

# Mailed Feedback Reduces Consumption Among Moderate Drinkers Who Are Employed

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To test the efficacy of mailed feedback for drinking reduction among employees of a manufacturing firm, 48 drinkers were recruited and alternately assigned to receive mailed feedback on their drinking either immediately or after an 8-week waiting period. Using a delayed treatment design, participants were assessed by mail at baseline, 8, and 16 weeks. After viewing their feedback, participants indicated a higher level of importance of making a change, but not confidence in their ability. There were also significant decreases in consumption after receiving the feedback, and these changes were mediated by participants' increased perceptions regarding the "riskiness" of alcohol consumption. An additional 26 nondrinkers at baseline volunteered to participate and also were mailed feedback. Among this group, receipt of feedback indicating a very low level of risk did not lead to increased drinking. This cost-effective intervention appears to reduce consumption among light-to-moderate drinkers, and may warrant a larger place in the framework of workplace alcohol reduction programs.

**KEY WORDS:** feedback; alcohol; intervention; workplace; EAP.

## INTRODUCTION

Surveys over the past three decades have consistently estimated that about 10% of American adults have significant problems related to their use of alcohol (Calahan, 1970; National Institute on Alcohol Abuse and Alcoholism [NIAAA], 1997). Each year alcohol abuse is responsible for the loss of a substantial number of productive life years and a considerable portion of health care costs, especially psychiatric care (Andreasson & Brandt, 1997). In addition to those who are alcohol dependent based on diagnosis, epidemiological data indicate that there are many additional problem drinkers who would not qualify as physically dependent alcoholics (Calahan, 1987).

Perhaps one third of the U.S. population over the age of 18 could be classified as moderate-to-heavy drinkers (NIAAA, 1997) and almost 40% of young males have experienced some negative consequences from alcohol (Polich, 1981). The public health opportunity among these nondependent drinkers has long been recognized by the National Academy of Sciences, which has recommended developing better and more cost-effective interventions for these less severe problem drinkers (Institute of Medicine, 1990).

Similar rates of problem drinking and dependence have been found in the workplace. Among managerial and professional workers, about 70% currently drink alcohol and most drink moderately (Stinson *et al.*, 1993). Rates of alcohol dependence among the employed range from about 3 to 15% for men and from 2 to 12% for women and vary widely with occupation (Parker & Harford, 1992). Employers have noted substantial productivity losses, as well as the costs of treating those covered under employee benefit programs. For instance, productivity losses attributed to alcohol during 1995 were estimated at \$119 billion (Harwood *et al.*, 1998), excluding the considerable legal and public relations costs. One

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study found that drinking at work and frequency of getting drunk was positively related to frequency of absenteeism, arriving late to work or leaving early, poor work performance and arguing with coworkers (Mangione *et al.*, 1999).

Employee assistance programs (EAPs) focus on alcohol reduction through identifying and referring problem drinkers to treatment (Hutchinson & Emener, 1997). At their most basic function, EAPs identify those with alcohol and other substance problems, assess drinking severity, and make referrals to appropriate treatment sources. The workplace is a natural setting for providing prevention messages to individuals with drinking problems. Unfortunately, many employees avoid EAPs, who are primarily responsible for disseminating prevention messages, because of the stigma associated with receiving drug and alcohol treatment (Bennett & Lehman, 2001; Hersch *et al.*, 2000). In addition, although recovery groups such as Alcoholics Anonymous are well integrated into most EAPs, there have been relatively few attempts to evaluate their effectiveness in terms of changes in actual consumption (Cook *et al.*, 1996; Foote & Erfurt, 1991; Lapham *et al.*, 2000; Walsh *et al.*, 1991).

Although rarely examined in the workplace setting, there is substantial evidence that changes in drinking can be affected by relatively brief interventions. Ever since Edwards *et al.* (1977) found that brief advice could be as effective as longer term treatment, researchers have looked for ways to make treatment less invasive and costly. One such intervention that has shown promise in several clinical trials involves motivational feedback as a stand-alone treatment or as an adjunct to more intensive treatment. In an early feedback study, Miller *et al.* (1993) provided a two-session motivational *checkup* to drinkers recruited via newspaper ads. After completing an assessment packet, participants met with a therapist who summarized their assessment information, including estimated level of risk, and offered support and advice. Overall, the intervention resulted in a 57% drinking reduction at 6 weeks, which was maintained at 1 year. Likewise, among a group of heavy drinking college students, Baer *et al.* (1992) found that a single hour of advice and feedback produced statistically similar results to findings obtained from 6-week class and discussion group.

