Global Pediatric Health
Volume 8: 1–9

DOI: 10.1177/2333794X211037985
journals.sagepub.com/home/gph
SAGE

Adolescent Experiences with Self-Asphyxial Behaviors and Problematic Drinking in Emerging Adulthood

Jillian E. Austin, PhD, BCBA[1,2], Amy C. Lang, MS[3], Anna M. Nacker, MS[4], Alexander L. Wallace, MS[3], David C. Schwebel, PhD[5], B. Bradford Brown, PhD[6], and W. Hobart Davies, PhD[3]

Abstract

Self-asphyxial behavior to achieve a euphoric high (The Choking Game; TCG), occurs most often during early adolescence. Participants in TCG often engage in other risky behaviors. This study investigated the relationship between prior experience with TCG and problematic drinking behaviors in emerging adulthood. Emerging adults, 18 to 25 years old (N = 1248), 56% female, and 78% Caucasian completed an online survey regarding knowledge of and prior engagement in TCG and current drinking behaviors. Participants who personally engaged in TCG during childhood/adolescence or were familiar with TCG reported significantly more problematic drinking behaviors during emerging adulthood. Those present when others engaged in TCG but resisted participation themselves reported significantly less current problematic drinking behaviors than those who participated, but significantly more current problematic drinking behaviors than those never present. Emerging adults with increased social familiarity with TCG during adolescence endorsed greater problematic drinking behaviors. Results suggest resistance skills may generalize across time/activities.

Keywords

adolescents and emerging adults, problematic drinking behaviors, risky behavior, self-asphyxial behaviors, The Choking Game

Received June 8, 2021. Accepted for publication July 21, 2021.

Many adolescents and emerging adults engage in risky behaviors, including binge drinking and illicit substance use, unprotected sex, and criminal activity.[1] Research shows an association between adolescent risky behaviors[2] and continued susceptibility for risk-taking over time.[3] However, minimal research has focused on the impact of adolescent engagement in and familiarity with self-asphyxial behaviors on future risky behaviors, such as problematic drinking.

Non-erotic self-asphyxial behaviors are commonly referred to as The Choking Game (TCG), but are also known by other names such as Blackout, Space Monkey, the Pass Out/Fainting Game, and Flatliner.[4] Current prevalence estimates of adolescent engagement in TCG range from 6% to 11%.[5] TCG involves self-asphyxiation to experience a euphoric high prior to losing consciousness, and/or when re-gaining consciousness.[4] Self-asphyxiation results in a brief euphoria that does not require access to illicit substances and cannot easily be detected by others following completion.[2] Individuals may accomplish self-asphyxiation by first making themselves hyperventilate and then applying pressure to the chest and neck (ie, carotid artery) until they lose consciousness.[6] Participants may also use an object or their own or someone else's hands/arms (eg, a sleeper hold) to apply the pressure to the chest/neck.

[1]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA
[2]University of Cincinnati College of Medicine, Cincinnati, OH, USA
[3]University of Wisconsin-Milwaukee, Milwaukee, WI, USA
[4]Salem School District, Salem, WI, USA
[5]University of Alabama at Birmingham, Birmingham, AL, USA
[6]University of Wisconsin-Madison, Madison, WI, USA

Corresponding Author:
Jillian E. Austin, Division of Behavioral Medicine and Clinical Psychology, Cincinnati Children's Hospital Medical Center, 3333 Burnet Avenue, Cincinnati, OH 45229, USA.
Email: jillian.austin@cchmc.org

Individuals may perceive TCG as a safer way to achieve a "high" since it does not involve the use of illicit drugs or alcohol[7]; however, TCG can have dangerous consequences. Self-asphyxiation can result in death.[8] The Centers for Disease Control and Prevention (CDC) identified 82 probable deaths from engagement in TCG from 1995 to 2007.[9] Loss of consciousness and the resulting rapid and/or uncontrolled falling can result in head or bodily injury.[10] Although many participants quickly regain consciousness, negative complications may occur with even a brief loss of consciousness. Loss of consciousness is associated with decreased brain functioning which may lead to seizure, brain hemorrhage, stroke, short-term memory loss, permanent brain damage, and death.[6,8,11]

