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Jello Shot Consumption among Underage Youths in the United States

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Abstract

We sought, for the first time, to identify the extent of jello shot consumption among underage youth. We conducted a study among a national sample of 1,031 youth, aged 13 to 20, using a pre-recruited internet panel maintained by GfK Knowledge Networks to assess past 30-day consumption of jello shots. Nearly one-fifth of underage youth have consumed jello shots in the past 30 days and jello shots make up an average of nearly 20% of their overall alcohol intake. Jello shot users in our sample were approximately 1.5 times more likely to binge drink, consumed approximately 1.6 times as many drinks per month, and were 1.7 times more likely to have been in a physical fight related to their alcohol use as drinkers in general. Ascertainment of jello shot use should become a standard part of youth alcohol surveillance and states should consider banning the sale of these products.

Keywords

adolescents; alcohol; binge drinking; jello shots; youth

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to disclose.

STATEMENT ON HUMAN SUBJECTS

This research was approved by the Institutional Review Board of the Boston University Medical Center.

INTRODUCTION

Alcohol use in adolescents is a serious public health problem associated with increased risk of developing chronic alcohol use disorders (Gallimberti et al, 2011). Underage drinking, and in particular binge drinking, is associated with three of the main causes of death among youth: unintentional injury, homicide, and suicide (Stansfield & Kirstein, 2007). In the United States, alcohol use among underage youth continues to be a significant public health problem, leading to 4,700 deaths each year among persons under 21 years of age (Roeber et al., 2005). Among high school students, 70% have consumed alcohol in their lifetime and nearly 22% report heavy episodic binge drinking in the past 30 days (Eaton et al., 2012). Understanding what types of alcohol youths are drinking and by what methods they are being consumed can contribute to the development of more effective interventions. Several means of alcohol delivery have been documented such as direct consumption (e.g., beer, wine, or liquor shots), combining with another beverage (e.g., mixed drinks, cocktails, energy drinks mixed with liquor), snorting alcohol vapor, “eyeballing”, or as a “jello shot” (alcohol-infused gelatin).

Despite the abundance of material about jello shots on the Internet and social media outlets, such as recipes and links to purchase jello shot supplies (Breidenbach et al, 2004; Facebook, 2008, 2013; How to Make Jello Shots, 2011; Pinterest, 2013; Sullivan, 2006; The Campus Companion Party Lab, 2011; The Jellinator, 2013) and warnings on the dangers of jello shots (Brick, 2004; Mbugua, 2008), to the best of our knowledge no national survey has ever measured jello shot consumption among underage youth. The absence of scientific literature regarding the role of jello shots in youth drinking behavior is a result of the failure to recognize jello shot consumption as a significant public health issue. This is problematic because the consumption of liquor shots has been associated with a higher risk of severe negative consequences (Usdan et al., 2008).

There are several reasons why research concerning jello shot consumption is important in understanding and addressing underage alcohol consumption. One is the evidence regarding gelatin as an effective alcohol delivery device. Studies of the ingestion of jello shots in rats have found that rats consumed ethanol voluntarily when used in jello shots, resulting in brain ethanol levels similar to those achieved by drinking ethanol alone (Peris et al., 2006). Another concern is that gelatin masks the bitter taste of alcohol, making it less apparent how much alcohol is being ingested at one time, and thus increasing the risk of overconsumption. Studies have shown that adult rats nearly doubled their intake of ethanol when it was provided to them in gelatin (Nasrallah et al., 2009). Likewise, human experiments have shown that individuals given jello shots were considerably more likely to believe they had consumed a placebo and not alcohol (Ralevski et al., 2006). These results are particularly concerning for youth because it is appealing for early experimenters of alcohol to mitigate its unpleasant taste through agents that convey a sweet flavor (Copeland et al., 2007).

Jello shots may also contribute to the initiation of alcohol use among novice drinkers through use of a recognizable, widely available, appealing product such as jello as a channel for alcohol consumption. For instance, it has been shown that when alcohol is consumed using a familiar, alluring avenue, the similarity between the beverages allows the positive

experience of the nonalcoholic beverage to carry over to the alcoholic beverage allowing for an easy transition to alcoholic beverages among novice drinkers (Copeland et al., 2007). Although jello may not be considered a beverage, this finding is particularly alarming considering the increase in popularity of jello shots among youth, including alcohol-free versions referred to as “Jelly Shots” being recommended to serve at kid parties (Planning with Kids, 2009).