In an even more striking example, Agostinelli *et al.* (1995) reported substantial reductions even when feedback was mailed to drinkers, and no face-to-face meeting occurred. Reductions also were ob-

served in two recent trials conducted with heavy drinking college students (Walters, 2000; Walters *et al.*, 2000). In these studies, students identified as moderate-to-heavy drinkers completed baseline assessment measures, and were randomized to receive mailed feedback or not. Feedback was based on self-report data and included information summarizing the number of drinks consumed per month, peak blood alcohol levels, a comparison of reported levels of drinking to campus and national norms, and the identification of specific risk factors. In the first trial, participants who received mailed feedback reported an average reduction of 53.1% when reassessed at 6 weeks, whereas those participants in the control group remained virtually unchanged. Participants who received feedback in the second study likewise showed a decrease over control participants, albeit not as large as the decreases obtained in the first study.

Taken together, these studies provide evidence that personalized motivational feedback can influence alcohol consumption across levels of severity. However, the effect of feedback on alcohol consumption has yet to be investigated in a workplace setting where the overall level of alcohol consumption is moderate at best. The purpose of this study, then, was to investigate how a minimal feedback-based intervention might be implemented in the workplace for light and moderate drinkers who would not ordinarily receive EAP attention.

## METHOD

### Participant Recruitment

Employees of ALARIS Medical Systems, a California-based manufacturing firm, were randomized to receive feedback either immediately or after an 8-week waiting period. In the spring of 2000, approximately 1000 North American employees received an assessment packet in their quarterly health newsletter querying, "Have you ever wondered about your drinking?" and offering "a free confidential check-up by mail." One month after the mailing, 74 employees had agreed to participate. The Institutional Review Boards of the University of New Mexico and San Diego State University approved this project and all participants gave written consent. Participants received \$25 for completing the follow-up assessments.

Upon return of the informed consent and assessment forms, participants were alternately assigned to

immediate (IF) and delayed feedback (DF) groups. The study used an alternately assigned, delayed-treatment experimental design with a baseline assessment and follow-up assessments at 8 and 16 weeks. Both groups received feedback by mail, the IF group approximately 1 week following return of their consent/baseline assessment packet and the DF group approximately 1 week following receipt of the second assessment. To examine potential mediators of the feedback's effectiveness, a postage-paid card was included with the feedback, and provided participants an opportunity to rate on a 10-point scale how surprising they found the information to be, how motivated they were for change, and their level of perceived risk.

### Feedback Content

The feedback for this study was based on the Check-Up To Go (CHUG), which has shown efficacy in several studies with heavy drinking college students (Schroeder, 2001; Walters, 2000). Feedback materials included (1) a QF summary (i.e., number of standard drinks consumed in the last week and month, estimated peak BAC); (2) percentile comparison (Miller, 2000); (3) level of risk (i.e., drinking-related consequences, estimated genetic risk, and tolerance level; Miller *et al.*, 1995); (4) estimated amount spent on alcohol per year; (5) number of cigarettes smoked in a typical month; and (6) four pages of motivationally based information and advice (cf. Miller & Rollnick, 2002), including drinking myths and facts, the effects of alcohol at varying BAC levels, and a list of community and EAP resources.

### Measures

Instruments included measures of quantity/frequency of consumption, readiness for change, perceived risk of use, and alcohol-related consequences. All questions were self-report and scored according to standardized procedures.

#### *Quantity/Frequency (QF) of Consumption*

The QF measure used in this study was similar to measures used in other studies of alcohol consumption (Armor *et al.*, 1978; Calahan *et al.*, 1969; Miller *et al.*, 2003) and such self-report measures have been shown to be generally reliable and valid indicators

of drinking (Williams *et al.*, 1985; Wolber *et al.*, 1990). Although more sophisticated drinking measures have been developed in recent years (e.g., Miller, 1996), this measure was chosen because of its simplicity in this self-guided format. Respondents were asked to think about a typical week during the last 30 days and for each day, to record the number of standard drinks they consumed on that day. A standard drink was defined as one half ounce of pure ethyl alcohol, thus approximating a 12-oz beer, 5 oz of wine, or 1.5 oz of 80-proof liquor. To obtain the respondent's peak blood alcohol concentration (BAC) during the previous month, a similar question was posed regarding the heaviest episode during the past 30 days, and the number of hours in which the alcohol was consumed.