It is important to consider the social context of engagement in TCG. TCG can be done alone or in a group; with or without others assisting in asphyxiation.[11,12] Group engagement in TCG is more common than individual participation[11] and research suggests increased peer presence leads to increased engagement in risky behavior overall.[13-15] Although individuals are less likely to engage in TCG alone,[11] the health risks associated with engagement in TCG are greater and more dangerous when alone.[16] Individuals participating alone do not have others to help guide them to the floor when they lose consciousness, remove any devices that were used for the asphyxiation, and/or call for help, if necessary.[17]

Although group engagement in TCG is more common,[11] not all individuals exposed to TCG in group contexts personally participate.[12] Individuals who observe others participating in TCG but decline to do so themselves are referred to as "observers" for the purposes of this manuscript. Little information exists about observers and any potential differences between those who observe and resist participation and those who choose to participate in TCG in group settings. While research generally focuses on continued engagement in risky behaviors over time,[13-15] it is possible that observers who resist participation in TCG may be less likely than those that do participate to engage in risky behaviors in other contexts.

Of all controlled substances, adolescents and emerging adults most frequently use alcohol.[18] Twenty-nine percent of high school seniors and 66% of emerging adults ages 19 to 28 reported consuming at least one alcoholic beverage in the past 30 days.[18,19] Thirty-one percent of emerging adults report having binge drank in the past 30 days.[19] Alcohol use is associated with disruptions in social, academic, and occupational functioning.[20-22] In college-aged students, those who engage in binge drinking report increased loneliness, increased depression, and poorer academic performance.[23-25] Individuals reporting increased alcohol use also cited various psychosocial factors such as peer and family influences associated with their increased use.[26] As with TCG, alcohol use often occurs in a social context, especially among emerging adults.[27] Risky drinking behaviors outside of a social context (ie, drinking alone or individually) heightens the risk of suicidality.[28] Furthermore, individuals using alcohol often experience legal repercussions and a variety of negative behaviors that increase risk of further physical harm, such as risky sexual behavior and driving while intoxicated.[24,29] A dose-response relationship has been found between alcohol consumption and overall mortality indicating higher alcohol consumption is more problematic, even when consumed in smaller amounts than what is typically considered "harmful."[30]

Current literature has explored ways to detect adolescent engagement in TCG,[6] prevalence and awareness of TCG,[12] consequences of TCG,[9] and prevention of TCG.[31] However, the relationship between engagement in TCG during adolescence and later risky alcohol use remains unclear. Understanding the relationship between TCG and alcohol use during the transitional time period between adolescence and emerging adulthood may identify opportunities for further understanding of risky behaviors over time and targeted preventive interventions.

The purpose of this study was to investigate the relationship between prior knowledge of and engagement in TCG and current problematic drinking behaviors in emerging adulthood. Three hypotheses were considered. First, we hypothesized that emerging adults who reported previous participation in TCG would report greater current problematic drinking behaviors. Second, we hypothesized that emerging adults who reported participation in TCG alone would be more likely to report problematic drinking behaviors than those who only participated in a group. Finally, we hypothesized that observers to TCG would be less likely to report problematic drinking behaviors than those who participated.

Methods

Participants

Data from 1193 emerging adults between the ages of 18 and 25 years old ($M = 21.68$, SD = 1.81) were collected over 16 months from 2016 to 2017. Participants were primarily female (56%), Caucasian (78%), and single/never married (92%). Participants had, on average, some college education ($M = 14.38$ years, SD = 1.82) and a

Table 1. Participant Demographic Information.

