Social Norming and the Reduction of Harm from Heavy Drinking

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ABSTRACT

Objective: Determine effectiveness of a social norms marketing campaign to reduce alcohol-related harms among students at Michigan State University (MSU).

Participants: Undergraduate and graduate/professional students at MSU during 2000 to 2014 academic years.

Methods: Students surveyed biennially via NCHA beginning in 2000. Respondents categorized as heavy drinkers or not based on drinking frequency, volume and binging. Used bivariate and regression analyses of alcohol-related harms, prevalence of heavy drinking, and protective behaviors use across time. Because of question differences between NCHA I and NCHA II, primarily focuses on data from 2000 to 2008.

Results: Heavy drinking declined, protective behavior use increased among those drinking larger number of drinks, and alcohol-related harms among drinkers declined. Heavy drinker status and use of protective behaviors were most powerful predictors of harm experienced.

Conclusions: The social norming campaign reduced heavy drinking and increased use of protective behaviors, resulting in a robust reduction of adverse outcomes from alcohol consumption.

KEYWORDS: alcohol, high-risk drinking, heavy drinking, college students, social norms, misperception, harm-reduction, protective behaviors

INTRODUCTION

Recently, Hembroff et al.[1] reported a detailed evaluation of the effectiveness of a 13-year long social norming campaign to reduce the harmful effects of heavy alcohol consumption at Michigan State University (MSU). While virtually all the results were as the social norms approach would predict, the general impact on alcohol-related harms received limited attention. This paper assesses the campaign's effect on a broader set of alcohol-related harms to gauge the robustness of its impact.

The social norms marketing approach has been used in a variety of contexts to alter problematic behaviors that are believed to occur at least in part as a consequence of misperceived norms. Behavior change occurs by correcting the misperception that leads some individuals to engage in non-normal behavior because they believe it to be normal.

The approach has often been used to change health-related behaviors, especially alcohol consumption among college students. In the late 1990's and early 2000's, Wechsler and associates [2-5] documented and decried widespread patterns of heavy consumption or binge drinking among college students, at least partly out of concern for the harms associated with alcohol consumption. In response, many colleges and universities launched efforts to reduce problematic drinking among their students through various approaches[6], e.g., alcohol education, fear-based approaches, heightened enforcement, environmental management, social norming, etc.[7-11] A number of those applying a social norming approach who attempted to evaluate the effectiveness of their campaigns found generally positive results[12, 9], but others also reported negative results[13]. However, the assessment of the impact on harms of any alcohol-related behavior change has been limited.

Perkins[14] identified three categories of harm that result from heavy consumption: harm to self, harm to others, and institutional costs and damage. He listed specific harms within each that research has indicated are associated with heavy alcohol consumption. H**arm to self** includes academic impairment, blackouts, personal injuries, physical illnesses, unintended and unprotected sexual activity, suicide, sexual coercion and acquaintance rape victimization, impaired driving, legal repercussions, and impaired athletic performance. H**arm to others** includes fights and interpersonal violence, sexual violence, and other potential disturbances, property damage, and vandalism of personal or commercial property. **Harm to the institution** includes property damage, vandalism of campus property, failure and dropout rates, attrition, lost tuition revenue, loss to academic rigor and reputation, strains in 'town and gown' relations, administrative stress and personnel time needed for coping, counseling efforts, and social control efforts, and legal costs.

Hembroff et al. [1] reported evidence that the campaign at MSU had successfully altered perceptions about how much typical students drink, and reduced the amount students drink, the frequency of their drinking, and the frequency of their intense drinking across the 13 years of the effort. The report demonstrated that the campaign had also successfully increased students' uses of several key protective behaviors to mitigate the risk of harm from drinking. Additionally, the report demonstrated a substantial decrease in the prevalence of adverse impacts of drinking on academic performance.

However, the primary goal of the SN campaign at MSU has been harm reduction. While the results reported did strongly suggest the campaign was working, its effectiveness reducing alcohol-related harm received only brief attentions because of space constraints. In this report,

the social norming campaign's impact on harms to self and harms to others will be assessed. No data are available with which to explore the campaign's impact on harm to the institution.

The risk of harm from alcohol is greater among those who drink more and more often. Some adverse outcomes might be expected from a one-time bout or occasional episodes of substantial drinking (e.g., an auto accident, an injury, a bad sexual decision); however, it is likely that a respondent's general health would only be affected if the drinking were frequent, substantial, and sustained over a lengthy period of time, i.e., chronic heavy drinking. Since typical college students could have been drinking relatively few years, it is reasonable to expect heavy drinking among college students only to increase injuries and reduce resistance to easily communicable diseases.