#### *Short Index of Problems—Recent (SIP)*

The SIP is the brief version of the Drinker Inventory of Consequences, which measures adverse consequences of drinking during the previous 90 days. Test-retest reliability has been shown to range upward from .85, with the exception of the impulse control subscale (.71), and internal consistency scores have been found to be excellent (Miller *et al.*, 1995).

#### *Importance—Confidence Indicators*

Readiness to change is often divided into the *personal value* of change (e.g., perceived importance or benefit of change), and one's *perceived ability* to achieve it (Rollnick, 1998). Thus, to measure both importance and confidence, respondents were asked to rate on a 10-point scale: (1) "At this moment, how important is it for you to reduce your drinking?" and (2) "At this moment, how confident are you that you could change your drinking if you wanted to?" To estimate change effected by receiving feedback, these two questions were posed both at baseline assessment, and immediately after participants viewed their feedback (i.e., in the postfeedback card).

#### *Perceived Risk of Alcohol*

Risk ratings indicate the extent to which respondents believe that drinking in general, or one's drinking in particular, is becoming risky or problematic. Respondents were asked to rate on a 10-point scale:

Table 1. Sample Demographics at Baseline for Drinking Participants

Measure	Treatment			
	Immediate (N = 25)		Delayed (N = 23)	
	M	SD	M	SD
DPW	5.87	4.90	7.55	5.84
Peak BAC	0.043	0.048	0.064	0.072
Spent per week on alcohol	10.70	9.74	16.83	15.71
Blood relatives risk score	1.80	2.86	2.60	2.44
Cigarettes smoked/day	0.02	0.07	2.65	5.47
Negative consequences	0.50	0.83	3.25	4.41

(1) “In general, how risky is alcohol consumption?” and (2) “How risky is *your* alcohol consumption?” Similar questions have shown adequate reliability in other studies (Duitsman & Colbry, 1995). These two questions were posed at baseline assessment, as well as immediately after participants viewed their feedback.

RESULTS

Of the 74 employees who agreed to participate, 26 were nondrinkers at pretest (i.e., they reported consuming no drinks during a typical week in the previous month) and are excluded from analysis, except where specifically mentioned. The remaining 48 drinkers were 56% female. Forty-six (95.8%) responded at the 8-week follow-up, 46 (95.8%) responded at the 16-

week follow-up, and 44 (91.7%) responded at both times.

Table 1 summarizes mean values for drinkers at baseline. As a check of group equivalence, a series of *t* tests (allowing for heterogeneity of variance) between the immediate and delayed feedback groups at baseline revealed no significant differences in terms of drinks per week (DPW), gender, number of alcohol-dependent relatives, number of cigarettes smoked in an average day, or level of reported negative consequences.

Table 2 contains the correlation matrix between pretest variables. As expected, consumption measures were moderately related to each other and positively related to the presence of drinking-related consequences. Heavier drinking was positively related to the perception that one’s personal alcohol consumption was more risky ( $r = .61, p < .01$ ). Heavier drinkers also indicated that it was more important to them to make a change in their drinking ( $r = .39, p < .01$ ), although they reported being less confident that they could do so ( $r = -.32, p < .05$ ). There was no tendency for heavier drinkers to underestimate moderate and abstinent drinking norms, nor to rate alcohol consumption as generally risky. Perception of personal risk was positively associated with DPW ( $r = .61, p < .01$ ), peak BAC ( $r = .45, p < .01$ ), amount of money spent on alcohol ( $r = .55, p < .01$ ).

