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## Personalized Drinking Feedback: A Meta-Analysis of In-Person versus Computer-Delivered Interventions

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### Abstract

**Objective**—Alcohol misuse is a significant public health concern. Personalized feedback interventions (PFIs) involve the use of personalized information about one’s drinking behaviors and can be delivered in-person or via computer. The relative efficacy of these delivery methods remains an unanswered question. The primary aim of the current meta-analysis was to identify and directly compare randomized clinical trials of in-person PFIs and computer-delivered PFIs.

**Method**—A total of 14 intervention comparisons from 13 manuscripts, of which 9 were college samples, were examined: in-person PFIs ( $N=1240$ ; 49% female; 74% White) and computer-delivered PFIs ( $N=1201$ ; 53% female; 73% White). Independent coders rated sample characteristics, study information, study design, intervention content, and study outcomes.

**Results**—Weighted mean effect sizes were calculated using random-effects models. At short follow-up ( 4 months), there were no differences between in-person PFIs and computer-delivered PFIs on any alcohol use variable or alcohol-related problems. At long follow-up (> 4 months), in-person PFIs were more effective than computer-delivered PFIs at impacting overall drinking quantity ( $d = .18$ ) and drinks per week ( $d = .19$ ). These effects were not moderated by sample characteristics.

**Conclusions**—For assessing alcohol outcomes at shorter follow-ups, there were no differences between delivery modality. At longer follow-ups, in-person PFIs demonstrated some advantages over computer-delivered PFIs. We encourage researchers to continue to examine direct comparisons between these delivery modalities and to further examine the efficacy of in-person PFIs at longer follow-ups.

### Keywords

meta-analysis; personalized feedback; alcohol

Despite an increased focus on preventive interventions (e.g., Crounce & Larimer, 2011), research indicates emerging adults engage in harmful levels of alcohol use. Hazardous alcohol use has been associated with a variety of alcohol-related problems including impaired academic performance, physical injury, risky sexual behavior, and sexual assaults (Hingson, Zha, & Weitzman, 2009; Wechsler, Lee, Kuo, Seibring, Nelson, & Lee, 2002). Given these negative outcomes, interventions targeted at reducing heavy alcohol use among emerging adults are essential.

## Personalized Feedback Interventions

Personalized feedback interventions (PFIs) aim to reduce negative alcohol outcomes through the use of personalized feedback about one's drinking behaviors. Typically, PFIs target heavy drinkers and have historically been used in one-on-one counseling sessions delivered using Motivational Interviewing (MI) principles (Miller & Rollnick, 2012). Recently, studies have examined the efficacy of PFIs delivered without an in-person session (e.g., Carey, Scott-Sheldon, Elliott, Bolles, & Carey, 2009; Martens, Kilmer, Beck, & Zamboanga, 2010). For the purposes of the present study we use the terms "IPFI" to refer to in-person PFIs and "CPFI" to refer to computer-delivered PFIs to distinguish delivery modalities, even though some CPFIs were not technically delivered via computer but rather via mail or email link. Although exact components can vary, PFIs often incorporate social norms comparisons, a summary of indicators of alcohol consumption and associated risks, and alcohol-related problems (Carey et al., 2012).

IPFIs and CPFIs have been shown to reduce alcohol use compared to controls (see Carey et al., 2012; Crounce & Larimer, 2011). Although IPFIs are briefer than other interventions, they require trained providers, clinical training, and supervision. CPFIs are an appealing alternative as they are less costly, presumably easier to disseminate, and can be delivered in a variety of formats including the mail (Juarez, Walters, Daugherty, & Radi, 2006), an email link (Martens, Kilmer, Beck, & Zamboanga, 2010), or a hard copy (Butler & Correia, 2009). Limitations to CPFIs include difficulty ensuring participants review the feedback and inattention to content (Walters & Neighbors, 2011). Further, IPFIs may facilitate deeper understanding of the material through conversation and may provide increased opportunity for answering questions.

## Efficacy of In-Person versus Computer-Delivered Alcohol Interventions

A recent meta-analysis demonstrated both in-person and computer-delivered alcohol interventions are efficacious in reducing negative alcohol outcomes among college students compared to control groups (Carey et al., 2012). At short follow-up, face-to-face and computer-delivered intervention participants consumed less alcohol and reported fewer alcohol-related problems than controls. Face-to-face intervention participants continued to consume less alcohol than controls at longer follow-up. The authors also examined eight studies investigating direct comparisons between in-person and computer-delivered interventions at the last assessment. Results supported the efficacy of in-person interventions in reducing alcohol quantity, peak blood alcohol concentration (BAC), and alcohol-related problems, with no differences in drinking frequency. Carey et al. concluded face-to-face

interventions have enduring effects above and beyond computer-delivered interventions and control conditions.

