



Published in final edited form as:

*Addict Behav.* 2009 February ; 34(2): 232–235. doi:10.1016/j.addbeh.2008.10.010.

## Readiness to Change in Brief Motivational Interventions: A Requisite Condition for Drinking Reductions?

**Brian Borsari, Ph.D.,**

*Brown University, Center for Alcohol and Addiction Studies, Providence, RI, 02903 USA, and  
Providence VA Medical Center, Providence, RI, 20908 USA*

**James G. Murphy, Ph.D.,** and

*Department of Psychology, University of Memphis, Memphis, TN, 38152 USA*

**Kate B. Carey**

*Center for Health and Behavior, Syracuse University, Syracuse, NY 31244 USA*

### Abstract

Brief motivational interventions (BMIs) have been found to be efficacious for reducing alcohol use and consequences among college student drinkers. Despite the putative emphasis on motivation, surprisingly little is known about the role of motivation in BMI-facilitated changes. Using data from three published randomized trials implementing BMIs, we examined motivation or readiness to change (RTC) as a potential mechanism of behavior change. Two of the three studies indicated that BMI were associated with increases in motivation to change alcohol use that are apparent immediately after BMI sessions and persist up to 6-months post-intervention. However, RTC does not appear to be a mechanism of behavior change, as it did not mediate reductions in alcohol use or problems in any of the studies. Issues regarding the conceptualization and measurement of RTC are discussed, as well as promising directions for future research.

### 1. Introduction

Brief motivational interventions (BMIs) have been found to be efficacious for reducing alcohol use and consequences among college student drinkers (see Larimer & Currence, 2002, 2007). BMIs are brief therapeutic encounters (often only one session in length) that typically incorporate *motivational interviewing* (MI) and *personalized feedback*. However, relatively little is known regarding how BMIs facilitate changes in alcohol use and problems. As BMIs implemented with college students are explicitly designed to increase readiness to change (RTC) in alcohol use, RTC is a logical mechanism of behavior change (MOBC) for this type of intervention. Readiness or motivation to change is operationalized as an individual's statements about his or her desire to and likelihood of making changes.

Strong evidence for RTC as a MOBC would be obtained by empirical evidence that RTC (a) changed significantly following a BMI; (b) predicted subsequent changes in drinking and alcohol-related problems, and (c) mediated treatment effects of a BMI (Nock, 2007). This project examined these questions using data from three published randomized trials evaluating

---

Corresponding author: Brian Borsari, Ph.D, Assistant Professor (Research), Center for Alcohol and Addiction Studies, Brown University, Box G-S121-5, Providence, RI 02903 USA, Office: 1-401-863-6659, FAX: 1-401-863-6697, Email: Brian\_Borsari@brown.edu.

**Publisher's Disclaimer:** This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

the efficacy of BMIs with college students (Borsari & Carey, 2000; Carey, Carey, Maisto, & Henson, 2006; Murphy et al., 2004).

## 2. Materials and Methods

### 2.1 Procedures Common to All Three Studies

Similarities shared by the three studies in their recruitment strategies, measures, and BMI facilitated a cross-study examination of RTC.

**2.1.2 Recruitment and Sample Description**—All three studies recruited students from undergraduate academic classes, and the participants received course credit for their participation. Demographic information about each sample is provided in Table 1.

Participants in Study 1 (Borsari & Carey, 2000) reported binge drinking two or more times in the past month. Participants were randomized into one of two groups: BMI ( $n = 29$ ) or an assessment only control (AO;  $n = 31$ ). Groups did not differ on any demographic, outcome, or hypothesized mediating variables at baseline. Participants provided data at baseline and again 6 weeks post intervention. Study 2 includes a subset of heavy drinking students who participated in a large outcome study (Carey et al., 2006). All 509 participants in the parent trial reported at least weekly binge drinking episodes in the past month, and only the 138 students with complete data and randomized into a basic BMI ( $n = 68$ ) and the assessment only control ( $n = 70$ ) were eligible for these secondary analyses. The two groups did not differ at baseline on any demographic or outcome variable. Participants provided data at baseline and one-month post intervention. In Participants ( $N = 54$ ) in Study 3 reported consuming at least 13 drinks per week and experiencing one or more past-month alcohol-related problem. Participants were randomized into one of two groups: BMI ( $n = 26$ ) or personalized feedback only (PFO;  $n = 28$ ). The intervention groups did not differ on any baseline drinking or demographic variables, and participants were assessed at baseline, immediately following their interventions, and 6-months post-intervention.