The primary analyses of treatment effects included univariate analyses of the difference scores between pretest and 8-week follow-up scores (i.e.,  $T_2 - T_1$ ), and from the 8 to 16-week follow-ups (i.e.,  $T_3 - T_2$ ). No baseline measure added any significant

Table 2. Correlations for Pretest Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Female gender														
2. DPW	-.29													
3. Peak BAC	-.01	.63**												
4. Times drove intox.	.15	.57**	.47**											
5. Times rode intox.	.10	.42*	.56**	.49**										
6. Spent per week	-.12	.62**	.36	.41*	.19									
7. Blood relatives risk	-.14	-.21	-.18	-.08	-.02	-.28								
8. What % don't drink?	.12	.10	.09	.05	-.03	-.06	-.08							
9. What % two or less?	.08	.13	-.25	.06	-.15	.22	-.18	.39*						
10. Cigarettes smoked	.05	.17	.21	.21	.22	-.24	.33	.02	-.02					
11. Important to reduce?	-.11	.39*	.28	.24	.06	.30	-.08	.32	.22	.08				
12. Confident to reduce?	.04	-.32	-.19	-.20	-.12	-.07	.12	.00	-.04	-.31	.02			
13. General risk?	-.07	-.00	-.19	.02	-.22	.06	.05	-.17	.09	-.32	-.02	.19		
14. Personal risk?	-.27	.61**	.45*	.34	.04	.56**	-.14	-.02	.31	-.09	.49**	-.12	.23	
15. Negative consequences	-.19	.38*	.26	.40*	.29	.29	.15	.14	-.09	.08	.23	-.27	-.23	.25

\* $p < .01$ . \*\* $p < .001$ .

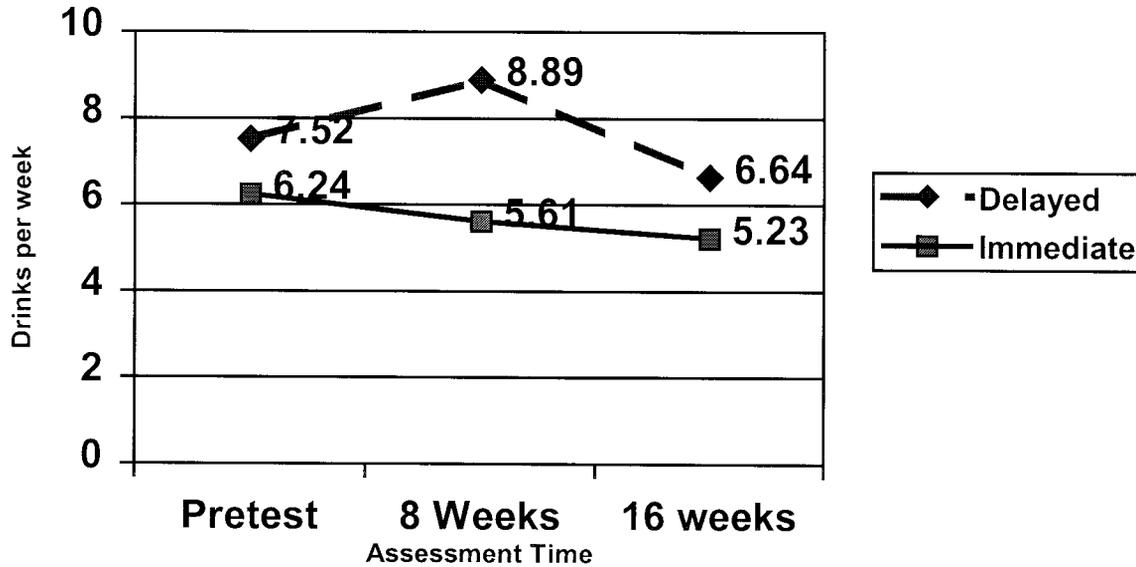


Fig. 1. Mean levels of drinks per month.