Based on Perkins' review[14], a decrease in heavy drinking as a result of the social norms marketing campaign at MSU should have led to a decline in reported injuries to self, involvement in fights, blackouts or not remembering where one had been or what one did, personal illnesses including sleep problems, unprotected sex, attempted suicide, driving while impaired, trouble with the police, and injuries to others.

To assess the campaign's impact on the variety of harms, it is necessary to identify which drinkers are heavy drinkers. If heavy drinkers are more likely to experience various kinds of harm compared to other drinkers or non-drinkers, then the campaign can be deemed successful if the prevalence of heavy drinking declines over time.

However, the campaign tried to reduce harm by reducing consumption and by increasing the use of protective behaviors. While some protective behaviors may moderate consumption (e.g., setting a limit ahead of time), other protective behaviors (e.g., arranging a designated driver) are designed to protect against harm (i.e., car accidents) while allowing consumption to

remain high. The overall goal was to reduce harm but there were two paths through which to achieve that end. Notably, the most powerful protective behavior against the risk of harm from alcohol is to drink little. Consequently, the need to use multiple other protective behaviors is greater among those who drink more.

Hembroff et al.[1] provide a detailed overview of the amount and variety of media used for disseminating social norms messages in the campaign. Many of the messages were aimed at moderating the amount or frequency of drinking which might lead to a reduction in heavy drinking; however, the campaign also disseminated numerous messages about using protective behaviors. If effective, the messages regarding protective behaviors should have increased their use over time and their increased use should have reduced the likelihood of harm even if drinking levels remained constant. If greater use of protective behaviors is associated with less harm and the mean number of protective behaviors respondents report should increase more among those who drink more, the campaign will also be considered effective.

METHODS

Data to evaluate the harm reduction impact of the campaign at MSU came from biennial administrations of the National College Health Assessment (NCHA)[15] from 2000 to 2014. The 2000 survey served as a pre-campaign baseline since the campaign did not begin until 2001. The surveys were administered to probability samples of MSU undergraduates and graduate/professional students during the same late-February to early-March time period each year it was conducted.

The NCHA was administered as a mail survey in 2000 and 2002 then as a web survey thereafter. ACHA significantly revised the NCHA questionnaire in 2008 but MSU did not switch to NCHA version II until 2010.

Sample sizes ranged from 736 (2000) to 1,666 (2008) with an average of 1,217. Response rates to the NCHA declined gradually from the 50-65% range in the early years to the mid-20% in 2014. Nevertheless, the sample profiles remained close approximations of the student body profile with respect to sex, class, residence, Greek organization membership and race/ethnicity.

Each of the NCHA surveys was reviewed and approved for administration by MSU's institutional review board. Each of the NCHA data files was weighted to match the student body demographic profile for the semester in which it was administered. All analyses were completed on the weighted data sets using SPSS 25.0.

Measures: Heavy Drinking. The NCHA questionnaires contains three questions focused on very recent drinking: the number of drinks consumed the last time the respondents partied or socialized, the number of days they drank alcohol in the previous month, and the number of times they drank five or more drinks in the past two weeks.

Responses to these three were combined to construct a "heavy drinking" variable. If respondents reported drinking six or more days in the past month and reported drinking eight or more drinks the last time they partied or socialized or reported drinking five or more drinks three or more times in the previous two weeks, the respondents were classified as "heavy drinkers." [i]

Examining the statistical relationship of this constructed variable to demographic variables on which there are known alcohol consumption differences, e.g., sex, race/ethnicity, undergraduate/graduate status, and the use of protective behaviors provides a way to evaluate the

validity of this heavy drinker index. Perkins[14] reported that heavy alcohol consumption is associated with greater harm to self, to others and to institutions. If the 'heavy drinker' indicator constructed is valid, then those classified as heavy drinkers should be more likely than others to report that their academic performance was adversely affected by consumption, and that they had experienced more of the harms to self or caused more harms to others.

Measures: Harms. The NCHA questionnaire included a question regarding sleep difficulties, suicidal thoughts, a battery on various health problems, and two batteries of questions specifically focused on alcohol-related harms: one regarding adverse academic impact and the other regarding physical, mental, social, or legal harms either experienced by or caused by the respondent.

Academic. A battery of questions asked respondents to indicate if and in what way each of nearly two dozen problems or circumstances affected their academic performance. Alcohol use was one of the problems listed. Hembroff et al. [1] reported significant decreases from 2000 to 2014 in the percentages of students who reported some academic harm as a result of their alcohol use. Among all students, the percentage reporting any type of academic harm from drinking fell from 10.3% in 2000 to 4.8% in 2014 (a 53% decrease), a 52% decrease in students reporting a lower grade on a project or exam, a 61% decrease in students reporting a lower grade in a course, and a 50% decrease in students reporting an incomplete or having to drop a course as a result of their alcohol use. For analysis, this was treated as a dichotomous variable: they experienced some type of academic harm (=1) or not (=0).

