Interventions for college student drinking are not as effective or powerful as we think: An individual participant-level data meta-analysis

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Background

- For over two decades, brief motivational interventions (BMIs) have been implemented on college campuses to reduce heavy drinking and related negative consequences.
- *Such interventions include:*
  - **In-person motivational interviews** (MI), which use an empathic and non-confrontational approach to increase motivation to change often including **Personalized feedback** (MI+PF) designed to heighten awareness of patterns of use, norms, and related consequences
  - **Standalone Personalized Feedback** (PF) interventions delivered via mail, computer, or the web
  - **MIs delivered in a group format** without PF (GMI)
- Both narrative (Larimer & Cronce, 2007) and meta-analytic reviews (Carey et al., 2007) using aggregate data from published studies suggest at least short-term efficacy of BMIs, although overall effect sizes have been small.
- Meta-analyses to-date have not accounted for the highly-skewed distributions with many zeroes that are typical for drinking measures.
- Meta-analysis using individual participant-level data (IPD) provides the opportunity to utilize more appropriate, flexible analytic techniques compared to meta-analysis using summary statistics (Cooper & Patall, 2009).

Purpose

- The current study aims to quantify overall intervention effect size of BMIs for reducing 1) drinks in a typical week and 2) alcohol-related problems using IPD pooled from multiple, independent trials.

Methods: Participants and Studies

- Data are from *Project INTEGRATE* (Mun et al., 2014), one of the largest IPD meta-analysis projects to date in alcohol intervention research.
- IPD sample included 17 studies with 8,275 individuals (see *Table 1*)
  - 2 – 5 repeated measures up to 12 months post-baseline
- Focused on randomized controlled studies evaluating one or more BMIs:
  - Individual MI with PF, Standalone PF, or Group MI

Measures

Drinks per week. For 15 studies typical weekly drinking was derived from a version of the Daily Drinking Questionnaire (Collins et al., 1985), which asks for the number of drinks consumed each day of a typical week. Diary-style reports were utilized in the remaining two studies.

Alcohol-related problems. Latent trait scores for alcohol problems were estimated across six different scales used in the original studies using a unidimensional item response theory analysis (Huo et al., in press).

Table 1. *BMI Study Characteristics*

Study	Reference(s)	Randomized Group (*n*)	BMI Type	Follow-ups (in months)
2	White et al. (2008)	92	PF	2
		102	Control	
7.1	Fromme & Corbin (2004)	81	GMI	1
		23	Control	
7.2	Fromme & Corbin (2004)	218	GMI	1, 6
		111	Control	
8a	Larimer et al. (2007)	551	PF	12
		551	Control	
8b	Larimer et al. (2007)	781	PF	12
		806	Control	
8c	Larimer et al. (2007)	133	PF	12
		165	Control	
9	Lee et al. (2009)	86	GMI	3, 6
		87	MI + PF	
		92	PF	
		91	Control	
10	Marlatt et al. (1998)	157	MI + PF	12
		164	Control	
11	Walters et al. (2007)	150	PF	2, 3
		160	Control	
12	Wood et al. (2010)	75	MI + PF	1, 3, 6
		80	Control	
13/14	Murphy et al. (2004) Murphy et al. (2001)	54	MI + PF	3, 6, 12
		27	PF	
		24	Control	
15	LaBrie et al. (2008)	139	GMI	1, 2, 3
		98	Control	
16	LaBrie et al. (2009)	156	GMI	1, 2, 3, 6
		126	Control	
18	Martens et al.(2010)	94	PF	1, 6
		100	Control	
20	Larimer et al. (2001)	217	MI + PF	12
		244	Control	
21	Walters et al.(2009)	74	MI + PF	3, 6, 12
		63	PF	
		70	Control	
22	Wood et al. (2010)	229	MI + PF	12

Statistical Analysis

- A Bayesian multilevel modeling approach (MLM) (Huh, Mun, & Atkins, 2014) was used to estimate intervention effects for each outcome.
  (Level 1) Alcohol outcome , (Level 2) Participant,
  (Level 3) Unique randomized group (study by intervention arm)
  Covariates: Baseline alcohol outcome and demographic variables (gender, race, first-year in college, and mandated status)
- *Drinks per week* analyzed in two-parts using a Hurdle Poisson MLM:
  - Zero vs. non-zero drinks (Logistic regression)
  - Quantity of drinks when drinking (Zero-truncated count regression)
- *Alcohol-related problems* analyzed using a Gaussian MLM.

Results

- 16 of 21 interventions had effects in the direction of reduced likelihood of any drinking, but only one was statistically significant (study 16, GMI; see *Figure 1*).
- 13 of 21 interventions had effects in the direction of reduced drinking quantity (when drinking) and none were statistically significant.

Figure 1. *Forest Plot of Intervention Effects on Drinks per Week (Hurdle Model)*

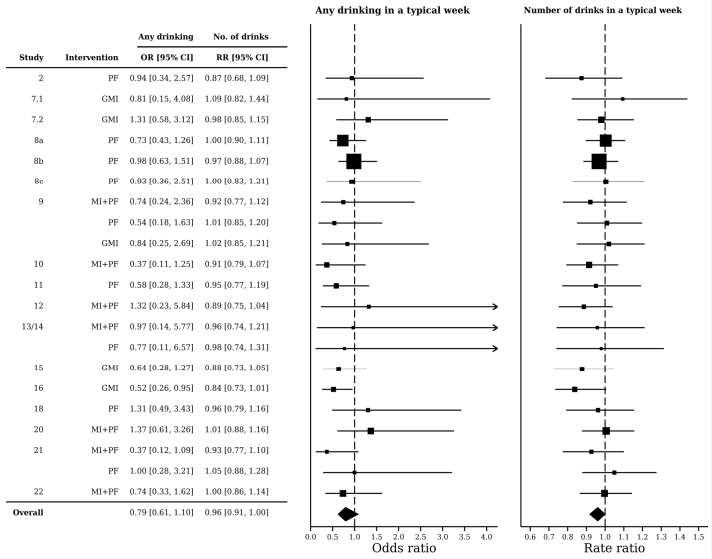

Table 2. *Intervention Effects Aggregated Across Post-Baseline Follow-Ups*

	Drinks per Week						Alcohol Problems		
	Logit			Count					
	OR	95% CI		RR	95% CI		B	95% CI	
Overall effect (BMIs vs. Control)	0.79	0.61	1.10	0.96	0.91	1.00	-0.02	-0.05	0.02
– MI + PF vs. Control	0.75	0.47	1.20	0.94	0.89	1.02	**-0.06**	**-0.12**	**-0.01**
– PF vs. Control	0.84	0.57	1.19	0.98	0.91	1.04	0.02	-0.03	0.07
– GMI vs. Control	0.78	0.49	1.31	0.96	0.87	1.03	-0.01	-0.09	0.05

- Overall intervention effects were small and not statistically significant for drinks per week and alcohol problems.
- There was a small, statistically significant reduction in alcohol-related problems for participants who received Individual MI with PF.
- There were no statistically significant intervention effects by BMI type for drinks per week.

Conclusions

- The current IPD meta-analysis represents a new way of evaluating the literature on efficacy of BMIs for college students and builds on previous reviews using summary statistics.
- Our findings suggest that efficacy of BMIs for reducing harmful drinking on college campuses is much less robust and smaller than believed.
- A limitation is that only studies for which the raw data were made available were included, therefore findings may not generalize to the broader pool of BMIs.
- The results suggest a need for the continued development of more effective intervention strategies to reduce harmful drinking on college campuses.