and without ADHD.

	N (%)		χ^2	p
	ADHD	Controls		
Ideation	41 (40.2%)	35 (34.3%)	4.676*	.031
<i>Chose not to answer</i>	3 (2.9%)	4 (3.9%)		
Plan	21 (20.6%)	12 (11.8%)	2.856	.091
<i>Chose not to answer</i>	5(4.9%)	4(3.9%)		
Past attempt	14 (13.7%)	3(2.9%)	11.241**	.001
<i>Chose not to answer</i>	5(4.9%)	4(3.9%)		

Note. Percentages indicate students who endorsed past suicidal ideation, plan and attempts in the matched data set. * $p < .05$; ** $p < .01$.

control group of college freshmen without ADHD. Pearson’s chi-square tests are recommended when testing for significant differences in categorical outcome variables for two distinct groups.³³ Hierarchical multiple linear regressions were used to develop models predicting participant-reported suicidal ideation, suicide plan, and past suicide attempt using sex, ethnicity, depressive symptom scores, and ADHD diagnostic status. The full data set (unmatched data) was used for the regression analyses. Analyses were conducted including participants who responded to the survey in the spring semester of their freshmen year, and again excluding participants who responded to the survey in the spring semester. Results were unchanged. Results reported below included data from participants responding in either the fall or spring semester.

Results

Before conducting analyses, assumptions of normality were checked for depression symptoms, which was the only continuous variable used. Assumptions of normality for depression symptoms were met (skewness = .700, $SE = .086$; kurtosis = $-.186$, $SE = .172$). The prevalence of missing data (including participants who chose not to respond) was assessed using the full data set, which revealed minimal levels of missing data on the suicide attempt (1.371%) and suicidal plan questions (1.122%). Accordingly, no further missing data analyses were conducted. The percentage of missing data in the matched data set, including participants who chose not to respond to these questions, ranged from 2.941% to 4.901% in the ADHD and control groups (see Table 2 for more information). Given the sensitive nature of the questions, it is unsurprising some students chose not to answer. Given that these cases may represent a subgroup that differs in important ways from the rest of the sample, these cases were not included in the analyses.

Prevalence rates are reported in Table 2. Frequency of past suicidal ideation, $\chi^2(1) = 4.676$, $p = .031$, and suicide attempt, $\chi^2(1) = 11.241$, $p = .001$, was significantly higher in freshmen with a diagnosis of ADHD compared to freshmen without a diagnosis of ADHD. Prevalence of past suicide plan did not differ significantly between freshmen with a diagnosis of ADHD compared to students without a diagnosis of ADHD. Basic descriptive statistics and correlations among predictor variables are reported in Table 3.

On the first step of the model predicting suicidal ideation, depression symptoms, ethnicity, and sex were entered

TABLE 3. Bivariate correlations of model variables.

	1	2	3	4	5	6	7
1. Sex	–	.015	.101**	–.046	.063	.002	.073*
2. Ethnicity		–	.055	.122**	.118**	–.043	.068
3. Depression			–	.052	.402**	.239**	.217**
4. ADHD				–	.097**	.061	.170**
5. Suicidal ideation					–	–	.319**
6. Suicide plan						–	.399**
7. Suicide attempt							–

Note. Correlation between suicidal ideation and suicide plan could not be computed as the item assessing suicide plan was only administered after the item assessing suicidal ideation was positively endorsed. * $p < .05$; ** $p < .01$.

simultaneously in the model, and ADHD diagnostic status was entered in the second step (see Table 4). The full model R^2 was significantly greater than zero, $F(4, 798) = 42.521$, $p < .001$, Adjusted $R^2 = .176$. In the full model, ADHD significantly predicted suicidal ideation ($\beta = .067$, $p = .040$). Depression symptoms ($\beta = .391$, $p < .001$) and ethnicity ($\beta = .088$, $p = .007$) were also significant predictors of suicidal ideation.

On the first step of the model predicting suicide plan, depression symptoms, ethnicity, and sex were entered simultaneously in the model, and ADHD diagnostic status was entered in the second step (see Table 4). The full model R^2 was significantly greater than zero, $F(4, 291) = 5.071$, $p = .001$, Adjusted $R^2 = .065$. In the full model, only depression symptoms significantly predicted suicide plan ($\beta = .242$, $p < .001$).

On the first step of the model predicting past suicide attempt, depression symptoms, ethnicity, and sex were entered simultaneously in the model, and ADHD diagnostic status was entered in the second step (see Table 4). The full model R^2 was significantly greater than zero, $F(4, 786) = 16.430$, $p < .001$, Adjusted $R^2 = .072$. In the full model, both ADHD ($\beta = .158$, $p < .001$) and depression symptoms ($\beta = .197$, $p < .001$) significantly predicted past suicide attempt.

Comment

The aims of this study were to examine the prevalence rates of suicidal ideation, plan, and attempts in college students with and without ADHD, and to evaluate ADHD as a predictor of suicidal ideation and related behaviors while controlling for depression symptoms and key demographic variables. Results revealed the prevalence of past suicidal ideation and attempts was significantly higher in first-year college students with ADHD compared to a matched control group. In addition, ADHD diagnostic status emerged as a significant predictor of history of suicidal ideation and suicide attempts, after controlling for demographic variables and depression symptoms. Consistent with hypotheses, ADHD did not predict report of a suicide plan beyond the effects of demographic variables and depression symptoms.