Sleep and Suicide**.** Both NCHA Versions I and II included a question about sleep problems, asking the respondents "on how many days of the past seven, did you get enough sleep

so that you felt rested when you woke up in the morning." This is a continuous variable ranging from 0 to 7.

The Version I and II questionnaires asked respondents how many times in the last school year they 'seriously considered suicide' in the context of a set of questions regarding emotional disturbances, but not specifically connected to drinking. Response options for this item were Never, 1-2, 3-4, 5-6 . . . 11 or more. 'Never' was recoded as 0 and each other number-of-times pair was recoded to its midpoint (e.g., 1-2 = 1.5).

Health. Both questionnaire versions asked respondents about their experiences of ill health. Twenty-two health problems were common to both versions. However, Version I asked respondents two questions about each, whether the respondents had any of these in the past school year and whether the respondents had ever been diagnosed with any of these. In contrast, Version II asked respondents whether or not they had been diagnosed or treated by a professional for any of these in the past 12 months. Consequently, even when the health problems listed were the same, the results are not directly comparable between versions since the time frames referenced differ (i.e., school year vs. 12 months vs. ever) and the criterion for an affirmative response differed (i.e., self-reported experience vs. ever diagnosed vs. diagnosed or treated by a professional). For this reason, the health data collected from 2000 through 2008 using the Version I questionnaire were chosen as the primary focus.

Using the aggregated data set for these five survey years, factor analysis (varimax rotation) was conducted on the 29 items in Version I. The analysis yielded eight factors: Factor A (had endometriosis, HIV, chlamydia, gonorrhea, pelvic inflammatory disease, tuberculosis), Factor B (had anxiety, chronic fatigue syndrome, depression, seasonal affective disorder, substance abuse), Factor C (had genital herpes, hepatitis B or C), Factor D (had bronchitis, ear

infection, mononucleosis, sinus infection, strep throat), Factor E (had anorexia, bulimia), Factor F (had allergies, asthma), Factor G (had diabetes, high blood pressure, high cholesterol), Factor H (had carpal tunnel, back pain, broken bone). Health problems in Factors B, D and H seem most likely to be impacted by heavy alcohol consumption.

Each item required only a 'yes' or 'no' response: the respondent had it or not. Therefore, for each factor, the number of items within the factor the respondent reported having experienced in the past academic year was counted. Respondents' scores on each factor could vary from 0 if they had none of the health problems up to the number of items in the factor (e.g., 6 for Factor A or 2 for Factor 5).

Physical, mental, social, legal. The questionnaires asked respondents who drink whether or not they had experienced each of seven (NCHA Version I) or nine (NCHA Version II) events as *a consequence of their drinking*. Version I asked about 'physically injured yourself,' 'physically injured another person,' 'been involved in a fight,' 'did something you later regretted,' 'forgot where you were or what you did,' 'had someone use force or threat of force to have sex with you,' and 'had unprotected sex.'

Version II did not include the item about fighting and significantly re-worded the coerced sex question, splitting it into two separate questions, 'had sex with someone without giving your consent,' and 'had sex with someone without getting their consent.' The Version II items are not comparable to the Version I items. Version II also added two new items to this 'as a consequence of your drinking' battery: 'got in trouble with the police' and 'seriously considered suicide,' but these are only available in the 2010 – 2014 data.

Importantly, Version I asked about experiences 'within the last school year' while Version II asked about the 'past 12 months,' which is roughly a quarter to a third of a year longer

time period. As a result, even for items whose wordings were otherwise the same, the results would not be expected to be directly comparable because the time periods referenced differ. Therefore, the focus of this analysis is primarily the results from 2000 through 2008.

Measures: Protective Behaviors. NCHA asks respondents how often they used each of the listed protective behaviors when they partied that academic year (or the past 12 months in NCHA II). Response options ranged from 'never' to 'always' and analysts typically report the percentage who report 'always' or 'most of the time' using the behavior. However, not 'always' using a protective behavior means the individual is not protected by that behavior sometimes and therefore is at risk. Since risk of harm is greater when consumption is greater, the focus will be on what respondents reported 'always' doing when they partied. The effect of always using several protective behaviors is assumed to mitigate risk more than does using a single protective behavior. Therefore, the number of different protective behaviors respondents reported always using when they partied was counted.

