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Relationships among self-report assessments of craving in binge-drinking university students

Harold Rosenberg *, Joseph Mazzola [1]

Department of Psychology, Bowling Green State University, Bowling Green, OH 43403, USA

Abstract

To assess the relationships among self-report craving questionnaires, and between craving and alcohol consumption, we administered four previously published measures of craving (Alcohol Urge Questionnaire, Obsessive-Compulsive Drinking Scale, Penn Alcohol Craving Scale, Temptation-Restraint Inventory), five single-item Visual Analog Scales (*need, urge, craving, desire, compulsion*), and measures of alcohol consumption and drinking consequences to 112 university students attending a large, public state university who reported at least two binge-drinking episodes (5+ drinks in a row by men; 4+ drinks in a row by women) in the previous 30 days. The associations among the multi-item self-report measures of craving were often larger for men than women, but the coefficients were typically statistically significant and meaningful regardless of gender, indicating good convergent validity despite differences in phrasing of items, response formats, and time periods over which craving was assessed. Generally smaller correlations among the VAS items indicated that these five terms were not inter-changeable among themselves (nor were they inter-changeable with scores on the multi-item questionnaires). Similarly to investigations using clinical samples, regression analyses revealed that recent drinking by binge-drinking students was associated with certain measures of self-reported craving.

Keywords: Alcohol; Craving; Binge drinking; University students

1. Introduction

Although considerably less debilitated than dependent drinkers, binge-drinking university students (typically defined as 5+ drinks in a row by men/4+ drinks in a row by women) comprise a considerably larger population of potentially abusive drinkers who experience serious and unhealthy consequences as a result of

* Corresponding author. Tel.: +1 419 372 7255; fax: +1 419 372 6013.
E-mail address: hrosenb@bgnet.bgsu.edu (H. Rosenberg).
[1] Joseph Mazzola is now a graduate student at the University of South Florida.

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Table 1
Demographic characteristics and drinking history of participants by gender

Variable	Male ($n=57$)	Female ($n=65$)
Mean age	20.1 (1.8)	19.6 (1.2)
Year in college		
First	27	20
Second	11	23
Third	9	17
Fourth or Fifth	10	5
Self-reported GPA *		
Below 2.0	3	0
2.0–2.5	15	9
2.5–3.0	16	19
3.0–3.5	17	20
Above 3.5	6	17
Employed		
No	28	31
Part-time	26	34
Full-time	3	0
Where live		
On campus	35	40
Off campus	22	25
Ethnicity		
White	52	63
Non-White	5	2
Age 1st drink	16.7 (2.0)	17.2 (1.2)
Days drink/week *	2.9 (1.3)	2.4 (0.8)
Total drinks/drink day **	10.0 (3.9)	7.0 (3.4)
Number of binges in past 2 weeks	4.5 (2.3)	3.8 (1.8)
Preferred beverage *		
Beer	44	41
Wine	0	3
Mixed drinks	4	15
Straight liquor	4	1
Is drinking under your control		
Completely under	40	46
Somewhat under	14	18
Somewhat/completely out of control	3	1
How easy/difficult to quit		
Very/somewhat easy	28	41
Very/somewhat difficult	29	24
Self-reported speed of consumption		
Very/somewhat slow	3	7
Neither fast nor slow	27	34
Very/somewhat fast	27	24

* t-test or χ^2 $p<.05$.
** t-test or χ^2 $p<.01$.

their excessive drinking (Wechsler et al., 2002). Craving may be one of the numerous psychological factors – along with, for example, social norms and outcome expectancies – that influences (and is influenced by) excessive drinking by college students. However, there has been notably little empirical research on the prevalence of craving or the relationship among self-report measures of craving in this population. In light of this gap in the research, and reviews (e.g., Collins, Koutsky, & Izzo, 2000; Mezinskis, Honos-Webb, Kropp, & Somoza, 2001) encouraging research to compare different craving questionnaires within the same investigation, the present study was designed to begin addressing these questions.