These findings are consistent with prior studies demonstrating higher rates of suicidal ideation and attempts in both adolescents³⁴ and adults^{20,34,35} with ADHD. The current study extends this evidence base by demonstrating

TABLE 4. Summary of hierarchical regression analyses predicting suicidal ideation, plan, and attempt.

	Model 1			Model 2		
Suicidal ideation	b	SE	β	b	SE	β
Ethnicity	.018	.006	.096**	.016	.006	.088**
Sex	.022	.034	.021	.026	.034	.024
Depression	.052	.004	.395***	.051	.004	.391***
ADHD	–	–	–	.110	.053	.067*
	Model summary			Model summary		
R^2	.171			.176		
F for change in R^2				4.249*		
Suicide plan	b	SE	β	b	SE	β
Ethnicity	–.005	.011	–.028	–.008	.011	–.041
Sex	–.015	.066	–.013	–.009	.066	–.008
Depression	.033	.008	.241***	.033	.008	.242***
ADHD	–	–	–	.123	.087	.081
	Model summary			Model summary		
R^2	.059			.065		
F for change in R^2				1.982		
Suicide attempt	b	SE	β	b	SE	β
Ethnicity	.005	.003	.054	.003	.003	.035
Sex	.025	.018	.047	.030	.018	.056
Depression	.013	.002	.204***	.013	.002	.197***
ADHD	–	–	–	.130	.028	.158***
	Model Summary			Model Summary		
R^2	.05			.072		
F for change in R^2	–			20.951***		

Note. ADHD = attention-deficit/hyperactivity disorder. * $p < .05$; ** $p < .01$; *** $p < .001$.

college students with ADHD exhibit higher rates of past suicidal ideation and attempts even when accounting for demographic variables which are considered “static,” or permanent, risk factors, including sex and race/ethnicity.^{36,37} Most strikingly, rates of suicide attempts were over four times as high in the ADHD group compared to the non-ADHD group (13.7% vs. 2.9%). This is highly concerning given prior attempt of suicide is a significant risk factor for future attempts.³⁸ In the current study, participants were instructed to report if they had ever had attempted suicide. In contrast, prior studies have asked students to report on suicide attempts within the past year, finding much lower prevalence rates among college students, ranging from 0.9% to 1.5%.^{9,11} These findings highlight the importance of colleges screening for lifetime history of suicide attempts and shed light on the considerably elevated risk for suicide attempts associated with a diagnosis of ADHD.

The current findings extend prior work^{21,22} by documenting that ADHD conveys a unique risk for suicidal ideation, above and beyond the effects of comorbid depression symptoms. This is important given high rates of comorbid depressive disorders among college students with ADHD (32.3%); in addition, symptoms of depression are a robust predictor of suicidal ideation.⁹ However, consistent with study hypotheses, first year college students with ADHD did not differ from students without ADHD with regard to history of making a suicide plan. This is likely explained by the core characteristics of ADHD, which include difficulties with long-term planning and organization of behavior to accomplish goals.³⁹ In the present study, the ratio of plan to attempt in the ADHD group was 3 to 2 in comparison to a ratio of 8 to 2 in the control group. This finding is clinically relevant, as best-practice guidelines, such as APA guidelines for assessment of suicidal behaviors,⁴⁰ recommend assessing for the presence of a plan and

considering the nature of the plan (ie, attainability) to determine level of risk. These data suggest absence of a plan may not indicate a lower level of suicide attempt risk for college students with ADHD.

Several mechanisms may explain the association between ADHD and suicidal ideation and suicide attempts. ADHD may impact risk of both suicide ideation and suicide attempt due to difficulties with coping and problem-solving skills.⁴¹ College students with ADHD may be ill-equipped to manage frustrations and negative emotions associated with struggles across multiple domains (eg, academic, peer, work). Moreover, adults with ADHD are more likely to use avoidant coping strategies (behavioral or cognitive attempts to avoid or escape problems).⁴¹ This is consistent with “disengagement coping,” defined as attempts to avoid or suppress stressors, negative thoughts, or emotions.⁴² In contrast, engagement-focused coping includes problem solving, seeking social support, and/or cognitive reframing strategies.⁴² Further, an emerging body of research has documented the presence of emotion regulation difficulties associated with ADHD,⁴³ and there is some evidence to support the association between emotion regulation and suicidal ideation in this group. For example, emotion regulation deficits *strengthened* the indirect relationship between ADHD and suicidal ideation through depression symptoms in a sample of college students.²¹ The heightened risk for suicidal ideation and attempts observed in college students with ADHD may therefore be at least partly attributable to deficits in emotion regulation.