The present study extends prior research by comparing the efficacy of IPFIs versus CPFIs, rather than in-person versus computer-delivered interventions in general as was examined by Carey et al. (2012). Many of the computer-delivered interventions included in the direct comparisons from Carey et al., did not provide detailed personalized feedback (as found in other CPFIs), but involved harm-reduction approaches through comprehensive interactive programs. Comparing PFI modalities has important implications as feedback is considered an important component for change in brief interventions (Larimer & Cronce, 2007; Riper et al., 2009).

Studies directly comparing the efficacy of IPFIs and CPFIs are somewhat equivocal. Some have shown CPFIs to be as effective as IPFIs (e.g., Butler & Correia, 2009; Juarez, Walters, Daugherty, & Radi, 2006), whereas others have shown IPFIs to be more effective than CPFIs in reducing negative alcohol-related outcomes (e.g., Monti et al., 2007; Walters, Vader, Harris, Field, & Jouriles, 2009; White, Mun, Pugh, & Morgan, 2007). A meta-analysis synthesizing these effects would contribute much to the literature on brief alcohol interventions.

In sum, previous research has shown (a) PFIs delivered in-person and by computer are efficacious compared to controls, (b) in-person alcohol interventions are efficacious when directly compared to broad computer-delivered alcohol interventions, and (c) effect sizes for these comparisons are small. Overall effects of IPFIs versus CPFIs among college and non-college student samples are still unknown. Thus, the primary aim was to identify and directly compare randomized clinical trials of PFIs with and without in-person contact.

## Method

Relevant studies published until July 2012 were identified from electronic databases (i.e., PsychInfo, PubMed, MEDLINE, Cochrane Library, Dissertation Abstracts, CINAHL, ERIC, CRISP) with the following terms: ((alcohol OR drink) AND (personal feedback OR personalized feedback OR personalized normative feedback OR bibliotherapy OR computerized intervention) AND (intervention OR treatment OR counseling OR therapy OR prevention)). Studies were included if they a) examined an alcohol-related intervention delivered with computer-delivered personalized feedback compared to interventions delivered with in-person personalized feedback, b) used a randomized controlled trial (RCT), and c) assessed alcohol-drinking behavior as a primary outcome. Backward and forward searches were conducted to identify additional manuscripts. Thirteen manuscripts were included in the analyses (Fig. 1)<sup>1</sup>.

Analyses were conducted in SAS 9.2 (SAS Institute Inc., Cary, NC), SPSS 19 (SPSS, Inc., Chicago, IL), and Comprehensive Meta-Analysis (CMA; Borenstein, Hedges, Higgins, & Rothstein, 2005). To determine the PFI efficacy, weighted mean differences at follow-up (*d*

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<sup>1</sup>Notably, one manuscript reported two intervention comparisons so a total of 14 intervention comparisons were examined.

+s), were calculated using random-effects procedures (Lipsey & Wilson, 2001). Cohen's  $d$  was used to calculate effect sizes for each outcome. A quantity/frequency composite effect size was calculated aggregating all alcohol consumption outcomes per study. Separate overall quantity and frequency effect sizes were calculated from alcohol quantity and frequency outcomes, respectively. Data were coded so positive effect sizes favored IPFIs, in that participants would report less alcohol use and problems than those in CPFIs<sup>2</sup>. To assess homogeneity,  $Q$  and  $I^2$  were calculated for each effect size.

Weighted mean effect sizes for between-group differences were stratified by follow-up interval. Short follow-up was defined as an assessment 4 months from baseline and long follow-up was defined as an assessment > 4 months from baseline (see Table 1). Follow-up assessments for each study were independent from one another, as each study had no more than one short follow-up and no more than one long follow-up, with the exception of one study in which data from the longest follow-up was included in the analysis.

## Results

Table 1 contains study characteristics. The majority of studies were comprised of a college student population of heavy drinkers. Table 2 displays sample characteristics for each intervention modality. IPFIs and CPFIs had similar demographic characteristics. Intervention characteristics varied with regard to intervention dose (see Table 3).

Within each study, personalized feedback components were the same for IPFIs and CPFIs; however, there was variation among feedback components between studies. All studies included personalized feedback on normative drinking and overall individual consumption, and the majority included gender-specific drinking norms, alcohol-related problems, and BAC on drinking occasions. Less common were studies that provided feedback on binge drinking frequency, gender-specific alcohol-related problems, and motivation to change (see Table 3).