Variable	Total (N = 1193)	Did not engage in TCG (n = 1147)	Engaged in TCG (n = 46)
Age	*M* = 21.68 (SD = 1.81)	*M* = 21.65 (SD = 1.80)	*M* = 22.30 (SD = 1.86)
Gender			
Female	658 (56%)	639 (56%)	19 (43%)
Male	515 (44%)	490 (43%)	25 (57%)
Race/ethnicity			
African-American/Black	74 (6%)	65 (6%)	9 (20%)
Asian	40 (3%)	40 (3%)	0 (0%)
Caucasian/White	929 (78%)	902 (79%)	27 (60%)
Latinx	61 (5%)	59 (5%)	2 (4%)
Multiracial	62 (5%)	58 (5%)	4 (9%)
Native American	9 (1%)	6 (<1%)	3 (7%)
Pacific Islander	4 (<1%)	4 (<1%)	0 (0%)
Other	9 (1%)	9 (1%)	0 (0%)
Not reported	5 (<1%)	4 (<1%)	1 (2%)
Marital status			
Single, never married	1098 (92%)	1058 (92%)	40 (87%)
Married	83 (7%)	77 (7%)	6 (13%)
Divorced, separated, or widowed	9 (1%)	9 (1%)	0 (0%)
Education level			
<12 years	37 (3%)	34 (3%)	3 (6%)
12 years—High school graduate	168 (14%)	163 (14%)	5 (11%)
13-15 years—Some college	661 (55%)	643 (56%)	18 (39%)
16 years—College degree	233 (20%)	223 (19%)	10 (22%)
>16 years	94 (8%)	84 (7%)	10 (22%)
Average (in years)	*M* = 14.38 (SD = 1.82)	*M* = 14.36 (SD = 1.80)	*M* = 14.89 (SD = 2.15)
Student status			
Non-student	408 (34%)	387 (34%)	21 (46%)
High school student	33 (3%)	29 (3%)	4 (9%)
Part-time college student	91 (8%)	85 (7%)	6 (13%)
Full-time college student	659 (55%)	644 (56%)	15 (33%)

Some percentages do not sum to 100 due to rounding error.

slight majority of participants were full-time college students (56%). See Table 1 for full demographic data.

Procedures

As part of a larger study, participants were recruited by undergraduate and graduate students in an upper level psychology course at a large Midwestern university to complete an online survey via SurveyMonkey. Students could recruit participants from anywhere within the United States. Students received credit for their recruitment effort rather than for obtaining completed surveys to avoid participant coercion to complete the study. All students received training in the ethical conduct of research prior to recruitment. Upon entering the SurveyMonkey website, participants provided informed consent and confirmed their age and eligibility.

Measures

Demographic information. Participants provided their age, gender, race/ethnicity, years of education, and marital status.

The Choking Game (TCG) questions. Following a brief description of TCG, participants answered a series of questions about their knowledge of, familiarity with, and engagement in TCG during adolescence. Survey questions were developed after discussion and through consensus among a team of researchers familiar with existing research on TCG. See Table 2 for the full TCG survey.

Alcohol use disorders identification test (AUDIT).[32] The AUDIT is a 10-item self-report measure assessing

Table 2. The Choking Game Survey Questions.

Survey question	n (%)
1. Have you heard of TCG before this survey?	
Yes	740 (62)
No	453 (38)
2. Do you know someone who has done it?	
Yes	243 (20)
No	946 (80)
3. Have you watched someone else do it?	
Yes	117 (10)
No	1070 (90)
4. Do you know someone who has done it alone?	
Yes	67 (6)
No	1123 (94)
5. Have you done it?	
Yes	46 (4)
No	1147 (96)
How many times?	
1 time	9 (35)
2-5 times	13 (50)
>5 times	4 (15)
6. If you have done it, how have you done it? (select all that apply)	
Hyperventilated then had someone push on chest	25 (57)
Choked by arm or hand (sleeper hold)	9 (20)
Choked with an object (scarf or belt)	3 (7)
Placed a plastic bag over your head	0 (0)
Multiple techniques	6 (14)
7. Have you witnessed anyone having a seizure while doing it?	
Yes	8 (19)
No	34 (81)
8. If you have ever done TCG, what grade were you in the first time?	
High school	17 (40)
Middle school	20 (47)
Elementary school	6 (14)
9. If you have done TCG before, how did you first learn how to do it?	
Friend(s)	31 (70)
Internet	2 (5)
Television	1 (2)
Family (parent/sibling)	9 (20)
Book/magazine	1 (2)
10. Have you done it alone?	
Yes	10 (22)
No	36 (78)
11. If you have done it alone, did you do it in a group first?	
Did it in a group first	3 (37)
Did it alone first	5 (63)

