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RESEARCH REPORT

The Temptation and Restraint Inventory for measuring drinking restraint

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Abstract

In the present study, the measurement of drinking restraint was broadened by developing new items that better characterized its cognitive nature as well as by testing a factor structure which represents restraint as including both the regulation and the failure to regulate alcohol intake. A previously observed (Collins, George & Lapp, 1989) three-component structure of the Restrained Drinking Scale (RDS; Ruderman & McKirnan, 1984) was confirmed. In addition, two factors were extracted from the new set of cognitive items, which when combined with the RDS clusters formed a new measure of drinking restraint, the Temptation and Restraint Inventory (TRI). The factor structure of the TRI matched the conceptualization of drinking restraint as involving successful and unsuccessful regulation of alcohol intake, and differentially predicted self-reported weekly consumption and alcohol-related problems.

Introduction

The notion of common pathways to the misuse of addictive substances has prompted the sharing of constructs from diverse problem areas. One example of this cross-pollination is the application of the restraint construct, which was developed to describe maladaptive eating patterns of dieters who attempt to limit their food intake (Herman & Polivy, 1980; Polivy & Herman, 1985; Ruderman, 1986), to maladaptive drinking among individuals who attempt to limit their alcohol consumption (Ruderman & McKirnan, 1984). Restrained drinkers are somewhat analogous to dieters because both are cognitively and behaviourally pre-occupied with controlling their intake, but may fail and subsequently engage in excessive consumption. The restrained drinkers' pre-occupation with controlling alcohol intake may be expressed by invoking rules and/or setting limits on alcohol consumption in order to regulate intake. However, when the individual yields to temptation, the failure to regulate consumption may result in subsequent episodes of excessive drinking (Collins & Lapp, 1991; Curry, Southwick & Steele, 1987; Ruderman & McKirnan, 1984; Southwick & Steele, 1987).

Since the concept of drinking restraint as well as its measurement were adapted from the literature on restrained eating, they may reflect the same complexities and controversies found in the conceptualization and measurement of eating restraint. One such controversy is whether measures of restraint should assess only successful restriction of intake or both aspects of the theoretical cycle, namely restriction (i.e. regulation of intake) and disinhibition (i.e. yielding to temptation by temporarily suspending regulation), which are said to be inherent in the restraint construct (Heatherton *et al.*, 1988). The most commonly used measures of restrained eating, the Restraint Scale (Herman & Mack, 1975), contains a bifactorial structure that represents

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restriction and disinhibition of intake (Blanchard & Frost, 1983; Lowe, 1984; Ruderman, 1983). Heatherton *et al.* argue that such a structure is necessary because restraint "is a multifaceted syndrome involving both a propensity to restrict food inrtake as well as a tendency to splurge" (p. 26). In keeping with this characterization, Stunkard & Messick (1985) developed the Three Factor Eating Questionnaire (TFEQ), which contains separate Cognitive Restraint and Disinhibition factors. Although there is controversy as to the meaningfulness of a third (Hunger) factor for the measurement of restraint (cf. Heatherton *et al.*, 1988), the first two TFEQ factors reflect the successful and unsuccessful regulation of intake inherent in the restraint construct.

A similar issue was raised in the measurement of drinking restraint when Collins *et al.* (1989) evaluated the internal structure of the Restrained Drinking Scale (RDS; Ruderman & McKirnan, 1984). Collins *et al.* examined the internal structure of the RDS through a convergence of cluster solutions to test whether the RDS measured a unitary construct (cf. Ruderman & McKirnan, 1984). The RDS was consistently partitioned into four clusters: (1) restrict, attempts to limit drinking; (2) govern, difficulty controlling alcohol intake; (3) emotion, negative affect as a reason for drinking; and (4) consume, frequency and occasions for heavy drinking. The restrict cluster predicted lower levels of alcohol consumption, the govern and emotion clusters predicted higher levels of alcohol consumption, and the consume cluster had to be eliminated because it was confounded with heavy drinking. Drinking restraint was thereby shown to be multifaceted, with components that had both a positive and a negative relationship to alcohol intake.

The present study was designed to replicate and expand on this multiple component view of the measurement of drinking restraint. Replication focused on the confirmation of the three restraint-related RDS clusters identified by Collins *et al.* (1989) in a sample of community residents. In addition, we attempted to bolster the conceptual and face validity of the measurement of drinking restraint by developing new items that compliment the three RDS clusters and more closely matched the cognitive pre-occupation said to characterize restrained drinkers. Finally, the view that restraint includes successful and unsuccessful regulation of intake (cf. Heatherton *et al.*, 1988) was examined.