RESULTS

Heavy Drinkers. The initial task is to assess the validity of the 'heavy drinker' variable. Beyond face validity, the construct should be associated with other variables in patterns consistent with the findings of other research regarding the concept, such as its relation to demographic differences, health, harm, etc. Perkins [14] provides a review of patterns regarding these found in other research.

In the data we analyze from MSU, nearly one quarter (23.1%) of the respondents in the five surveys from 2000 to 2008 were classified as 'heavy drinkers.' Males were more likely than females to be coded as heavy drinkers (32.6% vs. 15.3%, Chi-square = 244.15, $p<.001$),

undergraduates more than graduate/professional students (26.3% vs. 9.0%, Chi-square = 148.43, p<.001), and white students more than others (26.6% vs. 11.3%, Chi-square=132.94, p<.001).

Table 1 indicates that respondents classified as heavy drinkers were significantly less likely to 'always' or 'usually' use any of the eight protective behaviors listed in the version I questionnaire.

Table 1. Percentage of Respondents Who Use (Usually or Always) Various Protective Behaviors by Heavy Drinker Status, 2000-2008

	Heavy Drinker		
Protective Behavior	Yes	No	Chi-sqr
Alternate alcohol and non-alcohol beverages	11.2%	32.1%	218.93 **
Set limit in advance number drinks	13.7%	42.3%	351.11 **
Choose not to drink	2.7%	28.0%	376.84 **
Use a designated driver	76.4%	81.9%	18.16 **
Eat before or while drinking	79.4%	82.8%	7.40 *
Have friends tell when had enough	15.9%	31.7%	121.45 **
Keep track of the number drinks drunk	43.1%	72.7%	372.08 **
Pace drinks to 1 per hour or less	4.0%	34.7%	470.98 **
Avoid drinking games	13.3%	47.6%	482.05 **
Drink an alcohol look-alike	0.8%	7.0%	75.79 **

* p < .01, ** p<.001

Respondents classified as heavy drinkers were much more likely than other students to report experiencing each of eight harms as a consequence of their drinking. Table 2 indicates that, compared to other students, heavy drinkers were 5 times more likely to experience negative academic impacts, 3.5 times more likely to injure themselves, 6 times more likely to injure someone else, 4.5 times more likely to be involved in a fight, twice as likely to do something they later regretted, 2.5 times more likely to not remember what they did or where they were, 1.5

times as likely to have someone use or threaten force to have sex with them, and 3 times more likely to have unprotected sex.

Table 2. Percentage of Respondents Who Reported Alcohol Related Harm by High-Risk Drinking Status, 2000-2008

	Heavy Drinker		
Harm	Yes	No	Chi-sqr
Academics Impaired	24.2%	4.3%	499.35 **
Injured self	45.1%	12.7%	602.33 **
Injured someone else	13.2%	2.1%	243.69 **
Involved in a fight	17.5%	3.8%	262.32 **
Did something later regretted	66.3%	31.0%	502.98 **
Could not remember what did/where	65.1%	24.4%	704.29 **
Had someone use force/threat to have sex	1.4%	0.9%	2.89 NS
Had unprotected sex	30.0%	10.0%	296.53 **

* $p < .05$, ** $p<.001$, NS=Not Significant

Table 3 compares heavy drinkers and other students regarding the numbers of health problems of various types they reported having over the previous year. Since Perkins[14] indicates that heavy alcohol consumption is associated with greater health consequences, one-tailed statistical tests are appropriate if the differences in means are in the predicted direction.

Table 3 indicates that, on average, heavy drinkers reported more of the health problems included in factors B, D, E, and H and fewer health problems included in factor G. The factor G problems include diabetes, high blood pressure, high cholesterol – largely chronic conditions – while those comprising B, D, E, and H include mental health issues (B), respiratory infections (D), eating disorders (E), and skeletal/joint problems (H). Factors B, D, and H are the factors most likely impacted by heavy alcohol consumption. The table also indicates heavy drinkers

Table 3. Differences in Mean Numbers of Problems Experienced by High-Risk Drinkers vs. Other Students, 2000-2008

Health Issues Experienced in Past Academic Year	Heavy Drinker: Yes Mean	Yes (sd)	No Mean	No (sd)	F	
Nights of Restful Sleep	3.260	1.82	3.357	1.99	2.57	NS
Factor A health problems	.024	.23	.034	.27	1.36	NS
Factor B health problems	.494	.89	.399	.78	14.36	**
Factor C health problems	.023	.17	.028	.19	.61	NS
Factor D health problems	.763	.98	.653	.91	14.53	**
Factor E health problems	.039	.23	.028	.19	3.16	*
Factor F health problems	.569	.64	.551	.65	.79	NS
Factor G health problems	.063	.27	.083	.32	4.26	*
Factor H health problems	.580	.64	.544	.63	3.43	*
Times seriously considered suicide	0.294	1.36	0.206	1.04	6.32	*

* p < .05, one-tailed, ** p<.01, NS=Not Significant

reported seriously considering suicide more times than other students, and, heavy drinkers reported fewer nights of restful sleep per week than other students although this difference did not quite reach the .05 level of significance.

