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Impact of a New Gender-Specific Definition for Binge Drinking on Prevalence Estimates for Women

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Abstract

Background—Binge drinking accounts for more than half of the 79,000 deaths due to excessive drinking in the U.S. each year. In 2006, the Behavioral Risk Factor Surveillance System (BRFSS) lowered the threshold for defining binge drinking among women from ≥ 5 drinks to ≥ 4 drinks per occasion, in accordance with national recommendations.

Purpose—To assess changes in binge-drinking prevalence among women.

Methods—The relative and absolute change in binge drinking among U.S. adult women was assessed using pooled BRFSS data from the 2 years before (2004–2005) and after (2006–2007) the implementation of the new gender-specific definition. Analyses were conducted in 2008–2009.

Results—Binge-drinking prevalence among women increased 2.6 percentage points (from 7.3% in 2004–2005 to 9.9% in 2006–2007), a 35.6% relative increase. The percentage of women who reported consuming exactly 4 drinks in 2006 (3.6%) was similar to the increase in the prevalence of binge drinking among women that was observed from 2005 to 2006 (absolute change, 2.9 percentage points).

Conclusions—The new gender-specific definition of binge drinking significantly increased the identification of women drinking at dangerous levels. The change in prevalence among women was primarily due to the change in the definition and not to actual changes in drinking behavior. The new gender-specific definition of binge drinking can increase the usefulness of this measure for public health surveillance, and support the planning and implementation of effective prevention strategies (e.g., increasing alcohol excise taxes).

Introduction

Binge drinking is responsible for over half of the estimated 79,000 deaths and two thirds of the 2.3 million years of potential life lost annually due to excessive alcohol use in the U.S.¹ It is also a risk factor for many health and social problems.² Since the Monitoring the Future

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Study³ began using a 5-drink measure for high school students in 1975, most national surveys have defined binge drinking as consuming 5 or more drinks on an occasion (or in a row) for both women and men.^{4,5} The Harvard School of Public Health College Alcohol Study used a gender-specific measure of ≥ 5 drinks for men, and ≥ 4 drinks for women, because of gender differences in the risk of alcohol-related harms at these levels.^{6–8} The use of a 4-drink threshold for defining binge drinking in women is also justified because women generally have a smaller stature than men and because of physiologic differences that affect the absorption and distribution of alcohol (e.g., women absorb alcohol more rapidly than men).⁹

Recognizing these differences, in 2004 the National Institute on Alcohol Abuse and Alcoholism (NIAAA) Advisory Council endorsed the use of a 4-drink threshold for defining binge drinking in women.¹⁰ The National Epidemiologic Survey on Alcohol and Related Conditions Survey also began using 4 drinks to define binge drinking among women that year,¹¹ and the Behavioral Risk Factor Surveillance System (BRFSS) did so in 2006. The present study assessed the impact of the new definition on BRFSS estimates of binge drinking among women, and examined whether any changes in prevalence were attributable to the new definition or to actual changes in drinking behavior of women.

Methods

Data for this study came from the 2004–2007 BRFSS (more details available at www.cdc.gov/brfss).¹² The number of respondents ranged from 303,822 in 2004 to 430,912 in 2007, and median state response rates ranged from 50.6% to 52.7%. Data analyses were conducted in 2008–2009 using SAS-callable SUDAAN. All data were weighted to produce population-based national estimates.

Current drinkers were defined as those who reported consumption of alcohol in the past 30 days. To assess binge drinking, in 2004 and 2005 current drinkers were asked: “Considering all types of alcoholic beverages, how many times during the past 30 days did you have 5 or more drinks on an occasion?” In 2006 and 2007, the definition of binge drinking varied by gender: “Considering all types of alcoholic beverages, how many times during the past 30 days did you have [5 (for men) / 4 (for women)] or more drinks on one occasion?”

To assess whether changes in binge-drinking prevalence among women were due to the adoption of a 4-drink threshold, the prevalence of binge drinking among women was compared to that of men (for whom no definition change occurred). In addition, data from another BRFSS question on the maximum number of drinks consumed by women during a drinking occasion were used to assess (1) the prevalence among women of consuming a maximum of 4 or more drinks (≥ 4) or 5 or more drinks (≥ 5) in 2005 and 2006 (before and after the new binge definition for women); and (2) the prevalence of consuming exactly 4 drinks in 2006 (when the new gender-specific binge-drinking definition was implemented).

