Short Communication

A Confirmatory Factor Analysis of the Protective Behavioral Strategies Scale among OEF/OIF Veterans☆

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HIGHLIGHTS

- We examined the psychometric properties of the Protective Behavioral Strategies Scale among veteran population.
- Model fit was similar to college student samples.
- Veteran strategies for reducing negative alcohol outcomes slightly differ from college students.
- Strategies such as Stopping/Limiting Drinking and the Manner of Drinking may be more effective for veterans.

ARTICLE INFO

ABSTRACT

Introduction: Military veterans of the wars in Afghanistan and Iraq (OEF/OIF/OND) are at-risk for increased alcohol consumption and alcohol-related consequences. The Protective Behavioral Strategies Scale (PBSS) has been shown to be a reliable and valid measure of assessing strategies to facilitate more responsible drinking and to reduce alcohol-related harm among college student populations. The purpose of this study was to examine the psychometric properties of the PBSS among the OEF/OIF veteran population.
Method: Participants were 251 veterans (94% male; 83% White; *M* age = 31.77 years) who were participating in a larger alcohol intervention trial and reported consuming alcohol within the past 30 days.
Results: Confirmatory Factor Analyses indicated the model fit of the PBSS was similar to college student samples. Although a confirmatory three-factor model best fits the data, model fit indices were slightly below commonly accepted guidelines. All PBSS subscales were negatively correlated with alcohol outcomes. Greater use of Manner of Drinking (MOD) and Stopping/Limiting Drinking (SLD) strategies were associated with less alcohol consumption and lower peak BAC. Greater use of MOD strategies was associated with less alcohol-related problems.
Conclusions: Findings provide initial support for use of the PBSS among OEF/OIF veterans. Strategies aimed at Stopping/Limiting Drinking and the Manner of Drinking may be more effective with a veteran sample. Additional studies examining the external validity of this measure are encouraged.

1. Introduction

Military veterans are at-risk for increased alcohol consumption and alcohol-related consequences. Returning soldiers from conflicts in Afghanistan and Iraq (Operations Enduring Freedom, Iraqi Freedom, and New Dawn OEF/OIF/OND) are at an increased risk for alcohol misuse compared to other veterans (Hoge et al., 2004), and at greater risk than non-veterans (Hawkins, Lapham, Kivlahan, & Bradley, 2010; Wagner et al., 2007). Increased levels of alcohol misuse among OEF/OIF veterans have been associated with harmful physical and psychological outcomes (Kehle et al., 2011; McDevitt-Murphy et al., 2010). Considering the negative and serious consequences of alcohol misuse, it is important to understand factors that may protect veterans from alcohol-related harms.

1.1. Protective behavioral strategies

Protective behavioral strategies (PBS) are defined as active behaviors used while consuming alcohol to facilitate more responsible drinking and to reduce harm associated with alcohol (Martens et al., 2005). Strategies include avoiding drinking games, using a designated driver, and alternating alcoholic and non-alcoholic drinks. The use of PBS has been associated with fewer alcohol-related harms (see Pearson, 2013).

A commonly used measure to assess PBS is the Protective Behavioral Strategies Scale (PBSS; Martens et al., 2005; Martens, Pedersen, LaBrie, Ferrier, & Cimini, 2007). The PBSS is a 15-item measure that asks participants to indicate how often they engage in each protective strategy when using alcohol. Participants indicate a response using a 6-point, Likert scale ranging from 1 (never) to 6 (always). To date, studies examining the factor structure of the PBSS have primarily utilized college samples, including volunteers (Martens et al., 2005) and judicially mandated participants (Martens et al., 2007). Factor analytic studies have supported a three-factor structure, with the following subscales: Stopping/Limiting Drinking (SLD; seven items; e.g., "Determine not to exceed a set number of drinks"), Manner of Drinking (MOD; five items; e.g., "Avoid trying to "keep up" or "out drink" others"), and Serious Harm Reduction (SHR; three items; e.g., "Know where your drinks has been at all times") (Martens et al., 2005; Martens et al., 2007). Among college student samples, internal consistency estimates have ranged from .81 to .85 (SLD), .74 to .79 (MOD), and .59 to .66 (SHR) (Martens et al., 2007; Treloar, Martens, & McCarthy, 2014; Walters, Roudsari, Vader, & Harris, 2007).

Higher scores on the PBSS subscales have been shown to be associated with less alcohol consumption and fewer alcohol-related problems among college students (D'Lima, Pearson, & Kelley, 2012; LaBrie, Lac, Kenney, & Mirza, 2011; Martens et al., 2007; Pearson, Kite, & Henson, 2012). Although studies have shown the MOD and SHR subscales to be predictive of alcohol use and related problems, the SLD subscale has not been shown to uniquely predict alcohol outcomes (Martens et al., 2005; Martens et al., 2007; Pearson et al., 2012). Clinically, PBS have been shown to mediate brief alcohol interventions (Barnett, Murphy, Colby, & Monti, 2007; Larimer et al., 2007), and there is support for a PBS-specific group alcohol intervention (Kenney, Napper, LaBrie, & Martens, 2014).