Since the patterns of association between heavy drinker status and a variety of demographic, health, behavior and harm are consistent with findings related to this drinking concept in other studies, these results indicate the validity of the 'heavy drinker' classification on empirical grounds.

Table 4 indicates the prevalence of the problems in each of the health factors. Since the health problems in factors B, D, F, and H are the most common and factors B, D, and H are the

factors most likely effected by heavy alcohol consumption, reducing heavy drinking would have some positive effect on reducing common health problems.

Table 4. Prevalence of Factor-Clustered Health Problems, 2000-2008

Health Problems	% of All Students
Factor A health problems	2.3%
Factor B health problems	27.1%
Factor C health problems	2.4%
Factor D health problems	43.6%
Factor E health problems	2.6%
Factor F health problems	46.9%
Factor G health problems	6.8%
Factor H health problems	48.3%

Figure 1 shows the percentage of respondents classified as heavy drinkers for each of the survey years. The figure indicates that the prevalence of heavy drinking declined

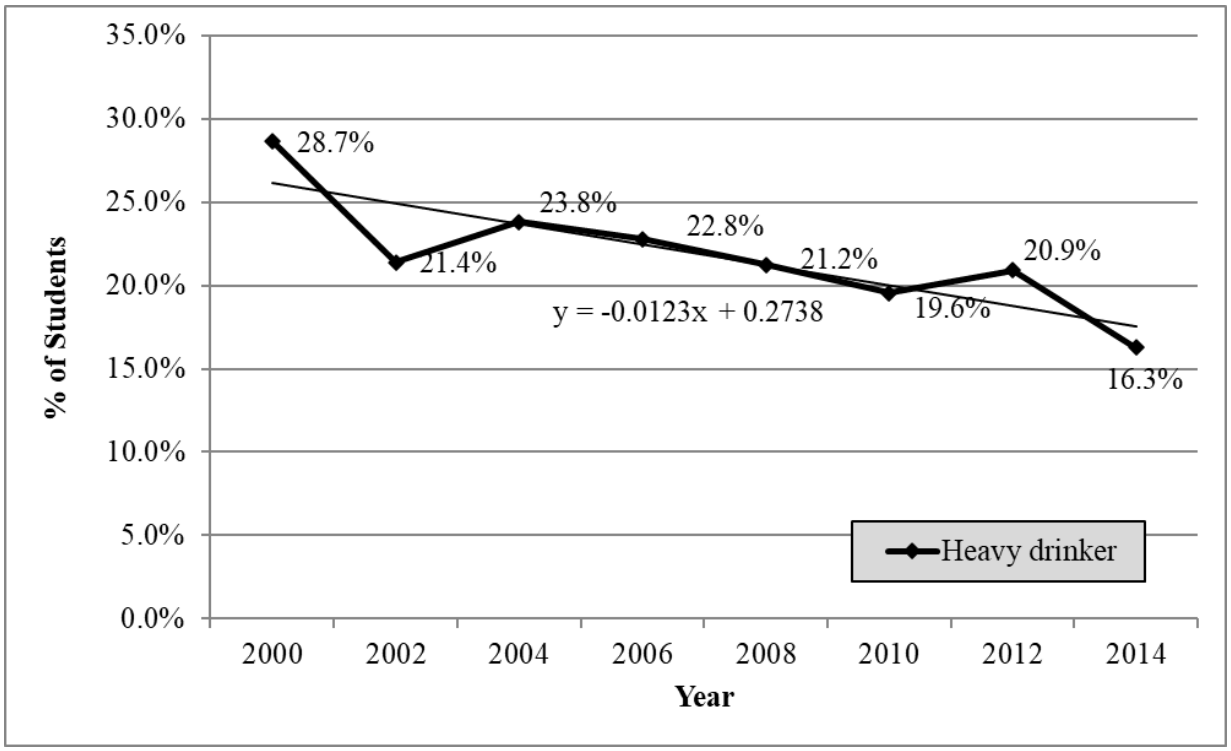

Figure 1. Percentage of Students Classified as Heavy Drinkers, by Survey Year: 2000-2014

from 28.7% in 2000 to 21.2% in 2008 and continued to decline with the on-going campaign effort to 16.3% in 2014.