Results

There were no significant changes in binge-drinking prevalence from 2004 to 2005, or from 2006 to 2007 among men and women (Table 1). Therefore, data were pooled for 2004–2005 and 2006–2007 and the two time periods compared. Binge-drinking prevalence for women increased from 7.3% to 9.9% (absolute increase: 2.6%; relative increase: 35.6%) during this time, while no increase was seen in binge drinking among men (Table 2).

The largest absolute increases in prevalence among women were generally among those with the highest baseline levels of binge drinking, including those aged 25–34 years, whites, those with incomes $\geq \$75,000$, college graduates, and those who were employed (Table 2).

The largest relative increases in the binge-drinking prevalence were among women aged ≥ 45 years, those with household incomes $\geq \$75,000$, and college graduates. Among women of childbearing age (18–44 years), binge prevalence increased from 11.3% to 14.5%.

Using data from the maximum number of drinks question, the percentage of women consuming ≥ 4 drinks increased slightly from 9.0% [95% CI = 8.8%, 9.3%] to 9.5% [95% CI = 9.2%, 9.8%] from 2005 to 2006. Furthermore, the percentage of women who reported consuming exactly 4 drinks in 2006 was 3.6% [95% CI = 3.4%, 3.8%], which was similar to the increase in binge-drinking prevalence observed from 2005 to 2006 (absolute change: 2.9 percentage points [95% CI = 2.7, 3.0]).

Discussion

Lowering the BRFSS threshold for defining binge drinking among women from ≥ 5 drinks to ≥ 4 drinks per occasion, in accordance with national standards,¹⁰ increased the absolute prevalence of this behavior among U.S. women by approximately 3 percentage points, which corresponded to a one-third relative prevalence increase. Given the evidence and rationale for lowering the threshold in the first place, the new binge-drinking definition improves the ability of the BRFSS to identify women drinking at levels that increase their risk and result in impairment-level blood alcohol concentrations.¹⁰ In addition, these analyses demonstrated that the increased prevalence was attributable to the change in the binge-drinking threshold.

The larger relative increases in binge-drinking prevalence following the adoption of the new definition among women in older age groups, with higher income levels, or with more education probably reflects the greater sensitivity of this definition for identifying women who were drinking just below the 5-drink threshold as well as the distribution of binge-drinking intensity (i.e., the number of drinks per binge) in these populations. For example, a recent CDC study concluded that the average number of drinks per binge was lower for women than men (6.9 vs 8.3), declined with increasing age (from 9.8 to 6.4 drinks), and was lower for college graduates (6.5 drinks) and those with a household income $\geq \$35,000$ (6.8 drinks).¹³

The current study has several limitations. BRFSS data are self-reported, and alcohol measures in particular are subject to recall bias and underestimation.¹⁴ The 2004–2007 BRFSS surveys were land-line based, and binge drinking is more common among people who exclusively use cell phones, such as those aged 18–24 years.^{15,16} The prevalence of binge drinking based on both the old and new definitions among women could not be assessed within the same year. However, indirect methods (e.g., comparison of alcohol consumption by women at the 4-drink level before and after this definitional change) strongly suggest that the increased prevalence was due to this definitional change.

These results, along with prior biological evidence of gender differences in the metabolism of alcohol,⁹ suggest that changing the operational definition of binge drinking for women from 5 to 4 drinks should be considered in other settings, such as in alcohol screening protocols in primary care settings. Evidence-based prevention strategies for binge drinking, such as increasing alcohol excise taxes,¹⁷ limiting alcohol outlet density,¹⁸ and maintaining and enforcing age-21-years minimum legal drinking-age laws^{19,20} should be widely adopted.

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Table 1

Binge-drinking prevalence among U.S. adults, BRFSS, 2004–2007

	2004 n=303,821 % (95% CI)	2005 n=356,112 % (95% CI)	2006^a n=355,710 % (95% CI)	2007^a n=430,912 % (95% CI)
Women	7.5 (7.3, 7.8)	7.1 (6.9, 7.3)	10.0 (9.7, 10.3)	9.9 (9.7, 10.2)
Men	22.7 (22.2, 23.2)	22.0 (21.5, 2.5)	20.7 (20.2, 21.2)	21.5 (21.0, 22.0)
Overall	14.8 (14.6, 15.1)	14.3 (14.0, 14.6)	15.2 (14.9, 15.5)	15.5 (15.3, 15.8)

^aIn 2006 the Behavioral Risk Surveillance System (BRFSS) changed the threshold to define binge drinking among women from consuming 5 or more drinks on an occasion to 4 or more drinks on an occasion in the last 30 days.