2. Methods

During the spring semester, 2004, we recruited 122 undergraduates (57 men; 65 women) attending a large, public state university (enrollment approximately 20,000 comprising diverse intellectual abilities and economic backgrounds) who were at least 18 years of age, and who reported at least two binge-drinking episodes in the previous 30 days (not including spring break week). As Table 1 reveals, we recruited a sample of heavy drinkers who reported an average of 4 binges in the previous two weeks (regardless of gender), although men drank significantly more standard drinks per drinking day ($M=10.0$, $SD=3.9$) than did women ($M=7.0$, $SD=3.4$).

Participants were provided with a packet of materials containing four previously published alcohol craving questionnaires [*Alcohol Urge Questionnaire* (AUQ; Bohn, Krahn, & Staehler, 1995), *Obsessive-Compulsive Drinking Scale* (OCDS; Anton, Moak, & Latham, 1995), *Penn Alcohol Craving Survey* (PACS; Flannery, Volpicelli, & Pettinati, 1999), and *Temptation and Restraint Inventory* (TRI; Collins & Lapp, 1992); see Table 2 for number of items and internal consistency coefficients], five 100-mm Visual Analog Scales assessing *need, urge, craving, desire,* and *compulsion* for an alcoholic beverage at the most recent time they really wanted to drink, a measure of alcohol-related negative consequences [*Rutgers Alcohol Problem Index* (RAPI; White & Labouvie, 1989)], a 21-item version of the *Drug Abuse Screening Test* (DAST; Skinner, 1982), a 10-item version of the *Marlowe–Crowne Social Desirability Scale* (Crowne & Marlowe, 1960), and a two-page questionnaire to assess both background information (e.g., age, ethnicity, sex, year in college, GPA, employment, on/off campus living) and drinking history [e.g., age of onset of regular drinking, self-reported speed of drinking, total number of drinks (i.e., number of 12-ounce beers plus glasses of wine plus straight or mixed drinks) consumed per day, number of days of drinking in a typical week, and number of episodes during which they had 5+ (men) or 4+ (women) drinks in a row in the past two weeks].

Table 2
Internal consistency reliability of multi-item craving questionnaires for source sample and current sample

Questionnaire	# items	Internal consistency source article/current sample
AUQ (Bohn et al., 1995)	8	$\alpha=.91/\alpha=.92$
OCDS (Anton et al., 1995)	14 (4 paired)	$\alpha=.86/\alpha=.84$
Obsessive subscale	7 (2 paired)	$\alpha=.85/\alpha=.85$
Compulsive subscale	7 (2 paired)	$\alpha=.73/\alpha=.71$
PACS (Flannery et al., 1999)	5	$\alpha=.92/\alpha=.90$
TRI (Collins & Lapp, 1992)		
Cognitive–emotional preoccupation	9	$\alpha=.84/\alpha=.83$
Cognitive–behavioral restraint	6	$\alpha=.80/\alpha=.77$

Participants were assessed in small groups ($M = 8$ participants/group, range = 1 to 14) in a classroom in the Psychology Department. Participants were awarded an extra credit point in their psychology class and/or paid $5, an amount we selected as large enough to compensate participants for their time (30 min), but not so large as to induce non-eligible students to misrepresent their drinking history. The packet of materials contained an informed consent sheet (approved by our institutional review board), the paper-and-pencil measures listed above (instruments were arranged in various random orders across participants, except that the background information/drinking history questionnaire was always placed last), and a debriefing sheet.