To address this issue, a preliminary study of youth drinking behaviors was piloted using an Internet survey of 108 drinkers aged 16–20 (Binakonsky et al., 2011). The study found that jello shot use is prevalent among youths, and represents a substantial proportion of their alcohol intake. The prevalence of 30-day jello shot consumption was 21.4%, and among those who consumed jello shots, the percentage of alcohol consumption attributable to jello shots ranged from 1.2% to 92.6% with an average of 14.5%.

In this article, we report the results of the full administration of this survey to a national sample of underage youth, modeled after the pilot study. To the best of our knowledge, these findings provide the first national data on youth jello shot consumption. These results have important implications for alcohol surveillance and for the development of effective interventions to reduce alcohol use among underage drinkers.

METHODS

Sample

We obtained a national sample of 1,032 underage youth (ages 13 to 20) who had consumed at least one drink of alcohol in the past 30 days using a pre-recruited internet panel maintained by GfK Knowledge Networks (Palo Alto, CA). The details of this sample and the survey design are explained in detail elsewhere (Siegel et al., 2013). Briefly, an online, self-administered survey assessed each of the brands of alcohol consumed by the respondents during the past 30 days. We examined the self-consistency of the survey responses by comparing the overall number of drinks per day that each respondent reported consuming in the past 30 days to the sum of the number of drinks that individual reported consuming of each brand. We identified one major inconsistency, in which a respondent reported drinking more than 15 drinks per day of more than 20 alcohol brands. Thus, this respondent was deleted and our final data set consisted of 1,031 individuals.

GfK Knowledge Networks maintains a pre-recruited panel of approximately 50,000 adults (including young adults ages 18–20) who have agreed to be invited periodically to participate in internet-based surveys (GfK Knowledge Networks, 2012). Recruited panelists who do not have internet access are provided with a web-enabled computer and free internet access. Using this panel, GfK Knowledge Networks recruited youth ages 13–17 and young adults ages 18–20 via email to participate in our internet survey. For the 18–20 year-olds, panelists received an email invitation that did not indicate the survey was related to alcohol consumption. For the 13–17 year-olds, respondents were identified by asking adult panelists to indicate whether they had any children in this age group and if so, whether they would grant permission to GfK Knowledge Networks to survey those youth. Youths who agreed to participate in the survey were emailed a link to a secure web site where a screening

questionnaire was administered to determine if the panelist consumed alcohol in the past 30 days and was thus eligible for the survey. Those who completed the survey received a \$25 gift credited to their GfK Knowledge Networks account. The protocol was approved by the Institutional Review Board of the Boston University Medical Center. For the older youth sample (ages 18-20), the overall response rate was 43.4%. For the younger youth sample (ages 13-17), the overall response rate was 44.4%.

Youth Alcohol Brand Survey

The internet-based survey instrument inquired about past 30-day consumption of 898 major brands of alcohol within 16 different alcoholic beverage types: 306 table wines, 132 beers, 86 vodkas, 77 cordials/liqueurs, 62 flavored alcoholic beverages (FABs), 54 rums, 33 tequilas, 29 whiskeys, 27 gins, 25 scotches, 23 bourbons, 15 brandies, 10 spirits-based energy drinks, 9 cognacs, 5 low-end fortified wines, and 5 grain alcohols.

Drinks were defined based on the NIAAA definition of a “standard drink,” which is a drink size that contains 14 grams of pure alcohol (NIAAA, 2012). Thus, based on the average alcohol content of different alcoholic beverage types, we defined a drink as a 12-ounce can or bottle of beer; a 5-ounce glass of wine or champagne; 4 ounces of low-end fortified wine; an 8.5-ounce flavored alcoholic beverage; an 8-ounce alcohol energy drink; a 12-ounce wine cooler; 8.5 ounces of malt liquor 1.5 ounces of liquor (spirits or hard alcohol), whether in a mixed drink or as a shot; 2.5 ounces of cordials or liqueurs, whether in a mixed drink, a coffee drink, or consumed on their own; and 1 ounce of grain alcohol, whether in a mixed drink, punch, or as a shot.