Some participants did not answer each question, thus missing data was excluded; some percentages may not sum to 100 due to rounding error.

current alcohol intake, dependence, and social and interpersonal consequences of alcohol use over the past year. The AUDIT has adequate sensitivity (81%) and specificity (95%) and is recommended for detecting early-stage alcohol use problems.[31] All question on the AUDIT are scored from 0 to 4. Eight items had 5 response options and 2 items had 3 response options (0, 2, and 4). Total scores of 8 or higher indicate *harmful*

alcohol use. In the current study, higher drinking levels, although not necessarily harmful as defined by the AUDIT, are referred to as more *problematic*.

Statistical Analyses

Descriptive statistics were used to characterize demographics of the sample. Participants who reported first engaging in TCG after the completion of high school were excluded from analyses regarding TCG participation because the sample of interest included individuals who engaged in TCG during or before adolescence. Chi-Square tests and independent sample *t*-tests were used to examine demographic and group differences based on familiarity with TCG (yes/no), participation in TCG (yes/no), and observation without active participation in TCG (yes/no). A one-way ANOVA with Scheffé's post hoc tests was used to compare AUDIT scores of those who had never participated in TCG, those who participated in TCG in a group only, and those who participated alone.

Results

Descriptive Statistics

There were no significant demographic differences between those who engaged in TCG and those who did not based on gender, marital status, education level, or student status (student or non-student; all $P > .05$). There was a small, but significant demographic difference by age, $t(1169) = -2.15$, $P < .05$, such that those who reported engaging in TCG were currently older ($M = 22.30$; SD = 1.86) than those who reported not engaging in TCG ($M = 21.65$; SD = 1.80). There was also a significant demographic difference by race/ethnicity, $\phi = -.087$, $P < .01$. Table 1 shows a significantly higher percentage of the non-White/Caucasian individuals in the sample engaged in TCG (7%) compared to White/Caucasian participants (3%). Native American participants had the highest prevalence of engagement in TCG within their demographic group (n = 3, 33%), followed by 12% of African-American/Black participants (n = 9), 6% of multiracial participants (n = 4), 3% of Latinx/Hispanic participants (n = 2), and 3% of Caucasian/White participants (n = 27). No Asian (n = 40) or Pacific Islander (n = 4) participants reported engaging in TCG.

Descriptive statistics for the following results are summarized in Table 2. Most emerging adults reported previously hearing of TCG (62%). Twenty percent of all participants reported knowing someone who engaged in TCG whether alone or in a group, with 6% of the total sample reporting knowing someone who engaged in TCG alone. Ten percent reported watching someone else engage in TCG. Of those who reported witnessing someone engage in TCG, 67% resisted participation themselves.

Table 2 shows only 4% of the total sample endorsed personal experience engaging in TCG. Participants were most likely to first participate in TCG during middle school (47%); however, others first participated in elementary school (14%) or high school (40%). There was a range of previous experiences engaging in TCG. Of those who could recall how many times they had participated (n = 26), 35% reported engaging in TCG only once. However, half reported engaging in TCG 2 to 5 times (50%) and 15% reported engaging in TCG more than 5 times. Seventy-eight percent of those who participated in TCG did so only in a group setting while 22% reported doing it alone. Of those who had engaged in TCG alone, 37% reportedly first engaged in TCG in a group and then did it alone and 63% reported first engaging in TCG alone. Most participants engaged in TCG by first hyperventilating and having someone push on their chest (57%). Some were choked with an arm or hands (eg, sleeper hold; 20%), used an object (eg, scarf or belt; 7%), or implemented multiple techniques (14%).

Overall, the average AUDIT score for the full sample fell below the clinical cutoff (8) of harmful alcohol use ($M = 6.32$, SD = 5.48). In the current sample, 34% reported AUDIT scores of 8 or greater, indicating harmful drinking behaviors.