3. Results

Because men drank significantly more days per week and drank more per drinking day than did women (see Table 1), we calculated the mean scores by gender on each of the alcohol craving instruments (and/or their chief subscales) and each of the 5 VAS items (*need*, *desire*, *craving*, *urge*, *compulsion*) to provide norms for our sample. As examination of Table 3 reveals, men reported more craving on several multi-item measures, including OCDS Total, OCDS Compulsive Subscale, and TRI-Cognitive and Emotional Preoccupation Subscale. Although men and women did not differ on 3 of the 5 VAS items (*need*, *desire*, *craving*), men reported having experienced a more pronounced *urge* and more pronounced *compulsion* the last time they "really wanted a drink" (which was usually within the past 7 days). On the measure of drinking-related consequences, there was no significant gender difference on the RAPI, and the means indicate relatively few alcohol-related problems. On the DAST, men endorsed one more item, on average, than did women, although neither endorsed having experienced many negative consequences of drug use (Ms = 3.07 and 2.11, respectively). We also found that the average binge-drinking student reported craving

Table 3
Means (and standard deviations) for multi-item questionnaires, VAS items and consequences questionnaires by gender

Variable	Gender		Potential range
	Male *M* (SD)	Female *M* (SD)	
OCDS-Total	11.39(6.4)	8.55(4.1)**	0–40
OCDS-Obsession	3.54 (3.7)	2.57(2.3)	0–20
OCDS-Compulsion	7.84 (3.6)	5.98(2.4)***	0–20
PACS-Total	11.37(6.2)	9.12(5.5)*	0–30
AUQ-Total	22.96(12.3)	20.31(11.3)	8–56
TRI-CEP	33.63(13.7)	29.20(10.5)*	9–81
TRI-CBR	16.79(7.9)	16.45(8.2)	9–54
VAS-need	35.26(27.4)	35.49(27.7)	0–100
VAS-desire	67.91(20.5)	65.46(22.5)	0–100
VAS-crave	49.39(26.3)	45.78(27.9)	0–100
VAS-urge	63.26(22.7)	54.23(25.1)*	0–100
VAS-compulsion	45.40(28.3)	32.80(25.5)**	0–100
RAPI	25.63(17.2)	23.11(12.5)	0–92
DAST	3.07(2.7)	2.11(2.5)*	0–21

Note. OCDS = Obsessive-Compulsive Drinking Scale; PACS = Penn Alcohol Craving Scale; AUQ = Alcohol Urge Questionnaire; TRI-CEP = Temptation and Restraint Inventory-Cognitive and Emotional Pre-occupation, TRI-CBR = Temptation and Restraint Inventory-Cognitive and Behavioral Restraint; VAS = Visual Analog Scale; RAPI = Rutgers Alcohol Problem Index; DAST = Drug Abuse Screening Test.
*$p < .05$, **$p < .01$, ***$p < .001$.

with less intensity than alcohol-dependent subjects (mean scores were often one-quarter to one-half of those reported by instrument developers for clinical samples).

Because some aspects of drinking history and the subjective experience of craving might be considered embarrassing, we assessed the degree to which the craving measures were correlated with the tendency to present oneself in a positive manner as measured by a 10-item version of the Marlowe–Crown Social Desirability Scale (M–C SDS). The mean scores for men (M=5.1, SD=2.2) and women (M=5.6, SD=2.2) did not differ significantly and none of the multi-item craving scale scores were meaningfully or significantly correlated with M–C SDS scores (all rs<.25).

Table 4 displays the inter-correlations among the total scale and subscale scores on the multi-item self-report questionnaires of craving separated by gender (men below diagonal in bold face; women above diagonal in regular type face). Although the coefficients between the various instrument pairs were often larger for men than women, the associations among these self-report craving instruments were uniformly significant regardless of gender. These findings support the convergent validity among a rather diverse set of instruments comprised of only partially overlapping items, employing different response formats, and inquiring about craving over different time frames (e.g., craving right now; past week; time period not specified). The one exception to this pattern of correlations were the weak coefficients between the TRI-CBR subscale and the PACS, AUQ, OCDS and OCDS subscales (rs<.24), but this could be interpreted as indicating discriminant validity because the TRI-CBR scale was not designed to measure craving or desire for alcohol, but to assess cognitive and behavioral efforts to restrain or limit one's drinking.

