FACTOR MODELS OF ALCOHOL PROTECTIVE BEHAVIORAL STRATEGIES: ARE WE TREATING SIGNAL AS NOISE?

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Introduction

- Much factor analytic work has been conducted on measures of alcohol protective behavioral strategies (PBS), revealing distinct factor structures ranging from two to four factors (Madson et al., 2013, Martens et al., 2005, Walters et al., 2007)
- Others have used hierarchical factor models (i.e., lower order factors load onto a higher order factor) (Bravo et al., 2015) or bifactor models (i.e., all items load onto a general factor in addition to the specific lower order factors) (Horvath et al., 2021)
- **Hypothesis**: We suspect that there are not underlying latent factors for PBS, which may make factor analysis an inappropriate tool for guiding the development and enhancement of PBS measures

Method

PARTICIPANTS

- We used data from 2 large, multisite surveys of college students: Project PSST (10 states, 10 states, n=7307, Bravo et al., 2018) and Project ART (10 sites, 8 states, n=5494, Richards et al., 2021)
- Analyses were restricted to those who reported drinking during the past month (PSST: N=5086, ART: N=2808).

MEASURES

- Daily Drinking Questionnaire (DDQ, Collins et al., 1985) used to measure the number of drinks consumed during a typical drinking week across all studies
- Alcohol Use Disorder Identification Test (AUDIT) was used to assess consumption and problems
- Brief Young Adult Alcohol Consequences Questionnaire (BYAACQ, Kahler et al., 2005) was used to measure negative alcohol-related consequences
- Modified Protective Behavioral Strategies Scale (PBSS; Martens et al., 2005; Treloar et al., 2015) used to measure PBS used in last month

STATISTICAL ANALYSES

- Data analyzed using M*plus* 8.5
- We compared the overall (R^2 values) and specific predictive utility (standardized regression coefficients, β) of PBS factors based on 2-, 3-, and 4-factor models, hierarchical versions of these models, bifactor versions of these models, individual PBS items, and item residuals (i.e., "errors") from each model

Results

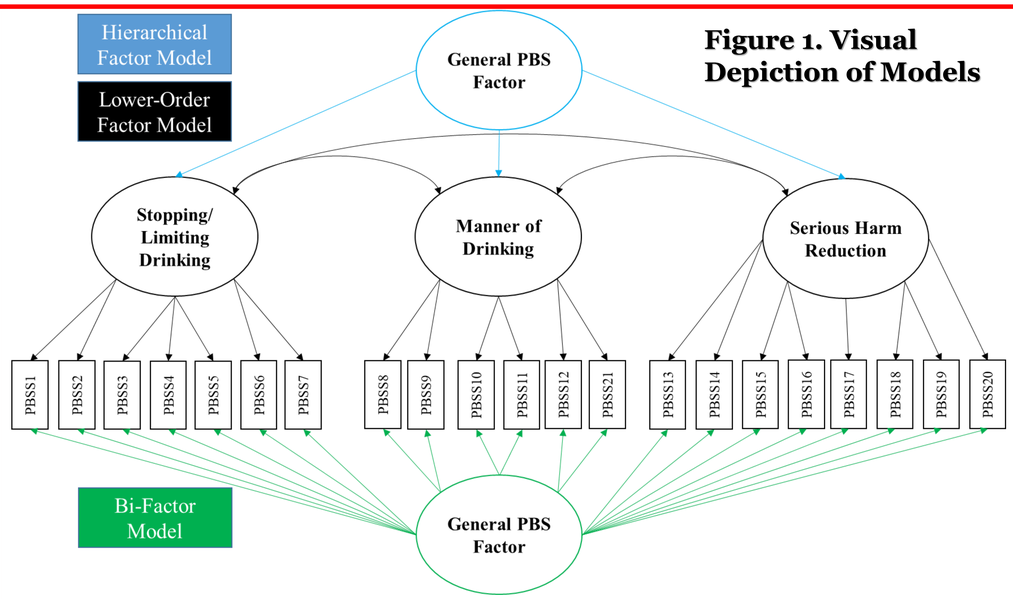
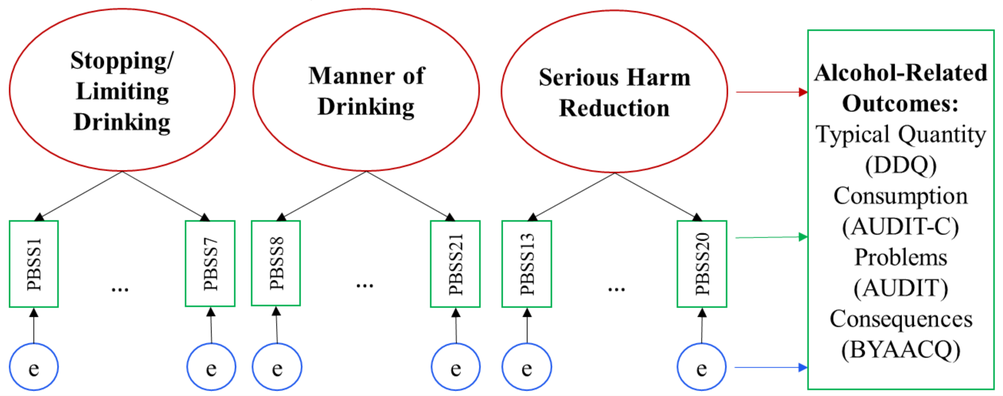