Figure 1 shows results of the primary and exploratory analyses comparing groups and subgroups on their AUDIT scores of alcohol use and patterns. There was a significant difference between the total AUDIT score of emerging adults who had never participated in TCG ($M = 6.13$, SD = 5.25), emerging adults who had participated in TCG, but only in a group ($M = 10.85$, SD = 7.50), and emerging adults who had participated in TCG alone ($M = 15.20$, SD = 12.72), $F(2,857) = 16.48$, $P < .001$. Scheffé's post-hoc analyses showed the total AUDIT scores of emerging adults who had never participated in TCG were significantly lower than individuals who had participated in TCG either alone or in a group ($P < .001$; see Figure 1). However, there was no significant difference between AUDIT scores of emerging adults who had only engaged in TCG in a group and those who had engaged in TCG alone.

To address the third hypothesis, respondents present during TCG activities were split in to 2 groups, those who resisted participation and those who participated. Current problematic drinking behaviors were significantly lower for observers who resisted participation ($M = 7.18$, SD = 6.67) compared to those who participated ($M = 11.55$, SD = 8.43), $t(85) = -2.66$, $P < .01$ (See Figure 1).

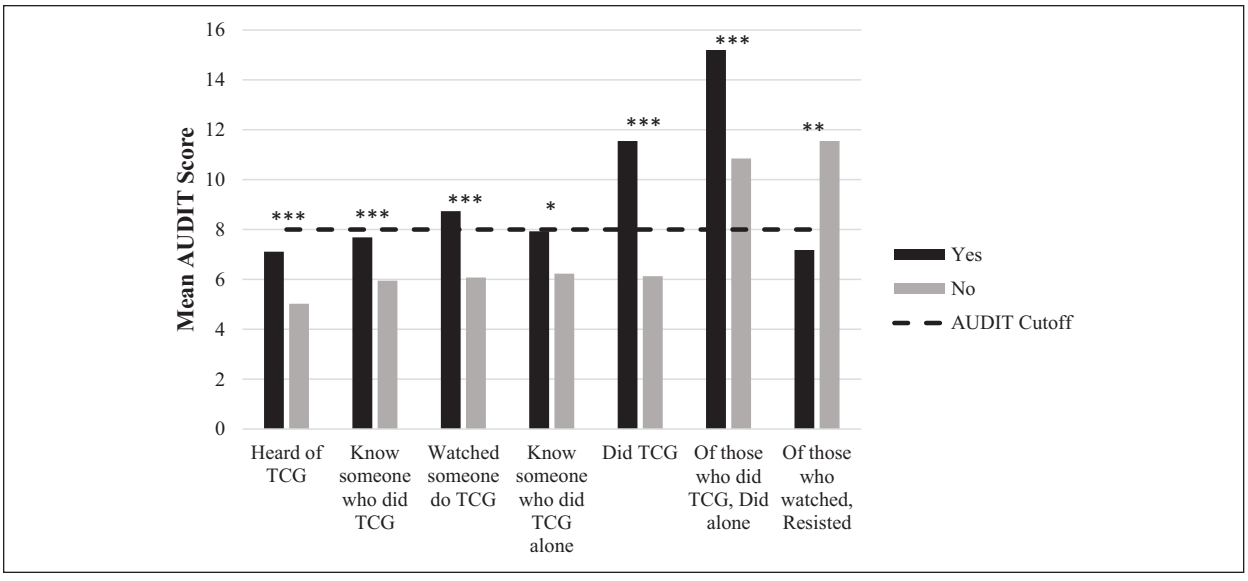

Figure 1. Mean AUDIT Scores by comparison group.
Scores above dashed line indicate harmful levels of alcohol use (*$P > .05$, **$P < .01$, ***$P < .001$).

Although not part of the study's original hypotheses, exploratory analyses were conducted to examine the social context in which TCG occurs to identify potential group variances in current drinking behaviors with increasing adolescent familiarity with TCG. Current problematic drinking behaviors were significantly greater for individuals who had heard of TCG ($M = 7.11$, $SD = 5.61$) compared to those who had not heard of TCG ($M = 5.02$, $SD = 5.00$), $t(863) = 5.53$, $P < .001$; for those that knew someone who engaged in TCG ($M = 7.68$, $SD = 6.33$) compared to those who did not ($M = 5.95$, $SD = 5.16$), $t(860) = 3.89$, $P < .001$; for those who had watched someone engage in TCG ($M = 8.73$, $SD = 7.32$) compared to those who had not ($M = 6.07$, $SD = 5.20$), $t(857) = 4.24$, $P < .001$; and for those who knew someone who engaged in TCG alone ($M = 7.93$, $SD = 6.80$) compared to those who did not know someone who engaged in TCG alone ($M = 6.23$, $SD = 5.36$), $t(860) = 2.23$, $P < .05$.