Measures

Jello shot consumption was assessed through a series of three questions. First, we asked, “During the past 30 days, on how many days did you have at least one jello shot?” Second, for those who indicated having consumed jello shots on at least 1 day, we asked the respondents to specify the usual number of jello shots they had on a day when they consumed jello shots. Third, we asked respondents to indicate the type of alcohol that was typically used in the jello shots they consumed. We also identified the brands of alcohol consumed by participants who reported using jello-shots, although we did not ascertain the specific brand used in the jello-shots.

Jello shots are defined as an alcoholic beverage made by preparing jello in a manner that utilizes a conventional recipe, but substitutes alcohol for some of the water in the recipe. The prevalence of past 30-day jello shot consumption was defined as the proportion of respondents who reported having consumed a jello shot in the past 30 days. The total number of jello shots consumed in the past 30 days was estimated by multiplying the number of days the respondent reported consuming jello shots by the typical number of jello shots the respondent reported consuming on those days.

For each respondent, we translated the number of jello shots consumed in the past 30 days to the equivalent number of drinks of alcohol used in the jello shot (which was liquor in all cases). The amount of liquor that constitutes one standard drink is 1.5 ounces. While jello shots vary widely in the amount of liquor they contain, a review of the amounts typically

used in jello shots revealed a range of 0.5 to 1.0 ounce of liquor per jello shot (Wright, 2007). Therefore, we used 0.75 ounces as an estimate of the amount of liquor in a typical jello shot. Since this is half of the amount of liquor contained in one standard drink, we divided the number of jello shots by two to derive an estimate of the equivalent number of drinks of liquor that were consumed by drinking jello shots.

Analysis

Weighted adjustments were employed to account for deviations in selection in order to provide a sample that is representative of the overall population. A detailed description of the weighting procedures has been published (DiSogra, 2009). Briefly, Knowledge Networks computed weights to address two aspects of sampling. First, the construction, recruitment, and maintenance of the panel sample were handled using a panel base weight. Second, the recruitment of the specific sample for this study was handled using a study-specific post-stratification weight.

Knowledge Networks recruited its panel using both random-digit-dialing (RDD) and address-based sampling (ABS). The panel base weight accounted for the different selection probabilities associated with the RDD- and ABS-based samples. In addition, the panel base weight accounted for the oversampling of minority communities, nonresponse to panel recruitment, and panel attrition. These weights were created using post-stratification adjustments based on demographic distributions from the Current Population Survey (CPS) conducted by the U.S. Bureau of the Census. These weights adjusted for gender, age, race/ethnicity, education, census region, metropolitan area, and internet status.

Study-specific post-stratification weights were then computed using an iterative raking procedure starting with the panel base weight to account for survey non-response. These weights also used as a benchmark demographic distributions from the CPS. These weights also adjusted for gender, age, race/ethnicity, education, census region, metropolitan area, and internet status.

In assessing the significance of differences in the proportion of jello shot users in different demographic groups, we used the Rao-Scott chi-square test to account for the survey design weights.

RESULTS

Prevalence of Jello Shot Use

The prevalence of jello shot consumption in the past 30 days among the 1,031 underage drinkers in the study (Table 1) was 20.4% (95% confidence interval [CI]=16.6%, 24.2%). Females had a higher prevalence of jello shot consumption (23.3%; 95% CI=17.9%, 28.7%) compared to males (17.5%; 95% CI=12.2%, 22.8%), but the difference was not statistically significant. There were no significant differences in jello shot use by age, race, or region. There was a significant trend of increasing jello shot use with lower levels of household income ($P < .05$). The most significant difference in prevalence in jello shot consumption was based on an individual's access to Internet. Those without Internet access had a

prevalence of 43.3% (95% CI= 23.2%, 60.4%) compared to 18.7% for those with Internet access (95% CI= 14.9%, 22.4%).

Frequency of Jello Shot Use

Jello shot consumers within the past 30 days were significantly more likely to drink heavily compared to those who did not consume jello shots (Table 2). The average number of alcoholic beverages drunk per day for jello shot users was 3.8 compared to 3.1 for non-users ($P < .05$). Jello shot users also consumed alcohol 2.2 days more per week, on average, compared to non-users ($P < .05$). The average number of alcoholic beverages consumed per month for jello shot users was also significantly higher at 30.9 drinks per month compared to an average of 18.8 drinks per month ($P < .05$). Binge drinking, defined as consuming 5 or more alcohol drinks in a row, was significantly more common among those who consumed jello shots (73.5%) compared to non-users (48.4%).