Focusing primarily on the 2000 – 2008 surveys because of consistency in the harms items included, the drinking status variable (coded 1 if heavy drinker, 0 if not) has been regressed on the year in which the surveys were conducted. The logistic regression Model 1 of Table 5 below indicates that there was a significant reduction in the likelihood of heavy drinkers in the population from 2000 to 2008. Model 2 controls for the independent effects of several

TABLE 5. Logistic Regression of High-Risk Drinker Status* on Survey Year and Demographic Variables

	Model 1				Model 2			
Variables	B	Wald	Sig.	Exp(B)	B	Wald	Sig.	Exp(B)
Survey Year (2000 - 2008)	-.032	7.73	.005	.97	-.02	3.53	.060	.98
Male (=1)					1.06	237.10	.000	2.88
White (=1)					.86	67.08	.000	2.37
Member of Greek Org. (=1)					.84	56.11	.000	2.31
International Student (=1)					-.44	2.69	.101	.65
Grad Student (=1)					-1.13	82.02	.000	.32
Hours work per week					-.04	2.62	.106	.96
Constant	-1.06	284.51	.000	.35	-2.17	251.65	.000	.11
Model Chi-Square		7.71	.006			594.78	.000	
Cox-Snell R Squared		.003				.103		

* High-Risk Drinker (=1; Not=0)

demographic variables. The table indicates that sex, student status, race/ethnicity, membership in a Greek fraternity/sorority are significant predictors of heavy drinking. Being male, white, a member of a Greek organization increases the likelihood of being a heavy drinker while being a graduate student decreases the likelihood. Controlling for these, the net effect of survey year is reduced but remains significant (one-tailed) and negative. This strongly suggests that some characteristics of the demographic groups are associated with drinker status and the earlier

analyses confirmed there are heavy drinker status differences based on sex, race/ethnicity, undergraduate/graduate student status. There are similar differences based on Greek organization membership and domestic/international student status.

Table 6 shows the percentage of drinkers who reported experiencing each of the seven types of harm from alcohol listed on NCHA I for 2000 through 2008. It indicates the regression coefficient for each on survey year is negative. The decline was statistically significant for three of the types of harm – had unprotected sex, got in a fight, did something you regretted. The overall prevalence of "had forced sex" is sufficiently low that its linear coefficient is not statistically significant despite its 52% net decline from 2000 to 2008.

Table 6. Percentage of Respondents Who Reported Experiencing Harms As Result of Drinking in Academic Year, 2000-2008

	Survey Year							
	2000	2002	2004	2006	2008	Change	Trend	t
Regret what did	39.7%	35.8%	33.1%	33.6%	32.6%	-17.8%	-0.007	-3.135 *
No recall what did/where were	32.0%	30.4%	28.9%	31.6%	28.8%	-10.0%	-0.003	-1.184 NS
Injury to self	20.5%	18.0%	18.2%	19.2%	16.9%	-17.4%	-0.003	-1.585 NS
Injury to other	4.1%	5.0%	4.6%	4.7%	3.7%	-10.2%	-0.001	-1.008 NS
In a fight	7.4%	7.2%	6.4%	5.6%	5.8%	-21.4%	-0.002	-1.977 *
Had forced sex	1.8%	0.8%	0.8%	0.4%	0.8%	-52.3%	-0.001	-1.803 NS
Had unprotected sex	18.3%	13.8%	12.2%	11.3%	12.3%	-33.1%	-0.006	-3.682 *

* $p(t) < .05$

The average number of such harms that respondents (including non-drinkers) reported decreased from 1.26 in 2000 to 1.01 in 2008 (1.54 in 2000 to 1.29 in 2008 among those who had consumed alcohol in the previous month). The decline in either case is significant ($F_{4, 5778} = 4.38$; $p < .01$ among all respondents; $F_{4, 4401} = 3.36$; $p<.05$ among those who drank in the past month).

Importantly, across the 2000 to 2008 time period, respondents classified as heavy drinkers comprised 23.1% of the students but accounted for 51.4% of these types of harms reported. The percentage of respondents classified as heavy drinkers declined from 28.5% in 2000 to 21.3% in 2008, while the percentage of the harms reported by heavy drinkers declined from 59.5% of all harms in 2000 to 51.1% in 2008.