Discussion

The present study investigated the association between self-reported experience with TCG in childhood or adolescence and current problematic drinking behaviors during emerging adulthood. Emerging adults who previously participated in TCG endorsed significantly greater current problematic drinking behaviors than those who never participated in TCG, although no significant differences were found between those who had participated in TCG alone versus only in a group. Further, individuals who observed others engage in TCG but did not personally participate (ie, observers) reported significantly fewer problematic drinking behaviors in emerging adulthood than those who actively participated in TCG. Taken together, results suggest that the emerging adults who engaged in TCG during adolescence, as well as those exposed to TCG even if they did not personally participate, may be at higher risk for problematic drinking behaviors during emerging adulthood.

Although primarily investigating associations between adolescent engagement in TCG and later risk for problematic drinking behaviors in emerging adulthood, this study uncovered additional trends of interest related to greater familiarity with TCG. For this study, familiarity with TCG includes knowledge of TCG, knowledge of specific peers engaging in TCG, and direct observation of TCG. Those who previously heard of TCG and personally knew someone who had engaged in TCG in adolescence reported significantly greater problematic drinking behavior in emerging adulthood than their counterparts (ie, individuals who had not heard of TCG and did not know someone who had engaged in TCG). Participants who previously watched someone engage in TCG (regardless of their personal participation) endorsed greater problematic drinking behaviors in emerging adulthood than those who had simply heard of TCG or knew someone who engaged in TCG. In fact, the group of participants who watched someone engage in TCG was the only one of these socially familiar groups whose average current drinking behaviors fell within the harmful range. These results suggest individuals with increasingly closer social familiarity with TCG during adolescence are at a greater

risk for problematic drinking behaviors in emerging adulthood, but physically being present when others engaged in TCG carries the highest risk for harmful drinking.

Similar to previous research,[3] engagement in one risky behavior (ie, TCG) correlated with subsequent engagement in another risky behavior (ie, problematic drinking). The reasons for this association are likely multifaceted, but there is ample evidence in the current literature for a range of social-environmental, familial, and intraindividual determinants of risk-taking that may influence all risk-taking outcomes.[26] The present study highlights possible social and intraindividual determinants of adolescent engagement in TCG and problematic drinking behaviors in emerging adulthood.

Adolescence is a period where there is a natural shift toward spending more time with peers and less time with family[13]; thus, social groups significantly impact adolescent development. Consistent with previous research,[11,12] an overwhelming majority of participants in the sample heard of or became familiar with TCG from and through their friends and participated in TCG as a "social activity" (ie, they participated in a group setting). The most common technique to achieve asphyxia by participants in this study required another person to provide aid (eg, someone else pushed on their chest) to achieve loss of consciousness. That is, participants gained access to knowledge about TCG and were provided with the means to engage in TCG due to their group membership.

The salience of social influences on risk-taking could, in part, be due to knowledge/access, peer influence, and/or individual desire to conform.[33] When social context dictates close proximity to risky activities, individuals susceptible to peer influence or conformity in one setting could be more susceptible to similar social forces later in life and across a variety of activities. For example, those susceptible to peer influence on engagement in TCG during adolescence may be more susceptible to peer influence on risky or problematic drinking in emerging adulthood. Although the current study suggests engagement in TCG during adolescence correlates with knowledge/access to TCG, more research is needed to understand any potential casual relationships between social influences and engagement in risky behaviors over time.