In sum, research with college student populations has supported the psychometric properties of the PBSS, but less is known regarding its reliability and validity among other at-risk populations. The current study aimed to address this limitation by examining the psychometric properties of the measure among a sample of OEF/OIF veterans.

2. Method

2.1. Participants and procedures

Participants were enrolled in a larger study examining the efficacy of a brief alcohol intervention among OEF/OIF veterans (Martens, Cadigan, Rogers, & Osborn, 2015). Participants were recruited from a primary care clinic at the Harry S. Truman VA Hospital from January 2011 to February 2013. All OEF/OIF veterans who presented at the clinic were eligible for the study and were randomized to a personalized drinking feedback intervention or an alcohol education control condition. They were compensated $30 for completing the baseline assessment.

The current project analyzed baseline data from 251 veterans (94.4% male; 82.5% White; M age = 31.77 years) who reported consuming alcohol within the past 30 days. The majority (72.1%) were in the Army. Participants reported an average of 1.62 (SD = .91; range = 1–7) deployments to Iraq and/or Afghanistan. Over half (56.6%) were married and 62.9% had children. Participants reported consuming an average of 13.76 drinks per week (SD = 14.27) with an average estimated peak blood alcohol concentration (BAC) of .067 (SD = .091) within the past 30 days.

2.2. Measures

Protective Behavioral Strategies Scale (PBSS; Martens et al., 2005; Martens et al., 2007). The PBSS is a 15-item measure assessing strategies used to reduce high risk drinking and associated negative consequences. Participants indicated how often they engage in each protective strategy

on a 6-point, Likert scale ranging from 1 (never) to 6 (always). One item is reverse coded. Higher scores indicate greater use of PBS.

Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985). Participants indicated the number of drinks typically consumed each day of the week over the past 30 days. Responses were summed to provide an estimate of typical drinks consumed per week. Participants indicated the maximum number of drinks consumed on a single occasion in the past 30 days, and the number of hours they consumed alcohol on that occasion. A standard formula accounting for gender and body weight was then used to estimate peak BAC (Matthews & Miller, 1979).

Short Inventory of Problems (SIP; Miller, Tonigan, & Longabaugh, 1995). The SIP is a 15-item self-report measure assessing alcohol-related consequences over the past 6-months. It is a brief version of the Drinker Inventory of Consequences (DrInC; Miller et al., 1995). Reponses were dichotomously scored, as participants indicated whether or not they had experienced the alcohol-related consequence. Internal consistency in the present sample was .87.

3. Results

3.1. Descriptive statistics

Mean scores on PBSS subscales were as follows: SLD = 2.81 (SD = 1.22), MOD = 3.82 (SD = 1.33), SHR = 4.48 (SD = 1.25). Internal consistency for the SLD, MOD, and SHR subscales was .84, .83, and .52, respectively.

3.2. Confirmatory Factor Analyses

One-factor and three-factor models were examined. Due to high covariance between error terms, the error terms for PBSS item 10 ("Stop drinking at a predetermined time") and item 6 ("Leave the bar/party at a predetermined time") were correlated. Martens et al. (2007) also correlated these error terms.

To assess model fit, we followed commonly accepted guidelines (Kline, 2011), where adequate model fit is indicated by CFI > .90, TLI > .90, RMSEA < .08, and SRMR < .10. Model fit was significantly better for the three-factor model compared to the one-factor model, as the χ^2 difference test was significant ($p < .001$). Model fit for the three-factor model was slightly below commonly accepted guidelines, χ^2 (86) = 249.639, $p < .001$, CFI = .886, TLI = .861, RMSEA = .087, SRMR = .069. Factor loadings for each subscale were mostly moderate to large in magnitude (see Table 1) and were similar to those found in previous

Table 1
Factor loadings by subscale (item standardized regression coefficients).

Item	Coefficient	
Stopping/Limiting Drinking		
10 Stop drinking at a predetermined time	.813	
2 Determine not to exceed a set number of drinks	.774	
6 Leave the bar/party at a predetermined time	.758	
3 Alternate alcoholic and non-alcoholic drinks	.619	
4 Have a friend let you know when you have had enough to drink	.551	
11 Drink water while drinking alcohol	.501	
12 Put extra ice in your drink	.436	
Manner of Drinking		
14 Drink slowly, rather than gulp or chug		.815
5 Avoid drinking games		.742
13 Avoid mixing different types of alcohol		.700
15 Avoid trying to "keep up" or "out-drink" others		.657
9 Drink shots of liquor[a]		.572
Serious Harm Reduction		
8 Know where your drink has been at all times		.594
7 Make sure that you go home with a friend		.579
1 Use a designated driver		.330

Note.
[a] Item is reverse coded.