Figure 2 displays the trendlines for the mean numbers of protective behaviors used by those who had 0-4, 5-7, and 8 or more drinks the last time they partied. The slope of the trendline among those who drank 0-4 was flat (b = 0.0096) while it increased among those who drank 5-7 drinks (b = 0.0444) and increased even more among those who had 8 or more drinks (b = 0.0517). Similarly, the trendline among heavy drinkers had an increasing slope from 2000 to 2008 of 0.0715 compared to the slope of the trendline among other respondents of 0.0054. This

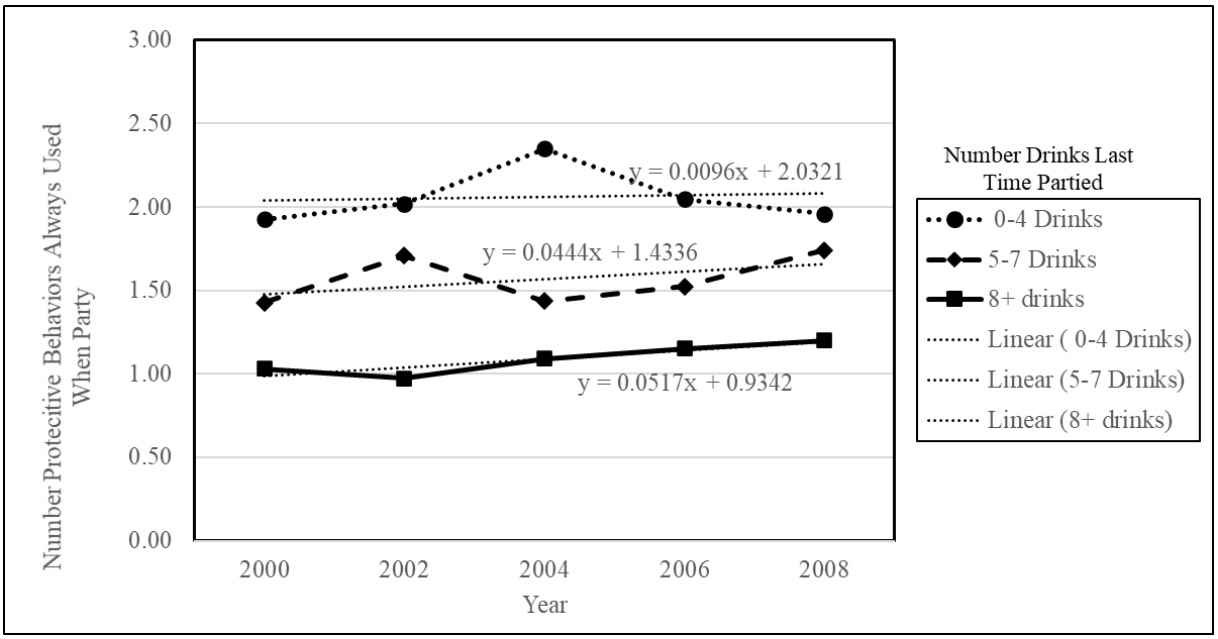

Figure 2. Mean Number Protective Behaviors Always Used When Party, by Number Drinks Last Time Partied: 2000-2008

indicates that, over the course of the social norming campaign, there was an increasing use of protective behaviors among the segments of the students who would otherwise be at greater risk of harm from drinking because of the volume and frequency of their drinking.

Finally, to determine the extent to which the decline in harms may be attributable to the campaign, the number of harms experienced has been regressed on year, heavy drinking status, numbers of protective behaviors used, and selected demographic variables in three steps. The results are shown in Table 7.

Model 1 assesses whether or not there was a gross reduction in the number of harms respondents experienced from 2000 to 2008. The table indicates that there was a significant decline ($p < .001$). Model 2 indicates that heavy drinking status is strongly positively associated with the number of harms experienced while the number of protective behaviors used was strongly negatively associated with the number of harms experienced. Controlling for these two – the primary mechanisms through which the social norming campaign's impact on harms would be manifested – reduced the effect of survey year. This indicates that these are important variables through which a reduction in harms occurred.

Model 3 adds in relevant demographic variables, some of which, after controlling for heavy drinking status and numbers of protective behaviors used, do not have significant net effects (e.g., race, international status, hours worked per week for pay). Additionally, while there was a substantial increase in the R Square of Model 2 over Model 1 (.264 vs. .002), the increase in R Square of Model 3 over Model 2 was relatively small (.285 vs. .264). This, along with the value of the beta coefficients, indicates that the most powerful predictors of the number of harms experienced was the heavy drinking status and the number of protective behaviors used – both directly targeted by the social norming campaign.

