



Are young men who overestimate drinking by others more likely to respond to an electronic normative feedback brief intervention for unhealthy alcohol use?☆

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HIGHLIGHTS

- 734 young men received an internet normative feedback brief intervention (IBI).
- We tested perception of others' drinking as a moderator of the IBI effects.
- IBI was effective among those overestimating others' drinking.
- The intervention was not effective among those accurately- or under-estimating.
- Correcting perception of others' drinking is a potential mechanism of action of IBI.

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ABSTRACT

Aim: To tested whether the efficacy of an internet-based brief intervention that included normative drinking feedback varied with estimations of the drinking of others.

Methods: This study is a secondary analysis of a randomized controlled trial showing an intervention effect on weekly drinking. Participants were males with unhealthy alcohol use (mean age [SD] = 20.8 [1.1]). Before the trial, participants were asked to estimate the percentage of men their age who drink more than they do. Using their self-reported drinking data, the “perceived” percentage of people their age and gender who drink more than they do, and data from Swiss statistics, we classified participants as overestimating (>+10%), accurately (−10% to +10%) or underestimating (<−10%) drinking by others.

Results: Of 734 participants with complete data, 427 overestimated, 205 accurately estimated and 102 underestimated the drinking of others. The mean (SD) number of drinks per week was 9.8 (7.9) and AUDIT score was 10.6 (4.2). In stratified negative binomial regression models predicting drinks per week, at 6 months, and controlling for baseline drinks per week, the intervention was effective among those overestimating (IRR[95%CI] = 0.86[0.74;0.98]), but showed no effect among those accurately estimating (IRR[95%CI] = 0.83[0.66;1.03]) or underestimating (IRR[95%CI] = 1.21[0.92;1.60]) the drinking of others.

Conclusions: Perception of drinking by others appears to be a moderator of effect of an electronic feedback intervention among hazardous drinkers. This finding is consistent with the hypothesis that correcting the perceptions of others' drinking is a potential mechanism of action in normative feedback paradigms.

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1. Introduction

Unhealthy alcohol use is a major public health problem (Rehm, 2011) and has been the target of multiple secondary prevention brief intervention models (Babor et al., 2010). It is one of the leading modifiable risk factors of morbidity and mortality in young adults (Marmet, Rehm, Gmel, Frick, & Gmel, 2014). Over the past decade, there has been a large increase in the development of web-based brief interventions for

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unhealthy alcohol use. These interventions are able to reach a broad population of users who are not necessarily seeking treatment (Cunningham & Breslin, 2004), and they have multiple advantages including low cost, less burden on primary care providers, no requirement for extensive training, continuous access for participants, no geographical restrictions, and reduced fear of stigma since the interventions are anonymous (Lapham et al., 2012). Recent systematic reviews indicate that this method of delivery of brief intervention has potential efficacy, but underline that few studies have investigated non-student populations, even though electronic interventions show promise for young adults and adolescents (Donoghue, Patton, Phillips, Deluca, & Drummond, 2014; Khadjesari, Murray, Hewitt, Hartley, & Godfrey, 2011; Patton et al., 2014; Riper et al., 2014; Riper et al., 2011; Rooke, Thorsteinsson, Karpin, Copeland, & Allsop, 2010).

Normative feedback has often been included as a component of brief web-based interventions for unhealthy alcohol use and is effective in reducing alcohol use (Cunningham, Hendershot, Murphy, & Neighbors, 2012; Cunningham, Wild, Cordingley, van Mierlo, & Humphreys, 2009; Kypri et al., 2013; Lewis & Neighbors, 2007; Neighbors et al., 2010). Intervention effects are significant, though small (Foxcroft, Moreira, Almeida Santimano, & Smith, 2015). In general, normative feedback aims at highlighting discrepancies between one's perception of others' drinking and one's actual alcohol use by using specific feedback (Lewis, Neighbors, Oster-Aaland, Kirkeby, & Larimer, 2007). For individuals with unhealthy use, the aim is reduced consumption through normative feedback. The hypothesized mechanism of action of normative feedback relies on the following assumptions: 1) individuals with unhealthy alcohol use overestimate the drinking by others (i.e. they perceive heavy drinking as the norm, or they misperceive their own drinking compared to the drinking of others); 2) these misperceptions can be modified; and 3) providing current norms will correct misperceptions and lead to reduced drinking (Borsari & Carey, 2001; Prentice & Miller, 1993). There is preliminary evidence supporting the theoretical hypothesis of normative feedback, namely, that changes in drinking have been shown to be mediated by changes in perceived norms following the feedback (Neighbors, Larimer, & Lewis, 2004). Following this hypothesis, the normative feedback is an active ingredient and the change in perceived norms the mechanism of change (i.e. the normative feedback introduces or increases discrepancy between one's perception and actual norms).