Elevated levels of problematic substance use, including both alcohol and illicit drug use⁴⁴ may also contribute to higher rates of suicidal ideation and suicide attempts. Alcohol use has been associated with increased suicide proneness in college students,^{18,45} and illicit drug use and misuse of prescription drugs is positively correlated with suicidal ideation.^{13,46,47} Associations between a diagnosis of ADHD and increased risk of substance use disorders is well-documented⁴⁴ and evidence is mounting that college students with ADHD display increased risk for problematic substance use.^{48,49} In addition, given high rates of comorbid psychopathology in this population⁵⁰ and struggles with the transition to college,⁵¹ it is possible college students with ADHD may use drugs and alcohol to cope. This may further increase risk, as using substances to cope is associated with a greater risk of suicidal ideation in clinical populations more broadly.⁵²

One factor which could uniquely increase risk for suicide attempts is increased levels of impulsivity. Impulsivity is a hallmark symptom of ADHD¹⁷ and has been identified as a robust predictor of suicide attempts in both adolescent and adult populations.^{53,54} Further, impulsivity has been positively associated with suicide proneness in college students.¹⁸ Prior research has shown impulsive behaviors are associated with past suicide attempts,⁵⁵ and a lack of ability to consider the consequences of one’s actions can distinguish between those that attempt suicide from those experiencing only suicidal ideation.⁵⁶ Moreover, emerging evidence shows “emotional” impulsivity (the tendency to act without

forethought in the presence of strong emotion) is associated with ADHD in adulthood.^{57,58} Thus, college students with ADHD may be more likely to act on suicidal thoughts or urges when experiencing strong negative emotions. Although impulsivity has been targeted in non-ADHD specific treatments such as dialectical behavior therapy,⁵⁹ treatments for ADHD in emerging adults have not addressed impulsivity directly. Instead, treatments for this population are generally focused on addressing difficulties with planning, organization, and time management.⁶⁰ An important future direction for research is clarifying the role impulsivity plays in predicting suicidal behaviors among adults with ADHD and developing or adapting treatments to include a focus on managing impulsivity.

Another important direction for future research in this area is designing and conducting rigorous longitudinal research to assess how risk for suicidal ideation and attempts unfolds over the course of development for individuals diagnosed with ADHD. Ideally, such studies might include following children and adolescents diagnosed with ADHD in childhood and tracking their symptoms of depression, as well as assessing for suicidal ideation, plan, and attempts. This line of research might be able to pinpoint periods of development in which risk for suicidal ideation is highest for this population, which could inform prevention and intervention efforts.

Limitations

Although the current study has several strengths, some important limitations should be noted. First, the assessment of ADHD diagnosis was done through self-report. Gold-standard assessment of ADHD diagnosis includes a comprehensive assessment.⁶¹ However, as all data collection for this study was completed online it was not possible to conduct a comprehensive assessment. Lack of a comprehensive assessment makes it difficult to conclude with confidence that participants would have met full criteria for ADHD at the time of their suicidal ideation. A second limitation is the lack of information about past diagnosis of depression. This information would have been helpful in further disentangling the relation between ADHD; depression; and suicidal ideation, plan, and attempts. It is possible, and even likely, that there is a higher rate of past diagnosis of depression in the ADHD group. However, even if this is the case, the median age of onset for ADHD occurs much earlier than the median age of onset for depression (before 11 years of age vs. 30 years old).⁶² Another limitation is the use of a cross-sectional sample composed of freshmen students only. Although using a sample composed entirely of college freshmen allows an examination of suicidal ideation, plan, and attempts at entry into college, it is important to acknowledge college freshmen may differ in important ways from students who are at later points in their college career. This design also did not allow for the examination of the course of suicidal ideation, plan, and attempts throughout college. Future studies should seek to elucidate the trajectory of

suicidal ideation, plan, and attempts through the use of longitudinal designs.

Conclusion

Results of the current study provide compelling evidence that rates of suicidal ideation and suicide attempts are elevated among college freshmen with a diagnosis of ADHD in comparison to peers, even when controlling for differences associated with current symptoms of depression and demographic factors. These findings indicate individuals with ADHD enter college with a higher baseline risk for suicidal behavior compared to other students. Prevention and intervention efforts should target students with ADHD at college entry, particularly when students are experiencing concurrent symptoms of depression. Finally, rates of self-reported suicide plan did not differ between students with and without ADHD, suggesting the presence or absence of a suicide plan may not be a reliable indicator of risk for suicide attempt for a student with ADHD. This finding has important implications for suicide risk assessments conducted with college students with ADHD.

Conflict of interest disclosure

The authors have no conflicts of interest to report. The authors confirm that the research presented in this article met the ethical guidelines, including adherence to the legal requirements, of United States and received approval from the Institutional Review Board of Virginia Commonwealth University.

Funding

Spit for Science has been supported by Virginia Commonwealth University, P20 AA017828, R37AA011408, K02AA018755, and P50 AA022537 from the National Institute on Alcohol Abuse and Alcoholism, and UL1RR031990 from the National Center for Research Resources and National Institutes of Health Roadmap for Medical Research.

Acknowledgments

We would like to thank the Spit for Science participants for making this study a success, as well as the many University faculty, students, and staff who contributed to the design and implementation of the project.

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