Method

Subjects

One hundred and ninety-seven men and 126 women residents of the Buffalo metropolitan area served as subjects. The mean age of the sample was 26.82 years (SD = 4.85) and most (62%) subjects were single. Seventy-two per cent of the sample were European-Americans, 22% were African-American and the remainder were from a variety of ethnic backgrounds. Subjects were recruited via newspaper advertisements and were paid $15.00 for their participation.

Procedure and measures

Questionnaires were administered, in counterbalanced order, to groups of approximately 20 subjects. Subjects completed questionnaire packets in approximately 1 hour.

The Restrained Drinking Scale (RDS). The RDS (Ruderman & McKirnan, 1984) consists of 23 items (e.g. "Do you find that once you start drinking it is difficult for you to stop?"). Each item is rated on a 9-point Likert scale in which "1" reflects a lack of pre-occupation and "9" reflects a high degree of pre-occupation. Collins *et al.* (1989) reported adequate levels of internal consistency for the three RDS clusters (govern, restrict, emotion; $\alpha = 0.79$–0.86), and the reliability for the current sample was similarly good ($\alpha = 0.76$–0.91).

The Cognitive Control of Drinking Scale (CCDS). The CCDS consisted of 18 items designed to broaden assessment of the cognitive aspects of the pre-occupation with control over drinking in terms of: (1) attention to drinking behaviour; (2) the perception of alcohol-related cues; 3) plans for limiting alcohol consumption; and (4) thoughts about limiting drinking. The items were developed by the present authors as well as staff working on research on drinking restraint. All personnel were familiar with the restraint construct and with research on the measurement of eating restraint and drinking restraint. The CCDS items were presented in the same format as those of the RDS to circumvent any differential response style biases arising from the use of different scales (Cronbach, 1946, 1950; but see Rorer, 1965).

Assessment of typical alcohol consumption. The Daily Drinking Questionnaire (Collins, Parks & Marlatt, 1985) served as the measure of alcohol consumption. Subjects completed a calendar of

estimates of the average number of drinks they typically consumed on each day of the week. These numbers were summed to derive their total weekly consumption.

Short Michigan Alcoholism Screening Test (SMAST). The SMAST (Selzer, Vinokur & Rooijen, 1975) is commonly used to screen for alcohol problems. Subjects respond "yes/no" to each of 13 questions concerning problems such as being "... arrested for drunken driving. ..." Responses are summed to form a total score and a score of 3 or more is regarded as indicative of problem drinking. The SMAST was internally consistent ($\alpha = 0.70$) for the present sample of community residents.

Results

Overview of data analyses

Analyses were organized with respect to developing a more comprehensive measurement of restraint that predicted typical drinking and alcohol-related problems. An initial analysis of subjects' self-reported weekly drinking and SMAST scores was conducted to assess both the relationship between these criterion variables and the possible contribution of gender to the effects observed in the final test of the newly-developed measure. Three sets of analyses were then conducted for the purpose of developing a reliable measure of restraint for use with the general population of social drinkers: (1) the three component structure of the RDS which was originally partitioned from the responses of university students was confirmed with a slightly older community sample; (2) the CCDS items were submitted to stringent psychometric analyses to extract and then confirm a robust factor structure from a small set of highly reliable items; (3) the relationships among the components of the RDS and CCDS were assessed using correlational analyses, and were then combined via factor analysis to form a new, integrated measure of drinking restraint. Finally, self-reported typical drinking and SMAST scores were regressed on the factors extracted from the new measure to test its ability to predict outcomes relevant to drinking restraint.

Self-reported alcohol consumption

The sample consisted of self-reported moderate to heavy social drinking men and women (M = 14.10 drinks/week, SD = 15.46), who had relatively low SMAST scores (M = 1.44, SD = 1.72). As might be expected, weekly alcohol consumption and SMAST scores were significantly correlated, $r(321) = 0.61$, $p < 0.001$. Given consistent reports of gender differences in alcohol consumption (NIAAA, 1990) we tested whether men and women were different with respect to weekly alcohol consumption and SMAST scores. Results of a one-way MANOVA indicated that men and women were different with respect to weekly alcohol intake and SMAST scores when these two measures were treated as a composite dependent variable, $F((2, 320) = 12.24$, $p < 0.0005$. Men drank more than women on a weekly basis, $F(1, 321) = 23.87$, $p < 0.0005$, but the slight difference between men's and women's SMAST scores was not significant.