As with other components of brief interventions, the study of mechanisms of action of normative feedback could lead to the development of more effective interventions (Miller et al., 2013) and to a better understanding of the potential or inherent risks of the intervention. Some concerns have been raised about possible “boomerang” effects of normative feedback, but Prince et al. (Prince, Reid, Carey, & Neighbors, 2014) investigated the impact of normative feedback among light drinkers in four samples and found no evidence of increased drinking following normative feedback. Nevertheless, while the perception of others' drinking is often exaggerated among young adults (Baer & Carney, 1993; Borsari & Carey, 2003), not all individuals with unhealthy alcohol use overestimate drinking by others. In two studies conducted in a sample of Swiss young men, some unhealthy alcohol users correctly estimated their own drinking, relative to peer drinking, or even underestimated drinking by others; up to 20% of individuals who drank 15 or more drinks per week accurately estimated or underestimated drinking by others (Bertholet, Faouzi, Studer, Daepfen, & Gmel, 2013; Bertholet, Gaume, Faouzi, Daepfen, & Gmel, 2011). Therefore, when delivered to large samples of unhealthy alcohol users, interventions that include normative feedback elements are likely to reach individuals who correctly perceive the norms and understand that their own consumption is relatively high. Determining whether normative feedback effects differ according to perceptions of how much others drink is important. Individuals who overestimate drinking by others should benefit most from normative feedback, but iatrogenic or boomerang effects are possible for those individuals who underestimate.

Therefore, the aim of this study was to determine whether the perception of drinking by others improves the efficacy of brief interventions which include normative feedback as a component, i.e., do perceptions of drinking act as a moderator of outcome effects? Using data from a randomized controlled trial of web-based brief interventions that showed a significant intervention effect on drinking at 6 months, we investigated the impact these perceptions had on the intervention effect. We hypothesized that there would be greater reductions in alcohol use among those who overestimated the drinking of others.

2. Material and methods

This study is a secondary analysis of a two-group, parallel randomized controlled trial showing an intervention effect on weekly drinking among 737 Swiss males with unhealthy alcohol use having a mean age (SD) of 20.8 (1.1) years (Bertholet et al., 2015). Participants were recruited in Switzerland within a population-based study of young males, the Cohort on Substance Use Risk Factors (CSURF, see <http://www.csurf.ch>).

Unhealthy alcohol use was defined as > 14 drinks/week or ≥ 6 drinks/occasion at least monthly or Alcohol Use Disorders Identification Test (AUDIT) scores ≥ 8 . Participants were randomized to receive an internet-based intervention ($n = 367$) or no treatment ($n = 370$) and were followed at one month and at six months. The intervention had a positive effect on the primary outcome (number of drinks per week at 6 months). Details of that research have been reported elsewhere (Bertholet et al., 2015). First, at the cohort study assessment that took place before the recruitment in the randomized trial, the participants were asked to estimate the percentage of people their age and gender who drink more than them with the question: *In your opinion, what is the percentage of people your age and gender drinking more than you do.* At the randomized trial baseline assessment, participants were then asked to report their weekly drinking and frequency of binge drinking (defined as six or more drinks per occasion), through questions about typical drinking frequency and amount consumed per typical drinking day. These quantity and frequency measures have been validated (Rehm, 1998). Number of drinks per week was calculated by multiplying number of drinking days per week by number of standard drinks per drinking days. This assessment was repeated at the six-month follow up. Reported drinking at baseline was compared to national data from the Swiss Health Survey (OFS, 2004) and shown to intervention group participants in the form of normative feedback, showing the percentage of individuals of the same age and gender who drink as much as, and less than they do. These comparisons were also presented in pie charts. Other intervention elements consisted of feedback on consequences of drinking, amount of calories consumed in alcoholic drinks over the past 12 months, estimated blood alcohol content during episodes of heavy drinking, recommendations for low-risk drinking, and general information on alcohol and health.

Using self-reported baseline drinking, participants' perceptions of peer drinking, and the national data used to provide the normative feedback, we classified participants as overestimating ($> +10\%$), accurately (-10% to $+10\%$) or underestimating ($< -10\%$) drinking by others. Participants with complete reported and perceived drinking data ($n = 734$) were used in the present study.

We chose to focus on number of drinks per week as an outcome variable because it was the primary outcome in the main study where an intervention effect was found.

Analyses: First, we compared each demographic and baseline drinking variable (number of drinks per week, binge drinking prevalence and AUDIT scores) between the three perception of drinking groups using Kruskal-Wallis for continuous variables and Chi square for categorical variables. Analyses were stratified by perception of drinking across three groups of participants who overestimated, accurately estimated, and underestimated drinking by others. Negative binomial regression

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