Alcohol Related Consequences Among Jello Shot Users

Jello shot consumption was also significantly associated with an increase in engaging in physical fighting when drinking 18.7% of jello shot users reported getting into a physical fight after consuming alcohol compared to 9.5% of non-users (Table 3). The percentage of youth who reported seeking medical help for injuries that occurred during or after drinking was more than 3 times as high for jello shot users as for non-users (7.3% vs. 2.6%). There was no significant difference between jello shot users and non-users in the proportion of individuals who reported incurring an injury while drinking or as a result of drinking.

Types of Alcohol Use in Jello Shots

The most common types of alcohol reported as being used in jello shots were bourbon (40.9%; 95% CI= 30.6%, 51.3%) and vodka (37.6%; 95% CI= 27.7%, 47.4%) (Table 4). Although the survey did not specifically ask what brand of alcohol was used in the jello shots, the most common bourbon brand consumed among youths who reported using bourbon in their jello shots was Jack Daniels, and the most common vodka brands consumed among youths who reported using vodka in their jello shots were Smirnoff and Absolut.

Drink Equivalents

The average equivalent number of standard liquor drinks per month per person derived from jello shots among those who consumed jello shots was 7.8. Among those who consumed jello shots, the percentage of their total alcohol consumption attributable to jello shots ranged from 0.4% to 95%, with a mean of 19.7% and a median of 13.5%. The proportion of jello shot users who derived at least 10% of their overall alcohol consumption from jello shots was 58.3%.

DISCUSSION

To the best of our knowledge, this is the first paper to report the prevalence of jello shot consumption among underage youth based on a nationally representative sample. We found that approximately one-fifth of underage youth have consumed jello shots in the past 30 days and that for these youth, jello shots make up an average of nearly 20% of their overall

alcohol consumption in terms of the number of standard drinks consumed during the month. Furthermore, we found that youth who consume jello shots have riskier patterns of drinking and are more likely to experience adverse consequences as a result of their drinking.

These results have several important public health implications. First, we are not aware of any national survey that measures jello shot consumption among underage youth. Now that we have identified jello shots as a substantial form of youth alcohol consumption, national agencies and organizations should consider adding the ascertainment of jello shot consumption as part of their youth alcohol use surveillance systems.

Second, our results suggest that estimates of youth alcohol consumption may be too low because they do not account for jello shots as a form of alcohol consumption. We found that among some jello shot users, this form of consumption accounts for as much as 95% of their total alcohol intake. This further highlights the importance of adding jello shots to youth alcohol use surveillance.

Third, jello shot consumption appears to be associated with riskier patterns of alcohol use and increased risk of adverse consequences. Based on observed prevalence ratios, jello shot users in our sample were approximately 1.5 times more likely to binge drink, consumed approximately 1.6 times as many drinks per month, and were 1.7 times more likely to have been in a physical fight related to their alcohol use. These findings suggest that specific interventions to address the consumption of jello shots may be warranted as part of the effort to reduce risky alcohol use among youth and its adverse consequences.

These findings also have important policy implications. In June 2013, the Ohio state senate budget plan included a provision that would legalize the sale of jello shots in the state (WBNS-TV, 2013). This research suggests that such a policy could exacerbate the problem of underage drinking, given the popularity of these products among underage youth.

There are three limitations of this research. First, the response rates of 43% among 18–20 year-olds and 44% among 13–17 year-olds create the possibility of non-response bias, a form of selection bias. Based on a comparison of respondents and non-respondents, the primary concern is that both Black and lower-income youths were less likely to have responded. To reduce the potential for non-response bias, we adjusted our estimates, via post-stratification, by weighting the survey responses from Black and lower-income respondents more heavily. Even with this weighting procedure, our estimates of jello shot consumption may be biased towards White, middle- and upper-income youth. Since we found that jello shot use increases as income decreases, we may actually be underestimating the overall prevalence of jello shot use among underage youth in the population.

Second, we cannot conclude from these findings that jello shot consumption is the cause of heavier drinking among youth. It may be that youth who are heavy drinkers are more likely to engage in jello shot consumption.