Confirmation of the structure of the Restrained Drinking Scale

A comfirmatory factor analysis was performed to test the hypothesis that nine items[1] of the RDS formed three correlated, but distinct components of restraint as measured by the RDS (Collins *et al.*, 1989). This hypothesis was tested using the method of maximum likelihood and was computed with LISREL 7 (Joreskog & Sorbom, 1989). In addition to testing the original hypothesis, the automatic modification indices available in LISREL 7 were activated to achieve an optimal solution.

The original model reported by Collins *et al.* fit the present data to a high degree of specificity: coefficient of determination = 0.994; adjusted goodness of fit index = 0.93; normed fit index (Bentler & Bonett, 1980) = 0.96; root mean square residual = 0.03. Although the model failed to meet the traditional χ^2 criterion, $\chi^2(24) = 49.07$, $p = 0.002$, it was accepted based on the criteria just listed. The traditional χ^2 criterion is notoriously over-sensitive to changes in sample size and produces spuriously large values when the sample size is large relative to the estimated number of parameters (Anderson & Gebring, 1984; Bentler, 1990; Bentler & Bonett, 1980). A slight modifcation of the original model[2] produced a significantly better fit,

[1] In Collins *et al.*'s (1989) refinement of the RDS, 13 of the 23 items fell into four clusters (restrict, govern, emotion, consume). The four items of the consume cluster were omitted from consideration because they were conceptually and statistically confounded with heavy drinking, leaving nine of the original RDS items in the confirmatory factor analysis.

[2] The automatic modification indices suggested that one of the items originally assigned solely to the govern cluster ("Do you find that once you start drinking it is difficult for you to stop?") also loaded on the Emotion cluster.

Table 1. *Standardized solution for the confirmation of the original subscales of the RDS*

Item	Govern	Restrict	Emotion
How much effort does it take for you to keep your drinking under control?	0.95	0.00	0.00
How much difficulty do you have controlling your drinking?	0.91	0.00	0.00
Do you find that once you start drinking it is difficult for you to stop?	0.83	0.00	0.00
Do you ever cut back on your drinking in an attempt to change your drinking habits?	0.00	0.80	0.00
How often do you attempt to cut down the amount you drink?	0.00	0.69	0.00
Do feelings of guilt about drinking too much help you to control your alcohol intake?	0.00	0.68	0.00
When you feel anxious, are you more likely to drink?	0.00	0.00	0.86
When you feel lonely, are you more likely to drink?	0.00	0.00	0.74
Do you ever feel so nervous that you really need a drink?	0.00	0.00	0.67

difference in $\chi^2(1) = 21.43$, $p < 0.0005$, that was confirmed by the traditional measure, $\chi^2(23) = 27.64$, $p = 0.230$, but the modified model was virtually identical to the original model. The original model was, therefore, retained because of its high degree of fit in the presence of a large (36:1) subject to item ratio and the conceptual coherence of the solution (see, Nunnally, 1978). Thus, the results showed a high level of agreement between Collins *et al.*'s three component solution obtained with university students and the factor structure observed with the present sample of community residents. Factor loadings for the confirmatory analysis are presented in Table 1.

Psychometric analysis of the Cognitive Control of Drinking Scale

Initial psychometric analysis of the CCDS consisted of removing three items that were highly skewed, six items that exhibited a high degree of kurtosis, and three items had low item-total correlations (<0.30). For a random half of the sample, the remaining six items were entered into an exploratory factor analysis in which the maximum likelihood extraction method was followed by oblique rotation. As presented in Table 2, two factors were extracted in this analysis, each of which contained three items. Factors were named based on the content of their items: the Cognitive Preoccupation (CP) factor contained items that referred to thoughts about drinking, whereas the Concern About Drinking (CAD) factor contained items pertaining to plans to reduce drinking and worry about controlling drinking.

A confirmatory factor analysis was performed for the remaining half of the sample, and the factor structure observed in the exploratory analysis was confirmed in its original form using LISREL 7: $\chi^2(8) = 12.99$, $p = 0.11$; coefficient of determination = 0.962; adjusted goodness of fit index = 0.93; normed fit index (Bentler & Bonett, 1980) = 0.96; root mean square residual = 0.05. Each factor exhibited an adequate level of internal consistency (α for CP = 0.82 and for CAD = 0.78), and as expected, the two factors were moderately correlated $r(321) = 0.36$, $p < 0.001$.