Table 2

Prevalence of binge drinking among women, stratified by selected sociodemographic characteristics, 2004–2007^a

Characteristic	2004–2005 ^b % (95% CI)	2006–2007 ^c % (95% CI)	Absolute difference percentage points	Relative percentage difference
All women	7.3 (7.1, 7.5)	9.9 (9.7, 10.1)	2.6 (2.3, 2.9)	35.6 (31.5, 39.7)
Age (years)				
18–24	16.8 (15.9, 17.6)	19.5 (18.5, 20.6)	2.7 (1.3, 4.1)	16.1 (7.9, 24.3)
25–34	10.7 (10.3, 11.2)	14.5 (13.9, 15.1)	3.8 (3.1, 4.5)	35.5 (28.8, 42.2)
35–44	8.4 (8.1, 8.7)	11.7 (11.3, 12.1)	3.3 (2.8, 3.8)	39.3 (33.1, 45.5)
45–64	4.7 (4.5, 5.0)	7.7 (7.5, 8.0)	3.0 (2.7, 3.3)	63.8 (56.9, 70.8)
65+	1.1 (1.0, 1.3)	2.0 (1.8, 2.2)	0.9 (0.7, 1.1)	81.8 (62.4, 101.3)
Race/ethnicity				
White, non-Hispanic	7.9 (7.7, 8.1)	10.9 (10.7, 11.1)	3.0 (2.7, 3.3)	38.0 (34.2, 41.8)
Black, non-Hispanic	5.2 (4.8, 5.7)	6.9 (6.4, 7.5)	1.7 (1.0, 2.4)	32.7 (19.2, 46.2)
Hispanic	6.1 (5.6, 6.7)	8.1 (7.5, 8.8)	2.0 (1.2, 2.8)	32.8 (19.7, 45.9)
Other ^d	8.3 (7.4, 9.3)	6.5 (5.8, 7.3)	1.8 (0.6, 3.0)	27.7 (9.2, 46.2)
Household income				
Less than \$25,000	6.8 (6.5, 7.1)	7.7 (7.4, 8.1)	0.9 (0.4, 1.4)	13.2 (5.9, 20.6)
\$25,000 to less than \$35,000	7.6 (7.1, 8.1)	9.4 (8.8, 10.0)	1.8 (1.0, 2.6)	23.7 (13.2, 34.2)
\$35,000 to less than \$50,000	7.9 (7.5, 8.4)	10.7 (10.2, 11.2)	2.8 (2.1, 3.5)	35.4 (26.6, 44.3)
\$50,000 to less than \$75,000	8.1 (7.7, 8.5)	11.3 (10.8, 11.8)	3.2 (2.5, 3.9)	39.5 (30.9, 48.1)
\$75,000 or more	8.9 (8.5, 9.4)	13.4 (13.0, 13.9)	4.5 (3.9, 5.1)	50.6 (43.8, 57.3)
Education level				
Less than high school	5.0 (4.6, 5.4)	6.2 (5.6, 6.8)	1.2 (0.5, 1.9)	24.0 (10.0, 38.0)
High school	7.0 (6.7, 7.3)	8.8 (8.5, 9.1)	1.8 (1.4, 2.2)	25.7 (20.0, 31.4)
Some college	8.5 (8.2, 8.9)	11.2 (10.8, 11.6)	2.7 (2.2, 3.2)	31.8 (25.9, 37.6)
College graduate	7.4 (7.1, 7.7)	11.1 (10.8, 11.5)	3.7 (3.2, 4.2)	50.0 (43.2, 56.8)
Employment status				
Employed	9.2 (9.0, 9.5)	12.7 (12.5, 13.0)	3.5 (3.1, 3.9)	38.0 (33.7, 42.4)
Unemployed	9.7 (8.8, 10.6)	12.2 (11.2, 13.3)	2.5 (1.2, 3.8)	25.8 (12.4, 39.2)
Not in workforce	4.5 (4.3, 4.7)	6.1 (5.8, 6.4)	1.6 (1.3, 1.9)	35.6 (28.9, 42.2)

^a CI = 95% CI;^b Binge drinking among women was defined as consuming 5 or more drinks on an occasion in the last 30 days;^c Binge drinking among women was defined as consuming 4 or more drinks on an occasion in the last 30 days;

^d Asian, American Indian/Alaska Native, Native Hawaiian/Pacific Islander, multiracial, other.