Third, we did not ascertain the brands of alcohol that were used specifically in jello shots.

Despite these limitations, this research has identified jello shots as a common source of alcohol intake among underage youth that is associated with riskier drinking patterns and adverse consequences. We conclude that ascertainment of jello shot use should become a standard part of the surveillance of alcohol use among underage youth. Furthermore, several states have banned the commercial sale of jello shots (Quad-City Times, 2002). As research regarding jello shot consumption develops, this policy initiative is one that other states should consider implementing. Further research should attempt to elucidate the causal direction between jello shot consumption and risky patterns of drinking and should explore the brands used specifically in the preparation of jello shots.

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TABLE 1

Prevalence of Use in the Past 30 Days for Consumption of Jello Shots

	Prevalence (%)	95% CI (%)
Total (N=1,031)	20.4	(16.6, 24.2)
Sex		
Male (N=428)	17.5	(12.2, 22.8)
Female (N=603)	23.3	(17.9, 28.7)
Age		
13–15 (N=117)	24.8	(14.3, 35.4)
16–18 (N=461)	20.7	(15.7, 25.6)
19–20 (N=453)	19.2	(13.2, 25.2)
Race		
White, non-Hispanic (N=592)	19.2	(14.3, 24.0)
Hispanic (N=214)	26.6	(13.8, 39.4)
Black (N=126)	18.2	(10.3, 26.0)
Other (N=99)	26.4	(12.1, 40.7)
Annual household income **		
Less than \$15,000 (N=235)	29.0	(18.5, 39.6)
\$15,000–\$39,999 (N=270)	19.1	(11.6, 26.6)
\$40,000–\$99,999 (N=365)	20.1	(14.7, 25.6)
\$100,000 or more (N=161)	16.2	(7.4, 25.0)
Region (U.S. Census)		
Northeast (N=177)	23.7	(12.6, 34.9)
Midwest (N=287)	15.5	(9.4, 21.7)
South (N=327)	24.6	(17.9, 31.4)
West (N=240)	16.8	(10.0, 23.5)
Internet Access *		
Yes (N=934)	18.7	(14.9, 22.4)
No (N=97)	43.3	(26.2, 60.4)

* Differences in proportions are significant at $P < .05$ by Rao-Scott chi-square test.

** Chi-square for trend is significant at $P < .05$

TABLE 2

Comparison of Jello Shot Users and Non-users on Drinking Patterns

	Jello shot users (N=216)	Non-users (N=815)
Average number of drinks per day *	3.8	3.1
Average days per week consumed alcohol *	7.1	4.9
Average number of drinks per month *	30.9	18.8
Proportion who binge drink (%) **	73.5%	48.4%

* Differences in means are significant at $P < .05$ by two-sample t-test.

** Differences in proportions are significant at $P < .05$ by Rao-Scott chi-square test.

TABLE 3

Comparison of Jello Shot Users and Non-users in Relation to Consequences While or After Drinking

	Jello shot users (%)	Non-users (%)
Percent reported physical fighting * (N=78)	18.7	9.5
Percent reported injury (N=173)	21.0	20.3
Percent reported seeking medical help for injury * (N=33)	7.3	2.6

* Differences in proportions are significant at $P < .05$ by Rao-Scott chi-square test.

TABLE 4**Most Common Types of Alcohol Used in Jello Shots**

	Percent	95% CI
Total (N=216)		
Bourbon (N=82)	40.9	(30.6, 51.3)
Vodka (N=89)	37.6	(27.7, 47.4)
Tequila (N=17)	7.7	(2.1, 13.4)
Rum (N=9)	5.5	(1.0, 10.0)
Grain Alcohol (N=6)	2.6	(0.8, 5.0)
Cognac (N=2)	1.6	(0.0, 4.4)
Brandy (N=2)	1.4	(0.0, 3.4)
Scotch (N=1)	1.1	(0.0, 3.2)
Whiskey (N=1)	0.4	(0.0, 1.3)
Gin (N=1)	0.1	(0.0, 0.3)
Cordials and Liqueurs (N=1)	0.1	(0.0, 0.2)
Don't know (N=3)	0.9	(0.0, 2.2)
Another type not listed (N=2)	0.2	(0.0, 0.4)

* Note: proportions are weighted measurements.