Relationships among RDS clusters and CCDS factors

Since the items of the RDS and the CCDS were developed to assess aspects of drinking restraint, the correlations among the three RDS clusters and the two factors of the CCDS were examined. As shown in Table 3, all subscales were significantly related, $r(319) = 0.30$–0.69, $p < 0.001$.

To further examine the relationships among the five subscales, scores for each of the subscales were entered as variables in a factor analysis. Two factors resulted from this analysis. The first factor, named Cognitive and Emotional Preoccupation (CEP), consisted of the Cognitive Preoccupation scale of the CCDS and the Govern and Emotion scales of the RDS. The second factor, named Cognitive and Behavioural Control (CBC), consisted of the Concern About Drinking scale of the CCDS and the Restrict scale of the RDS. Factor loadings resulting from this analysis are presented in Table 4. The CEP and CBC formed a new Temptation and Restraint Inventory (TRI) in which these two factors were moderately correlated, $r(321) = 0.43$,

Table 2. *Factor structure and loadings observed for the exploratory factor analysis of the CCDS and its subsequent confirmation*

	Exploratory		Confirmatory	
Item	CP	CAD	CP	CAD
At times, do you find yourself unable to stop thinking about drinking?	0.77	0.46	0.80	0.00
Is it hard to distract yourself from thinking about drinking?	0.75	0.40	0.88	0.00
Do thoughts about drinking intrude into your daily activities?	0.61	0.23	0.73	0.00
Does the sight and smell of alcohol make you think about limiting your drinking?	0.34	0.79	0.00	0.69
Does seeing alcohol-related commercials, magazine adds., and/or signs for liquor stores stimulate concerns about the need to limit your drinking?	0.41	0.74	0.00	0.68
Does seeing other people drink remind you of your efforts to control your alcohol consumption?	0.30	0.62	0.00	0.77

Table 3. *Correlations among the scales of the RDS and CCDS**

	Govern	Restrict	Emotion	CP	CAD
Govern					
Restrict	0.41				
Emotion	0.67	0.30			
CP	0.69	0.35	0.62		
CAD	0.32	0.57	0.18	0.36	

* $p < 0.0005$ for all correlations.

$p < 0.001$. Total scores were computed for each of the factors of the TRI and were then used as the basis for predicting: (1) the amount of alcohol subjects reported consuming during a typical week; and (2) scores on the Short Michigan Alcoholic Screening Test (SMAST).

Table 4. *Factor loadings of the RDS and CCDS scales on two second-order factors*

Scale	Cognitive and Emotional Preoccupation (CEP)	Cognitive and Behavioural Control (CBC)
Govern	0.87	0.40
Emotion	0.79	0.26
CP	0.79	0.43
CAD	0.33	0.99
Restrict	0.43	0.60

Drinking restraint as a predictor of weekly alcohol consumption and problem drinking

Given the previously reported significant correlation between weekly alcohol consumption and SMAST scores, we began by testing whether separate prediction of these two dependent variables was feasible. A multivariate multiple regression was conducted to determine whether gender and the two factors of the TRI (cognitive and behavioural control; cognitive and emotional preoccupation) had an effect on SMAST scores that was independent of the effect on weekly alcohol consumption. The results indicated a significant multivariate effect for weekly consumption and SMAST scores taken together, $F(8, 634) = 37.57$, $p < 0.0005$. Significant univariate effects also were observed for both weekly consumption, $F(4, 318) = 57.89$, $p < 0.0005$, and SMAST scores, $F(4, 318) = 50.23$, $p < 0.0005$. Most importantly, the Roy-Bargmann Stepdown F-test indicated that gender and restraint had an effect on SMAST scores even after the effects of weekly consumption had been partialled out, stepdown $F(4, 317) = 20.40$, $p < 0.0005$.