Intraindividual determinants in the present sample also likely played a role in risk-taking. A subset of participants were around TCG but declined to participate. These observers reported greater problematic drinking behaviors than those not exposed to TCG directly, but significantly fewer problematic drinking behaviors in emerging adulthood than those who participated. These results suggest that individuals who resisted social engagement in TCG during adolescence may find that those skills somewhat protect against future problematic drinking behaviors. These results are consistent with the literature on resistance to peer influence and other personal characteristics that serve as protective factors from engagement in risky behaviors.[18,32,34] Given that problematic drinking is often associated with and predicted by high-risk behaviors in adolescence,[35] it is possible those less likely to engage in TCG may have also been less likely to engage in risky drinking during emerging adulthood, or shown some constraint across various types of risky behavior.[36] Further research is needed on personal characteristics that may make adolescents more likely to resist participation in risky behaviors, such as TCG, when confronted with these social contexts and pressures.

In particular, better understanding of observers could inform the development of effective prevention-focused interventions to coach adolescents on how to resist participation in TCG, as well as other risky behaviors. These interventions should focus on teaching adolescents coping strategies to address the escalating familiarity with riskier peers, target assertiveness to minimize the impact of peer influence, or enhance self-confidence to prevent the desire for conformity. Intraindividual characteristics may increase resistance to participation in TCG during adolescence. Future research should implement qualitative research methods to allow participants to fully explain their experiences resisting, witnessing, and/or participating in TCG and further identify differences that exist between participators and observers. Such information could aid in the development of preventative interventions that aim to reduce the likelihood of individuals transitioning from observers to active participants. Although coping strategies would ideally be taught prior to adolescent engagement in TCG, those identified individuals who have engaged in TCG could also be targeted for similar interventions to help prevent future problematic drinking or other risky behaviors in emerging adulthood.[37]

Similarly, intraindividual determinants likely impact engagement in TCG outside of a social context (ie, engagement in TCG alone). Solo engagement heightens the risk of immediate and long-term adverse outcomes.[16] Those who previously participated in TCG alone tended to report greater problematic drinking behavior than those who participated only in a group. However, solitary engagement in the current sample was rare. A statistical difference was not found, possibly due to low power from such a small number of participants endorsing individual engagement in TCG. Further research should investigate those who engage in TCG alone as similar lines of research on alcohol consumption suggest solo drinking puts individuals at a higher risk for depression and later substance abuse.[28,35,38]

Limitations

Findings should be considered within the context of the study's limitations. Despite the large sample size, participant demographics were homogenous, limiting generalization of these findings to a more diverse population. Future research should target a more diverse sample to determine if similar associations are found in the greater population.

An association between TCG and problematic drinking behavior was found, but the causal nature of this relationship remains unclear and potential confounding variables were not investigated. Additionally, this study relied on emerging adults' retrospective reports of TCG involvement. A longitudinal study may assist with understanding the course of youth participation in risky behaviors and how those behaviors change through emerging adulthood. Previous research has determined there is overlap between adolescent engagement in TCG and adolescent substance use.[2] Future work will be needed to determine clear directionality between TCG and harmful alcohol use, the potential risk of engagement in TCG while intoxicated, and the likelihood that engagement in any risky behavior is associated with increased incidence of other risky behaviors.

Implications and Contribution

Adolescent familiarity with and engagement in TCG was related to emerging adult problematic drinking behaviors. Results highlight the salience of social influences on risk-taking and potential protective mechanisms exhibited by observers of TCG, who did not personally participate. The results can inform prevention efforts for self-asphyxial and problematic drinking behaviors.

Author Contributions

JEA: contributed to design; contributed to analysis and interpretation; drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring itegrity and accuracy. ALC: contributed to design; contributed to analysis and interpretation; drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring itegrity and accuracy; AMN: contributed to conception and design; contributed to acquisition, analysis, and interpretation; drafted manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring itegrity and accuracy. ALW: contributed to interpretation; drafted manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring itegrity and accuracy. DCS: contributed to interpretation; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring itegrity and accuracy. BBB: contributed to interpretation; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring itegrity and accuracy. WHD: contributed to conception and design; contributed to acquisition, analysis, and interpretation; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring itegrity and accuracy.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iD

Jillian E. Austin https://orcid.org/0000-0001-7894-6566

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