Table 5 displays the inter-correlations among the five single VAS items separated by gender (men below diagonal in bold face; women above diagonal in regular type face). Except for the notably weaker association of *need* with *desire* for a drink (rs=.20 and .26 for men and women, respectively), the self-ratings of *need*, *desire*, *craving*, *urge* and *compulsion* were correlated moderately (median r=.51, range=.35 to .68). Although this pattern of coefficients indicates some shared variance, these five terms were not completely inter-changeable expressions for "really wanting an alcoholic drink." This interpretation is supported by examination of the means for each of the five terms (Table 3), which revealed that participants reported having experienced a *desire* and *urge* to drink (means in 50s and 60s on 100-point scale), but not that they *needed* or *felt a compulsion* to drink (means in 30s for both men and women), at the last time they wanted to drink. Their scores on the item assessing *craving* hovered near the mid-point of the 100-point scale, and the relatively large standard deviations on the VAS items reveals that some students endorsed experiencing rather intense craving while others experienced little or no craving the last time they wanted a drink. Because

Table 4
Correlation among multi-item self-report questionnaires by gender [a]

	PACS	OCDS-TOT	OBSESS	COMPUL	TRI-CEP	TRI-CBR	AUQ-TOT
PACS		.65	.59	.55	.54	.09	.76
OCDS-TOT	**.78**		.86	.88	.54	.04	.57
Obsessive	**.75**	**.89**		.52	.47	.15	.57
Compulsive	**.62**	**.88**	**.56**		.47	–.07	.43
TRI-CEP	**.61**	**.72**	**.59**	**.68**		.33	.53
TRI-CBR	**.18**	**.24**	**.26**	**.16**	**.46**		.22
AUQ-TOT	**.66**	**.73**	**.65**	**.65**	**.53**	**.24**	

Note. All r_s>.26 significant at p<.05; r_s>.325 significant at p<.01.
[a] Men (n=57) below diagonal in bold face; women (n=65) above diagonal in regular type.

Table 5
Correlation among single VAS items by gender [a]

	VAS-1	VAS-2	VAS-3	VAS-4	VAS-5
	Need	Desire	Crave	Urge	Compulsion
VAS-1		.20	.46	.47	.55
VAS-2	**.26**		.45	.56	.35
VAS-3	**.45**	**.44**		.67	.65
VAS-4	**.42**	**.56**	**.60**		.58
VAS-5	**.42**	**.56**	**.47**	**.68**	

Note. All $r_s > .26$ significant at $p < .05$; $r_s > .325$ significant at $p < .01$.
[a] Men ($n = 57$) below diagonal; women ($n = 65$) above diagonal.

the five terms were printed in the same order for all respondents (*need*, *desire*, *craving*, *urge* and *compulsion)*, order and contrast effects may have influenced their ratings.

Table 6 displays the inter-correlations among the five single VAS items and the seven multi-item scale/subscale scores; for ease of readability and interpretation of such a large correlation matrix, we collapsed across gender in these analyses (copies of gender-specific tables are available from the corresponding author). Coefficients for the first two single VAS items – assessing *need* and *desire* for alcohol – were sometimes statistically, but rarely strongly, correlated with the multi-item scales. The three remaining single VAS terms – *craving, urge and compulsion* – correlated more highly but only moderately with the multi-item scales or subscales of craving. Because it measures restraint rather than craving, it is not surprising that the TRI-CBR subscale was correlated relatively weakly (and in one instance, negatively) with the five single-item VAS scales.

Finally, we wanted to examine the degree to which these various measures of craving were associated with frequency of drinking, quantity consumed per day, and frequency of binge drinking. Therefore, we conducted three separate regression analyses using PACS-Total, AUQ-Total, TRI-CEP, TRI-CBR, OCDS-Obsess, OCDS-Compulsion (but not OCDS-Total), VAS-*Need*, VAS-*Desire*, VAS-*Crave*, VAS-*Urge*, VAS-*Compulsion*, RAPI-Total, and gender as predictors (all predictors were entered simultaneously). All three equations were statistically significant: a) Number of drinking days per week: $F(13,121) = 9.64$, $p = .000$; b)