**2.1.2 Measures**—All three studies used the 9-item version of the *Readiness to Change Questionnaire* (RTCQ) (Heather, Rollnick, & Bell, 1993) to measure participants' motivation or readiness to change their current drinking patterns. The 3 items for each stage of change (precontemplation, contemplation, and action) were measured on a five-point scale (ranging from  $-2$  to  $+2$ ) and summed. The three scales demonstrated adequate to very good internal consistency across the three studies: precontemplation ( $\alpha$ 's =  $0.43$ – $0.69$  in the three studies), contemplation ( $\alpha$ 's =  $0.62$ – $0.92$ ), and action ( $\alpha$ 's =  $0.64$ – $0.79$ ). Participants were given a continuous stage designation by summing the action and contemplation scale scores and subtracting the precontemplation scale score (Budd & Rollnick, 1996; LaBrie, Quinlan, Schiffman, & Earleywine, 2005). All three studies assessed alcohol-related problems were assessed by all three studies with the dichotomously-scored Rutgers Alcohol Problem Inventory (RAPI) (White & Labouvie, 1989).

**2.1.3 Brief Motivational Intervention**—All three of the studies implemented a brief motivational intervention consistent with the Brief Alcohol Screening and Intervention with College Students (BASICS) approach (Dimeff, Baer, Kivlahan, & Marlatt, 1999), administered by BB in Study 1 and graduate students trained in motivational interviewing (MI) by KBC and JM (Studies 2 and 3, respectively). In all three studies, weekly group supervision helped to ensure adherence to both MI style and to manual content. In study 3, participants assigned to the PFO condition did not discuss their drinking with a clinician, but were instructed to carefully review the personalized feedback and advice sheet (identical to the materials included in the in-person BMI) for at least 30 minutes (see Murphy et al., 2004).

### 3. Results

#### 3.1 Study 1 (Borsari & Carey, 2000)

At the 6-week follow-up, the brief intervention group exhibited significant reductions on the three drinking measures of interest. There were no changes in alcohol-related problems. To assess the participants' change scores on readiness to change, we conducted hierarchical regressions (see Table 2). The dependent variable was change in RTC (i.e., follow-up minus pre-intervention). In the first step, the baseline RTC scores (centered at 0) were added in order to evaluate time effects, controlling for regression to the mean. In the second step, group differences were evaluated by entering a dummy-coded variable (AO = -1; BMI = 1). In the third step, gender differences were evaluated (Male = -1; Female = 1). These analyses revealed significant effects for time and for group; the BMI group demonstrated significant increases in motivation to change. Gender was not associated with change in RTCQ scores.

To address our second research question, we examined whether this change in RTC was associated with reductions in drinks per week and alcohol-related problems. Although there were group differences in readiness to change, analyses revealed that treatment-related changes in readiness to change were not associated with drinks per week or alcohol-related problems. These findings precluded the examination of mediation, as variation in the mediator significantly account for variations in the dependent variable (Baron & Kenney, 1986).

**3.1.1 Summary**—This study demonstrated differential changes in readiness to change following a brief motivational intervention, but this change did not mediate drinking reductions. Therefore, we sought to replicate and extend these findings with another larger sample of college students who received a BMI.

#### 3.2 Study 2 (Carey et al., 2006)

The original report of outcomes used multi-level modeling with six groups. Focusing only on one-month outcomes for the AO and BMI groups, we conducted t-tests on change scores for drinks per week and RAPI scores. A consistent pattern of larger reductions was confirmed for the BMI condition on all but drinks per drinking day (all  $ps < .09$ )

Regarding our first research question, hierarchical regressions revealed that neither group membership nor gender associated with change in RTC. To address our second research question, we conducted regressions using the RTCQ change score to predict alcohol use and alcohol-related consequences at the one-month follow-up. As can be seen in Table 2, changes in RTCQ did not predict either drinking or alcohol-related problems, which precluded examination of mediation.

**3.2.1 Summary**—This study did not replicate the findings of Study 1: there were no differential changes in readiness to change following a BMI. Furthermore, in neither study did RTC predict drinking outcomes, a prerequisite for identifying RTC as a mechanism of behavior change in BMIs. The major limitation of both studies 1 and 2 was that the proposed mediator was evaluated at the same time as the outcomes. Study 3 allowed us to examine whether RTC, measured immediately following a BMI, was associated with subsequent changes in alcohol use and problems.