TABLE 7. Regression of Number Harms Experienced on Survey Year and Demographic Variables

	Model 1					Model 2					Model 3				
Variables	B	Std. Err.	Beta	t	Sig.	B	Std. Err.	Beta	t	Sig.	B	Std. Err.	Beta	t	Sig.
Survey Year (2000 - 2008)	-.025	.007	-.048	-3.57	.000	-.015	.006	-.028	-2.44	.015	-.011	.006	-.022	-1.91	.056
High-Risk Drinker Status (=1)						1.604	.040	.472	40.00	.000	1.517	.041	.446	36.81	.000
Number Protective Behaviors Used						-.101	.010	-.126	-10.65	.000	-.100	.009	-.124	-10.55	.000
Male (=1)											-.100	.034	-.035	-2.97	.003
White (=1)											.179	.044	.052	4.10	.000
Member of Greek Org. (=1)											.416	.061	.078	6.80	.000
International Student (=1)											-.003	.083	.000	-.03	.972
Grad Student (=1)											-.383	.048	-.105	-8.04	.000
Hours work per week											.004	.011	.004	.34	.733
Constant	51.654	14.170	.000	3.65	.000	30.559	12.178	.000	2.51	.012	23.859	12.047	.000	1.98	.048
Model F				12.74	.000				662.11	.000				246.27	.000
Model R Squared				.002					.264					.285	

COMMENTS

Limitations

Hembroff et al.[1] list a number of limitations of the data used for this study, i.e. self-reported data, a cross-sectional rather than a panel survey design, a lack of measurement of campaign exposure in the NCHA survey where key alcohol-related behaviors and harms are measured, and the lack of a true control group. This test is also confined to a specific university, thereby making the generalizability of its results limited, although the focus here was to test whether or not a campaign driven by the social norming theory worked rather than to generalize its effect size to other universities.

Another limitation concerns the 'heavy drinker' index constructed. Other efforts to construct such an index rely on the number of drinks individuals drink per day, per week or per month by asking about the number of days they drink in a month and the number of drinks they have when they drink or whether the individuals drink five or more (if male) or four or more (if female when they drink. NCHA does not include questions about the number of drinks typically consumed on days when the respondents drink and does not measure the specific number of days the respondent drank in the previous month. Neither does it ask males and females about drinking different numbers of drinks (5 vs. 4) on an occasion to assess 'binge drinking.' Consequently, the index constructed is not directly comparable to other such 'heavy drinking' indexes, but was judged valid in this context.

Conclusions

The social norms marketing campaign at MSU began in 2001. This analysis has focused primarily on data from 2000 to 2008. During this time, the average number of drinking-related

harms students experienced at MSU declined. Projected to the university's total student body of approximately 50,000 students each year, the estimated numbers of harms experienced in 2000 was 61,209 compared to an estimated 50,210 in 2008. The most powerful predictors of experiencing drinking-related harms were being a heavy drinker and using fewer protective behaviors. But over the course of the campaign, and consistent with campaign messaging, the number of protective behaviors used increased faster among those who drank more while at the same time the prevalence of heavy drinking declined. These results appear to be strong evidence that the social norming campaign was effective. Importantly, the campaign continued through 2014 and the prevalence of heavy drinking continue to decline through 2014 so the decline in harms experienced would be expected to have continued as well.

Given the variety of harms tested that were associated with heavy drinking status, from physical health to academics to sexual behavior to mental health to social relationships, it appears the effect of this social norming campaign on reducing harm was quite robust.

Any equivocation in this conclusion rests on the absence of a control group with which to verify that the trends observed in these data were unique to the campaign on this campus rather than simply mirroring a more general trend on other U.S. campuses even in the absence of social norming campaigns during this same time period. It is this lingering question that should be the focus of subsequent studies.

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Acknowledgements

The authors gratefully acknowledge the assistance of Erica Phillipich.

Declaration of Interests

The authors have received some funding for their efforts on the campaign and evaluation through the National Social Norms Center at Michigan State University from the Anheuser-Busch Foundation.

Funding for the campaign and evaluation has been provided by grants from the U.S. Department of Education (Award # S184H010081) for (2001-2003) years, the U.S. Department of Education Model Grant program (Award # Q184NO70002) in 2007, and from the Anheuser-Busch Foundation via the National Social Norms Research Center at Northern Illinois University (2002-2010), the National Social Norms Institute at the University of Virginia (2010-2014), and the National Social Norms Center at Michigan State University (2015 to present).

END NOTE

[i] This differs from other "heavy drinking" measures such as that used in the Behavioral Risk Factor Survey[16] which uses two questions (the number of days per month on which the respondent drinks any alcohol, and the number of drinks the respondent usually consumes when the respondent drinks alcohol). These are combined to calculate the average number of drinks consumed per day or per week in a month. If the respondent's calculated drinks per day or per

week is greater than a fixed number for the respondent's sex, they are classified as a "heavy drinker."