predictive variance, nor were alpha (e.g., Bonferroni) corrections used for these tests. Results of the group comparison over the first time period showed that the treatment effect was significant from pretest to the 8-week follow-up,  $F(1, 44) = 4.099$ ,  $p = .049$ . Using the numbers available on a test-by-test basis, for this time period, the IF group decreased their consumption by an average of 0.87 DPW, whereas the comparison group increased by 1.75 DPW. Figure 1 graphically portrays the group means at baseline and follow-up. For the second time period, a nonsignificant trend for differential change was observed,  $F(1, 42) = 3.453$ ,  $p = .070$ . The delayed feedback group decreased by 2.9 DPW, whereas the immediate feedback group remained relatively unchanged (decrease of 0.22 DPW). Individual tests of the mean changes over time also indicate a significant feedback effect. The IF group showed a significant decrease during the first interval,  $t(22) = 2.310$ ,  $p = .031$ , though not during the second follow-up period,  $t(21) = .166$ ,  $p = .870$ , and the DF group showed a near significant change for the second interval,  $t(21) = 2.005$ ,  $p = .058$ , though not for the first follow-up period,  $t(22) = 1.25$ ,  $p = .224$ . Overall, collapsing the two groups revealed an aggregate change between pretest and 16-week drinking levels,  $t(45) = 2.791$ ,  $p = .008$ . To determine if there was a differential effect of the feedback for lighter versus heavier drinkers, a dichotomy was created using a median split and the data reanalyzed using the same procedure. Results of these tests revealed no

such differential effect at any period, and none of the median-split groups showed significantly different effects at any time.

A series of additional analyses examined program effects on reported importance of making a change, confidence in one's ability to make a change, and drinking-related risk. First, a series of correlated  $t$  tests was conducted to determine whether receipt of the feedback was associated with increased levels of these potential mediators. Significant increases were seen across the board in terms of importance, and general and personal risk perception after viewing the feedback. After receiving the feedback, the importance ratings of participants in the IF group increased by a mean of 1.41,  $t(23) = 2.944$ ,  $p = .007$ . General and personal risk scores in this group also increased after the feedback; mean of 2.13,  $t(23) = 3.408$ ,  $p = .002$ , and 1.00,  $t(23) = 2.695$ ,  $p = .013$ , respectively. Similarly, in terms of the DF group, after receipt of the feedback, participants increased their importance ratings by a mean of 0.95,  $t(19) = 2.894$ ,  $p = .009$ , general risk increased 2.85,  $t(19) = 3.775$ ,  $p = .001$ , and personal risk increased 1.35,  $t(21) = 2.864$ ,  $p = .009$ . There were no significant changes in confidence ratings, which tended to be high to begin with. Changes in estimated levels of general risk were inversely related to changes in DPW,  $r(41) = -.321$ ,  $p = .036$ , although none of the other proposed mediators (i.e., importance, confidence, and personal risk) were significantly related to change. In other words, those who

increased their estimates of general risk as a result of the feedback also showed reductions in consumption. When this variable was entered as a covariate into the previous univariate tests, there was a significant decrease in the *F* value, which is consistent with the hypothesis that perceptions of general risk were mediating the relationship of feedback on drinking outcome (Baron & Kenny, 1986).

Finally, in terms of whether the receipt of the feedback produced any adverse effects on those who were abstainers, a simple frequency table shows that it did not. Of the abstainers, only one person reported drinking (1 DPW) subsequent to viewing the feedback. In fact, in terms of norm estimation and general risk of alcohol consumption, the abstainers appeared quite like the drinkers, with no significant differences between the two groups either before or after the feedback.

## DISCUSSION

In response to the recent call for cost-effective interventions for light and moderate drinkers, this study demonstrated significant decreases in alcohol consumption after employees of a manufacturing firm were mailed personalized feedback on their drinking. These findings are significant because of both the reduction in drinking produced by the feedback—14% of baseline levels—and the cost-effective nature of the intervention. In addition, the lack of change in drinking practices of those who were initial abstainers argues that feedback would be a particularly safe method for more general prevention efforts. In other words, the intervention reduces drinking in those who are light and moderate drinkers and does not harm those who report little or no perceived risk from drinking. In addition to the demonstrated program efficacy, there are other aspects to this type of intervention that might lend themselves to a more widespread application: (a) The relative ease of the assessment and feedback package delivered to a large number of recipients; (b) specifics of the feedback that can be tailored to the needs of different groups (e.g., stage of contemplation, work-related information, gender or ethnicity of respondents); (b) the potential cost savings when compared to face-to-face intervention methods; (c) the potential to provide feedback at multiple time points; and (d) the option to integrate feedback into an existing prevention program or as a stand-alone intervention when none is available.