### In Person PFIs versus Computer-Delivered PFIs

Table 4 details a description of included studies. Table 5 displays weighted mean effect sizes and homogeneity statistics. At short follow-up, there were no differences between IPFIs and CPFIs on any alcohol outcome ( $d = -.01$  to  $-.21$ ,  $p > .05$ ). All effects were homogenous.

At long follow-up, IPFIs were more effective than CPFIs at impacting overall drinking quantity ( $d = .18$ ,  $p < .05$ ) and drinks per week ( $d = .19$ ,  $p < .05$ ). Effect sizes for all other outcomes (BAC, binge episodes, frequency, quantity/frequency composite, alcohol-related problems) were non-significant. All effects were homogenous.

Sample characteristics were examined as moderators of intervention effects based on a priori hypotheses consistent with previous research (Carey et al., 2012). Effect sizes did not significantly differ between college student samples versus other samples (e.g., workers, patients at the ER) or mandated student samples versus non-mandated student samples.

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<sup>2</sup>Two independent coders (the authors) rated sample characteristics, study information and design, intervention content, and study outcomes. There was 98% agreement among coders ( $k = .95$ ;  $ICC = .99$ ) and discrepancies were resolved by discussion.

## Discussion

The present study synthesized the effects of RCTs that directly compared IPFIs and CPFIs. Meta-analyses have shown in-person and computer-delivered alcohol interventions are efficacious when compared to control conditions, but direct comparisons yield mixed findings. The current study is the first to provide a direct comparison of IPFIs and CPFIs among college and non-college populations. At short follow-up, there were no significant differences between PFI delivery modality on any alcohol outcome. At long follow-up, IPFIs were more effective than CPFIs in reducing drinking quantity and drinks per week. There were no between-condition effects for drinking frequency or alcohol-related problems, and effects were not moderated by sample characteristics. Findings have important implications for prevention and intervention.

Our findings differ to some degree from a meta-analysis that showed in-person brief alcohol interventions were more effective than computer-delivered interventions (Carey et al., 2012). One difference between Carey et al. and the present meta-analysis is the current study focused exclusively on studies that provided personalized feedback instead of broad alcohol interventions. Many computer-delivered interventions described in Carey et al. did not provide detailed personalized feedback, but rather a comprehensive interactive program on alcohol use.

One of the most important implications from this meta-analysis are CPFIs seem to be as efficacious as IPFIs in the short-term. It is possible that having the opportunity to consider factors such as how one's alcohol use compares to relevant norms, BAC on various drinking occasions, alcohol-related problems, and other pieces of information included in PFIs are enough to result in short-term change regardless of whether one discusses the feedback with a clinician.

When evaluating longer outcomes, PFI delivery modality may be relevant to maximizing treatment effects. For longer follow-ups, IPFIs were more effective in reducing alcohol quantity than CPFIs. It is possible the greater level of depth and detail afforded from IPFIs may yield long-lasting effects than briefer self-directed interventions. Engaging in a conversation about one's drinking patterns in a MI style may begin the process of developing discrepancies between behavior, values, and goals. Although speculative, this discrepancy and subsequent change in behavior may take longer to manifest, which may explain the difference in findings at follow-up intervals. IPFIs also ensure individuals receive intervention materials. Nevertheless, we did not find between-condition effects for drinking frequency or alcohol-related problems, suggesting long-term differences between modalities may be minor. It is possible booster sessions may enhance PFI effects, although we were unable to examine this as only one study utilized them.

The most salient clinical implication is the additional evidence suggesting both IPFIs and CPFIs are viable strategies for alcohol prevention interventions. CPFIs have advantages relative to IPFIs as they are typically briefer, less costly, and easier to disseminate, with relatively few differences in treatment effects in comparison to more intensive IPFIs. Yet, IPFIs demonstrated some advantages over CPFIs in terms of long-term effects, and there

may be some individuals where IPFIs are most appropriate. We did not find moderator effects based on sample characteristics, but findings are tempered by the small number of trials. Additional trials would allow for more complete examinations of variables that may enhanced IPFI efficacy.

There are several limitations to this study. The number of trials included was relatively small, limiting our ability to adequately test for moderator effects. We also had to determine a cut-point for follow-up interval, although similar cut-points have been used in other meta-analyses. Finally, we note that on average the long-term effects did not extend to over even a year's time. Thus, enduring effects of IPFIs versus CPFIs are still a largely unanswered question.

Our findings have provided initial answers to several important questions, but have also spawned or reinforced additional issues. Considering excessive alcohol use and the relative benefits and limitations of each modality, it is important researchers continue to address the comparative efficacy of these intervention modalities. Although the context of the personalized feedback was the same in both delivery modalities within each study, many IPFIs contained goal setting and decisional balance exercises. Despite the additive intervention components, IPFIs did not demonstrate more pronounced effects above and beyond CPFI at short follow-up, and modest differences at long follow-up. We encourage researchers to address these additive components of PFIs through dismantling designs and to conduct studies comparing PFI effects over a longer time period to provide a clearer picture on the sustainability of effects. Finally, we hope clinicians and researchers will focus on dissemination efforts, particularly CPFIs that seem to be largely comparable to IPFIs and have the potential to be broadly disseminated.