#### 3.3 Study 3 (Murphy et al., 2004)

In both the PDO and the BMI conditions, women showed a significant reduction in weekly drinking but men did not. There were no significant changes in alcohol-related problems and no treatment group differences in drinking outcomes. Our regression analyses were identical to those completed in Studies 1 and 2, and revealed significant effects for time but not for

group; both the BMI and the PDO groups demonstrated significant increases in motivation to change immediately following the intervention session. Although motivation decreased from post-intervention levels by the 6-month follow-up, the increase relative to baseline remained significant. Gender was not related to change in RTC. Regarding our second research question, hierarchical regression analyses indicated that the change in RTC from baseline to post-intervention did not predict follow-up changes in drinking, precluding mediation analyses.

**3.3.1 Summary**—This study demonstrated that personalized drinking feedback, delivered with or without a counseling session, resulted in a significant increase in motivation to change drinking immediately post-session. However, once again this increase in RTC was not associated with changes in alcohol use following the interventions.

## 4. Discussion

Two of the three studies indicated that BMIs were associated with increases in motivation to change alcohol use that are apparent immediately after BMI sessions and persist up to 6-months post-intervention. In aggregate, these results provide some support for the assumption that brief motivational interventions have the intended effect on their proximal outcome: participants' recognition that their alcohol use causes harm and that there would be some benefits to reducing their drinking. The increase in motivation was greatest immediately post session and dissipated over time. The results of Study 3 suggest that in-person MI does not increase motivation to change any more than personalized feedback delivered without a counseling session. Barnett et al. (2007) found similar results when comparing MI to a computerized alcohol intervention.

Despite evidence that BMIs (with or without a counselor) can increase RTC, we did not find support for RTC as a mechanism of behavior change. There are several possible explanations for this finding. First, the models may have been underpowered (especially Studies 1 and 3). Second, studies 1 and 2 assessed RTC at the same time as the outcomes, which is not ideal for determining whether RTC is a mechanism of behavior change (Nock, 2007). Study 3 assessed RTC immediately post-session, and detected an increase in RTC; however, the follow-up drinking assessment did not occur until six months post-intervention. Finally, these results may indicate that, although BMIs increase motivation to change, actual change in drinking may be mediated by change in social-contextual variables (social networks, academic and other substance-free activity patterns) other than RTC (Murphy et al., 2005). Future research hoping to elucidate MOBC should focus on the refinement of the RTC construct and the measurement of other social-contextual variables that might facilitate drinking reductions.

## Acknowledgements

This work was supported by National Institute on Alcohol Abuse and Alcoholism grants R01-AA015518 to Brian Borsari, R01-AA12518 to Kate B. Carey, and by a U.S. Department of Education Model Programs Grant to James G. Murphy.

## References

- Baron RM, Kenney DA. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology* 1986;51:1173–1182. [PubMed: 3806354]
- Borsari B, Carey KB. Effects of a brief motivational intervention with college student drinkers. *Journal of Consulting and Clinical Psychology* 2000;68(4):728–733. [PubMed: 10965648]
- Budd RJ, Rollnick S. The structure of the Readiness to Change Questionnaire: A test of Prochaska and DiClemente's transtheoretical model. *British Journal of Health Psychology* 1996;1:356–376.

- Carey KB, Carey MP, Maisto SA, Henson JM. Brief motivational interventions for heavy college drinkers: A randomized controlled trial. *Journal of Consulting and Clinical Psychology* 2006;74(5): 943–954. [PubMed: 17032098]
- Dimeff, LA.; Baer, JS.; Kivlahan, DR.; Marlatt, GA. *Brief Alcohol Screening and Intervention for College Students (BASICS): A harm reduction approach*. New York: Guilford Press; 1999.
- Heather N, Rollnick S, Bell A. Predictive validity of the Readiness to Change Questionnaire. *Addiction* 1993;88(12):1667–1677. [PubMed: 8130706]
- LaBrie JW, Quinlan T, Schiffman JE, Earleywine ME. Performance of alcohol and safer sex change rulers compared with readiness to change questionnaires. *Psychol Addict Behav* 2005;19(1):112–115. [PubMed: 15783287]
- Larimer ME, Cronce JM. Identification, prevention and treatment: a review of individual-focused strategies to reduce problematic alcohol consumption by college students. *Journal of Studies on Alcohol* 2002;(Suppl 14):148–163.
- Larimer ME, Cronce JM. Identification, prevention, and treatment revisited: individual-focused college drinking prevention strategies 1999–2006. *Addictive Behaviors* 2007;32:2439–2468. [PubMed: 17604915]
- Murphy JG, Benson TA, Vuchinich RE, Deskins MM, Eakin D, Flood AM, et al. A Comparison of Personalized Feedback for College Student Drinkers Delivered with and without a Motivational Interview. *Journal of Studies on Alcohol* 2004;65(2):200. [PubMed: 15151350]
- Nock MK. Conceptual and design essentials for evaluating mechanisms of change. *Alcoholism: Clinical and Experimental Research* 2007;31(Suppl 3):4S–12S.
- White HR, Labouvie EW. Towards the assessment of adolescent problem drinking. *Journal of Studies on Alcohol* 1989;50(1):30–37. [PubMed: 2927120]

**Table 1**

Descriptive data for each sample.