Equally important, the immediacy of the feedback seemed to be an important factor in the impact on alcohol consumption. Participants who received immediate feedback did significantly better (larger alcohol consumption reductions) than those who received delayed feedback. This feedback immediacy effect may be an important finding for prevention researchers who are concerned with the timing of prevention messages that are tailored to an input-feedback format.

In terms of the hypothesized mediators, only increases in perceptions of general risk mediated changes in drinking. Interestingly, general risk (as did ratings of importance and personal risk) tended to decline back to baseline levels when participants were reassessed at follow-up. In the case of importance and personal risk, this might be seen as an artifact of the reductions in drinking (i.e., participants decreased drinking was seen as less of a problem), but in the case of general risk, other explanations seem to be warranted. One possibility is that participants tended to give higher ratings on the card than they did on the assessment forms. Another possibility suggests that consistent with the action of other hypothesized mediators, change can be elicited even through more transitory perceptions of risk. It is also interesting to note that levels of confidence did not increase as a result of viewing feedback. In this regard, it may be possible that this form of feedback works by evoking discrepancy (e.g., norm comparisons, risk factors), rather than by increasing confidence (e.g., advice on how to change, providing resources).

## STUDY LIMITATIONS

At least four study limitations must be considered. First, and most notably, our sample consisted primarily of light and moderate drinkers. Among the participants who reported drinking at baseline, the average consumption was 6.9 DPW (with a range of 1–21), placing the mean drinker at about the 80th percentile of adults or the 50th percentile of adult drinkers. The level of drinking in this study compares to a preintervention average of 40.8 DPW in the case of a sample of problematic drinkers recruited via the newspaper (Miller *et al.*, 1993), and 24.4 DPW for heavy drinking college students screened out of psychology classes (Walters *et al.*, 2000). Evidence of negative consequences resulting from alcohol use was also slight, averaging 1.92 at pretest as measured by the Short Inventory of Consequences. We did not

screen participants for this study based on a severity cutoff score (e.g., the AUDIT), and this relatively moderate drinking population (and, more curiously, abstainers) is likely due to the fact that we offered a \$25 incentive to all who agreed to participate. Even among those drinkers that participated, we had a relatively large proportion of light drinkers, and this may make it difficult to generalize the results of this study to populations containing more problematic drinkers. Future work might focus on whether this method might also apply to more problematic drinkers, and what methods are more likely to engage these individuals. On the other hand, the fact that we were able to find an effect among lighter drinkers provides information that previous clinical studies do not—that this inexpensive intervention might be appropriate for the large bulk of drinkers who would not be identified as “problem” drinkers through traditional screening methods. This is especially important given that the majority of drinking problems (e.g., DWI, absenteeism) are not actually experienced or caused by those who would generally be considered “problem drinkers” or “alcoholics.” Thus, workplace interventions like this one may be one way to meaningfully reach a broad audience with a prevention message (Hersch *et al.*, 2000).

Second, and in a related vein, all participants were volunteers recruited through a flyer inserted in the company’s newsletter, creating the possibility that those who volunteered were different either behaviorally or psychologically from other drinkers in the population. Indeed, the relatively low levels of consumption reported by participants in this study partially support this hypothesis, although it did include a relatively good range of light and moderate drinkers.

Third, this study had a smaller response rate than was expected given the offer of a \$25 incentive (approximately 7.4% response rate). It is possible that many of those who received the health newsletter did not actually open it, and never got to our recruitment flyer inside. Also, the study protocol required participants to complete a fairly lengthy consent form, which was to be returned with the pretest assessment, and this document may have also deterred would-be participants.

Finally, although an 8-week follow-up period was in line with the format of past mailed-feedback studies, this brief window does not allow us to say whether either group experienced an increase in drinking beyond the window we were able to measure. It is possible that the reductions observed as a result of the feedback, like many informational approaches, will

“wash out” over time (Collins *et al.*, 2002). Thus, future studies would do well to assess whether there are long-term effects of such an intervention. On the other hand, even if this is the case, the very low cost of the intervention might make it suitable for use at multiple times, such as a “quarterly drinkers’ check-up,” where participants could receive feedback at multiple time points. A cost–benefit analysis would be helpful in clarifying the relative benefit of this inexpensive intervention.

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