Figure 1. Visual Depiction of Models

Table 1. Fit Statistics for Models in PSST/ART

Models	Estimator	Structure	CFI	TLI	RMSEA
1. 2-factor	ML	Lower-Order	.784/.816	.758/.795	.102/.143
2. 2-factor	WLSMV		.847/.882	.830/.868	.124/.143
3. 3-factor	ML		.875/.896	.859/.883	**.078**/.082
4. 3-factor	WLSMV		**.920/.929**	**.909/.920**	.091/.111
5. 4-factor	ML		**.901/.913**	.886/**.900**	**.070/.076**
6. 4-factor	WLSMV		**.931/.938**	**.921/.929**	.085/.105
9. 3-factor	ML	Bifactor	**.927/.945**	**.907/.930**	**.063/.064**
10. 3-factor	WLSMV		**.949/.964**	**.935/.954**	**.077**/.084
11. 4-factor	ML		**.935/.948**	**.915/.932**	**.060/.062**
12. 4-factor	WLSMV		**.958**/-----	**.945**/-----	**.070**/-----

Figure 2. Predicting Alcohol-Related Outcomes by PBS Factors, Individual PBS Items, and Item Residuals



Results

- Using convention cutoffs for fit indices in confirmatory factor analysis (e.g., CFI/TLI>.90, RMSEA<.08), several of the models fit adequately (see bolded values in Table 1)
- Across both datasets, the most complicated model that converged fit best (4-factor bifactor model in PSST, 3-factor bifactor model in ART):
  - 4 factors > 3 factors > 2 factors
  - Bifactor Model > Lower-Order Factor Model
  - Categorical (WLSMV) > Continuous (ML)
- In our larger sample (PSST), PBS use accounted for 13.8-40.1% of the variance in alcohol-related outcomes across models (e.g., Typ. Quantity: .138<R^2<.238, AUDIT-C: .277<R^2<.401, AUDIT Probs: .153<R^2<.219, BYAACQ: .170<R^2<.298)
- Across most models in PSST (~71%) and ART (75%), we found that **individual PBS Items** and more importantly **item residuals** more strongly predicted alcohol-related outcomes than **PBS factors**

Discussion

- Consistent with previous research (Pearson, 2013; Prince et al., 2013), alcohol PBS use was robustly related to lower alcohol consumption and consequences across models
- Factor models assume that item variance unaccounted for by the latent factors is error, yet **item residuals** were found to better predict alcohol-related outcomes than **PBS factors** across most models
- Factor analytic approaches favor internal consistency of items, likely leading to the discarding of strategies that are less correlated with other strategies
- To serve prevention, harm reduction, and clinical efforts, specific PBS are valuable to the extent that they effectively reduce alcohol-related harms
- We recommend considering alternatives to relying on factor structure to guide the development and refinement of PBS measures (e.g., criterion validity)
- We believe a strategy of identifying the most effective individual PBS that are non-redundant with each other would be a stronger way of moving the PBS field forward

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