Demographics	Borsari & Carey, 2000 ( <i>n</i> = 29)	Carey et al., 2006 ( <i>n</i> = 138)	Murphy et al., 2004 ( <i>n</i> = 54)
Data Collection Period	1999	2001–2003	2001 – 2002
Age	18.6 (0.81)	19.29 (0.87)	19.91 (1.22)
Male	56%	35%	31%
Caucasian	90%	87%	94%
Greek Membership	14%	26%	52%
<u>Year in School</u>			
Freshman	68%	50%	8%
Sophomore	23%	38%	34%
Junior	2%	9%	34%
Senior	7%	3%	24%
<u>Alcohol Use</u>			
Frequency of drinking, past month	12.6 (4.80)	14.17 (5.38)	12.58 (5.17)
Drinks per week	18.1 (10.52)	20.62 (14.44)	24.12 (8.74)
Binge drinking episodes, past month	4.80 (1.04)	7.64 (4.62)	9.21 (5.05)
<u>Alcohol-related Problems</u>			
RAPI	3.4 (0.94)	5.94 (4.16)	7.85 (4.24)

Note. RAPI = Rutgers Alcohol Problem Index, dichotomously scored

Table 2  
Changes in readiness to change, alcohol use, and alcohol-related problems following a brief motivational intervention.

	Borsari & Carey, 2000 (N = 29)			Carey et al., 2006 (N = 138)			Murphy et al., 2004 (N = 54)					
	R <sup>2</sup>	ΔR <sup>2</sup>	t	β	R <sup>2</sup>	ΔR <sup>2</sup>	t	β	R <sup>2</sup>	ΔR <sup>2</sup>	t	β
<b>Readiness to Change (pre-post change)</b>												
	<i>6 week follow-up</i>			<i>1-month follow-up</i>			<i>Post-session</i>					
Baseline RTCQ	.425	.425	5.60**	.540	.165	.165	-4.79*	-.380	.17	.	-3.18*	-.41
Group †	.503	.078	3.32**	.306	.170	.005	1.13	.089	.18	.01	0.77	.10
Gender ††	.555	.042	2.52*	.241	.178	.008	-1.54	-.122	.18	0	0.05	.01
Group					<i>6-month follow-up</i>							
Gender					.0	0	-1.5		.02	.02	1.0	-.15
Pre-post session RTCQ					.09	.07	1.8					.26
<b>Alcohol Use (drinks per week) at follow-up</b>												
	<i>6 week follow-up</i>			<i>1-month follow-up</i>			<i>6-month follow-up</i>					
Baseline Drinking	.253	.253	3.88*	.488	.125	.125	3.33**	.285	.41	.41	5.82**	.64
Group	.322	.069	-2.08*	-.249	.141	.016	-1.41	-.113	.41	0	-0.02	-.01
Gender	.330	.008	0.64	.080	.177	.036	-2.42*	-.203	.49	.08	-2.65**	-.30
Change in RTCQ †††	.330	.000	-0.57	.069	.182	.005	.89	.074	.51	.02	-1.41	-.15
<b>Alcohol-related Problems at follow-up</b>												
	<i>6 week follow-up</i>			<i>1-month follow-up</i>			<i>6-month follow-up</i>					
Baseline Problems	.418	.418	5.68**	.654	.394	.394	9.04**	.613	.34	.34	5.01**	.57
Group	.427	.009	.573	-.067	.403	.009	-1.50	-.102	.35	.01	-.4	-.05
Gender	.430	.003	.526	.071	.409	.006	-1.03	-.070	.35	0	.03	.01
Change in RTCQ †††	.426	-.004	-0.69	-.077	.414	.005	0.99	.067	.35	0	-1.14	-.02

\* p < .05

\*\* p < .01;

† group was coded -1 Control, 1 Brief Motivational Intervention;

†† gender was coded -1 male, 1 female;

††† For Borsari & Carey (2000) and Carey et al. (2006), the change score was follow-up minus baseline RTCQ scores, while for Murphy et al. (2004) the change scores were baseline minus post-session RTCQ scores.