Regression of weekly alcohol consumption and SMAST scores on the factors of the Temptation and Restraint Inventory. Separate hierarchical multiple regressions were performed to test the prediction of weekly alcohol consumption and SMAST scores based on the two factors of the TRI and their interaction. Gender of the respondent was entered first in each equation to statistically control for any pre-existing differences between men's and women's self-reported weekly alcohol consumption and

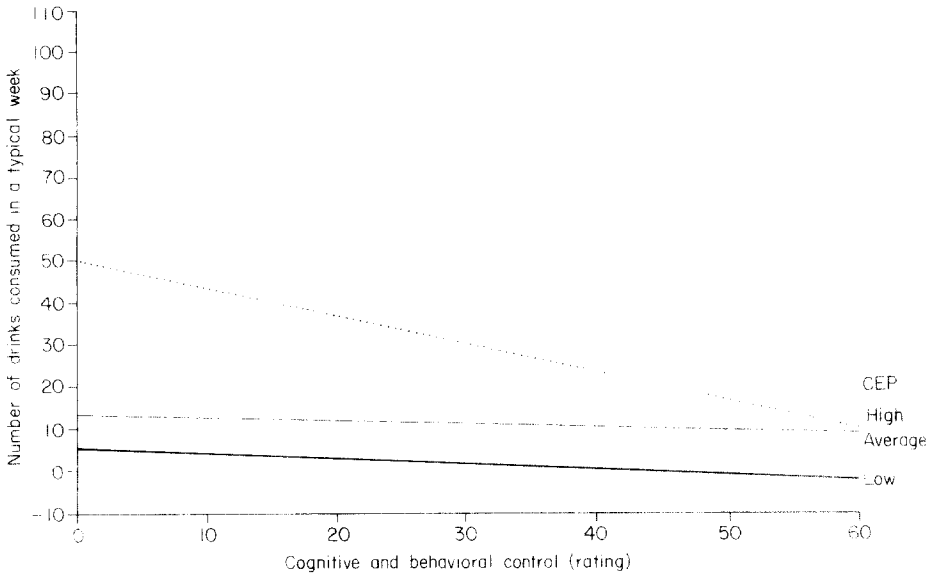

Figure 1. *Interaction of Cognitive-Emotional Preoccupation (CEP) and Cognitive-Brehavioural Control (CBC) in the prediction of self-reported weekly alcohol consumption.*

alcohol-related problems. The two TRI factors (CBC and CEP) were entered second in each equation, and the product interaction of these two drinking restraint factors was entered third (see Cohen & Cohen, 1983, for the statistical logic of this order of entry).

Above and beyond the fact that men reported consuming more standard drinks per week than did women, both TRI factors and their interaction predicted an additional 36% of the variance in weekly alcohol consumption (see Table 5). The CEP factor predicted higher levels of weekly alcohol consumption ($\beta = 0.64$) and the CBC factor predicted slightly lower levels of weekly alcohol consumption ($\beta = -0.16$). The interaction term predicted the highest levels of drinking by individuals who were one or more standard deviations above the mean on CEP and at the low end of CBC. As presented in Fig. 1, weekly alcohol consumption decreased among highly pre-occupied individuals as scores on the CBC factor increased. In contrast, weekly alcohol consumption remained essentially unchanged by the subjects' level of Cognitive and Behavioural Control among individuals who reported average and below average (more than 1 SD below the mean) levels on the CEP factor.

Drinking-related problems, as measured by SMAST scores, also were predicted by one of the TRI factors. Cognitive and Emotional Preoccupation predicted a substantial increase in SMAST scores ($\beta = 0.64$; see Table 5), whereas CBC and the interaction of the two factors of the TRI were not significantly related to SMAST scores.

Discussion

The results of the present study supported the multifaceted characterization of drinking restraint as consisting of a reciprocal relationship between restricted and excessive intake. The three component structure of the RDS was confirmed in a sample of social drinkers from the general community, suggesting that the previous results obtained with a sample of university students (Collins *et al.*, 1989) generalize to a broader population. The subscales of the RDS combined with the two new cognitive subscales to form the Temptation and Restraint Inventory (TRI). In accordance with research on eating restraint, the two factors of the TRI predicted a pattern of results reminiscent of the cycle of successful (the CBC factor) and unsuccessful (the CEP factor) regulation inherent in the restraint construct (cf. Heatherton *et al.*, 1988; Ruderman & McKirnan, 1984). The TRI therefore measures the multifaceted construct of drinking restraint in a manner that quantifies an individual's propensity to resist or engage in drinking.