Table 6
Correlation among VAS items and multi-item questionnaires of craving combined across gender

	VAS-1	VAS-2	VAS-3	VAS-4	VAS-5
	Need	Desire	Crave	Urge	Compulsion
PACS-Total	.34	.28	.52	.40	.46
OCDS-Total	.34	.16	.39	.32	.39
OCDS-Obsession	.31	.05	.33	.20	.29
OCDS-Compulsion	.30	.22	.37	.36	.40
TRI-CEP	.35	.24	.42	.41	.50
TRI-CBR	.18	−.26	.22	.07	.16
AUQ-TOTAL	.39	.16	.38	.36	.36

Note. For total sample $df = 120$, $r_s \geq .18$ significant at $p < .05$; $r_s \geq .23$ significant at $p < .01$; $r_s \geq .30$ significant at $p < .001$.

Table 7
Drinking history regression summary

	Drinking history variables		
	Drinking days/week	Drinks/drinking day	Binges
R^2	.537	.357	.438
Adjusted R^2	.481	.278	.370
Predictors			
PACS-Total	.021	−.114	−.015
Obsessive	.215*	−.042	.009
Compulsive	.277*	−.037	.415*
TRI-CEP	−.135	.070	.093
TRI-CBR	−.208*	−.258*	−.082
AUQ-TOT	.192	.258*	.014
RAPI-TOT	.198	.431*	.178
VAS-1	.151	−.060	−.130
VAS-2	−.025	.070	.053
VAS-3	.012	−.119	−.201
VAS-4	.082	.053	.345*
VAS-5	−.041	.020	−.020
Sex	−.092	−.329*	.018

Note. Significant beta weights marked by asterisk.

Number of drinks per drinking day: $F(13,119)=4.52$, $p=.000$; and c) Number of binges in past two weeks: $F(13, 119)=6.34$, $p=.000$. As examination of the standardized beta weights in Table 7 reveals, the number of days of drinking in a typical week was correlated with craving on subscales of the OCDS and TRI; number of drinks per drinking day was correlated with AUQ-Total, drinking-related consequences and gender; and number of binges in the previous two weeks was correlated with OCDS-Compulsion score and the VAS item measuring urge for a drink.

4. Discussion

Similarly to researchers who examined the relationships among different instruments within the same investigation (e.g., Bohn et al., 1995; Flannery et al., 1999; Love, James, & Willner, 1998), we found good convergent validity among different multi-item scales (or subscales) assessing the subjective experience of craving, in this instance in a sample of binge-drinking university students. Consistent with their shorter duration of drinking history and lower level of consumption compared to clinical samples, our binge-drinking students reported lower mean craving compared to scores reported in source articles for these instruments. Nonetheless, the large standard deviations around those means reveal that students endorsed items indicating persistent or intrusive thoughts of drinking, anticipation of desirable outcomes, and interference of drinking with functioning — all considered indicative of craving. The correlations among the VAS items and with the questionnaires indicate that these terms (*need*, *desire*, *urge*, *craving*, *compulsion*) are neither inter-changeable among themselves nor inter-changeable with the multi-item instruments. In addition, similarly to previous research using clinical samples (e.g., Collins et al., 2000), craving was correlated with recent drinking by these binge-drinking students.

Although we were able to recruit a relatively large sample of frequent binge drinkers of both sexes, we recognize that our sample was comprised of predominately freshmen-and sophomore-level, Caucasian/white

students from a single Midwestern university who may reflect only partially the diversity of American university student drinkers. In addition, our conclusions are tempered by the possibility that some respondents may have misrepresented either their drinking history or their experience of craving, even though we collected responses anonymously, randomized the order of instruments, and paid subjects only a token stipend ($5) to avoid recruiting non-bingers. These limitations notwithstanding, we believe our study contributes to the literature on the assessment of craving by beginning the process of publishing university-student norms and internal consistency coefficients for several key self-report measures of craving, and by evaluating the convergent validity of these instruments and commonly employed VAS items.

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