Table 5. *Prediction of weekly alcohol consumption and SMAST scores by the factors of the temptation and restraint inventory*

Predictor	Adj. R^2	Change in R^2	Partial F	B	$t(321)$
Weekly alcohol consumption	0.41				
Step 1		0.07	23.87**		
Gender				−0.26	−4.89**
Step 2		0.34	90.68**		
CEP				0.64	13.29**
CBC				−0.16	−3.34**
Step 3		0.02	8.12**		
CEP × CBC				−0.41	−2.85**
SMAST scores	0.41				
Step 1		0.01	4.57**		
Gender				−0.12	−2.14*
Step 2		0.40	109.80**		
CEP				0.64	13.58**
CBC					NS
Step 3			NS		
CEP × CBC					NS

Commonalities in drinking and eating restraint

Given the origin of the restraint construct, one would expect restrained drinkers and restrained eaters to share a number of commonalities and that measures of eating and drinking restraint would capture similar phenomena. For example, the Concern for Dieting factor of the Restraint Scale (Herman & Mack, 1975) and the disinhibition factor of the Three Factor Eating Questionnaire (TFEQ; Stunkard & Messick, 1985) encompass pre-occupation and difficulty with controlling food intake, as well as the negative affective states that lead to increased food intake in restrained eaters (cf. Frost *et al.*, 1982; Ruderman, 1985; Schotte, Cools & McNally, 1990). In our community sample, typical drinking and alcohol-related problems were predicted by a combined set of analogous factors. A cognitive-emotional pre-occupation with drinking (i.e. thoughts about drinking, drinking in response to negative emotions, perceived difficulty in controlling one's drinking) was strongy and positively associated with self-reported drinking as well as SMAST scores. These findings are consistent with research in which the individual's perceived sense of competence, and/or the experience of negative affect increases substance use and may potentiate substance-related problems (Collins & Lapp, 1991; Cummings, Gordon & Marlatt, 1980; Marlatt & Gordon, 1980, 1985).

Resistance to the temptation to consume is also similar in form, if not content within the domains of food and alcohol consumption. For example, the Cognitive Restraint factor of the TFEQ includes items that specifically assess cognitive and behavioural strategies for controlling food intake. This Cognitive Restraint factor has been found to be related to actual caloric intake (1 week food diary) of healthy, normal weight, young women (Laessle *et al.*, 1989) and is said to represent a measure of successful regulation of food intake. The items of the Cognitive and Behavioural Control (CBC) factor of the TRI similarly assessed phenomena related to the regulation of alcohol intake. The CBC scores were inversely related to typical consumption and did not predict alcohol-related problems. It seems likely that individuals who attempt to control alcohol intake tend to drink less, but their success in avoiding alcohol-related problems may depend upon their level of pre-occupation with controlling alcohol intake.

The interplay of successful and unsuccessful regulation of intake was observed in the significant interaction of the CBC and CEP factors of the TRI: typical drinking was greatest among individuals who had higher than average scores on the CEP factor while also scoring low on the CBC factor. Typical drinking was lower among individuals who were highly pre-occupied with alcohol, but were attempting to control their alcohol intake. This interaction suggests that restraint may be successful when control strategies are active, as well as the possibility of increased drinking when such control strategies are suspended. Curiously, cognitive-behavioural control had a negligible impact on weekly consumption of subjects with moderate or low levels of cognitive-emotional pre-occupation. It may be that

cognitive and behavioural control is more relevant when the individual is cognitively and affectively pre-occupied with controlling drinking. Based on this pattern of results, it is the presence of the cognitive-emotional pre-occupation that is key to placing some individuals at risk for increased alcohol consumption, whereas cognitive-behavioural control exerts a moderating influence.

A broader, psychometrically sound, measure of drinking restraint was developed and tested in the present study. It is consistent with the conceptualization of drinking restraint as involving a cognitive pre-occupation with controlling alcohol intake as well as the notion that measures of restraint should capture both aspects of the cycle of successful and unsuccessful regulation. However, the larger question of how these components are associated with alcohol consumption over time cannot be answered on the basis of the present cross-sectional evidence. In addition, the fact that the present sample consisted of social drinkers, who for the most part did not exhibit excessive levels of alcohol consumption, limits the generalization of these findings to problem drinkers for whom setting and/or maintaining drinking limits may be a highly salient and difficult undertaking.

Future research on the multifaceted approach to measuring drinking restraint should include behavioural measures of the alcohol consumption of restrained drinkers as well as assessment of restraint among populations at high risk for alcohol problems. The TRI could play an important role in such investigations because it is a psychometrically rigorous instrument that predicts relevant criterion variables in a theoretically sound fashion.

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