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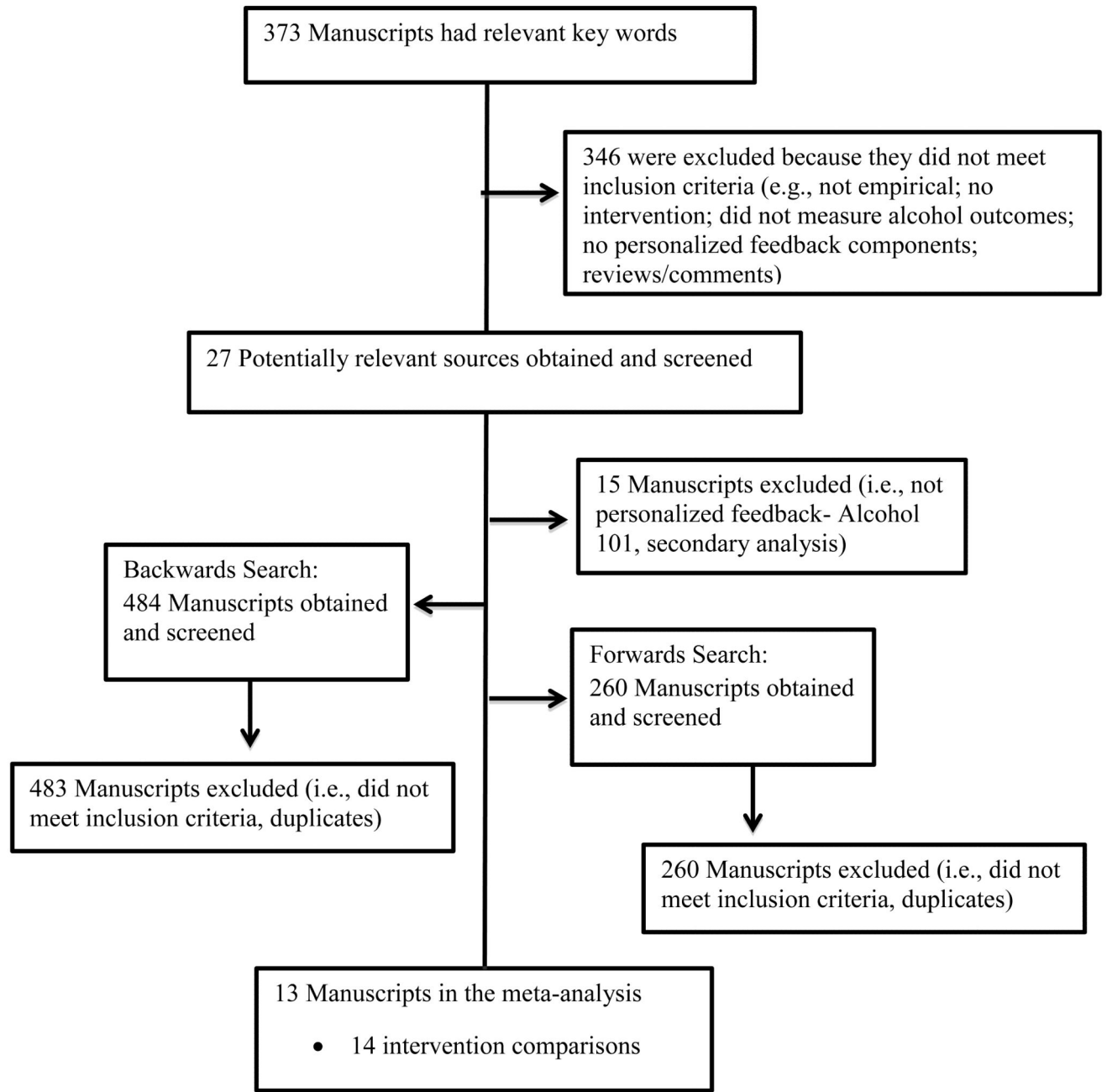
Public Health Significance: The study suggests both computer-delivered PFIs and in-person PFIs are viable strategies for alcohol interventions. In-person PFIs demonstrated some advantages over computer-delivered PFIs in long-term effects.

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**Fig. 1.** Selection process for study inclusion in the meta-analysis.

Table 1

## Study characteristics

Number of studies	13
Publication year, <i>Mdn</i> (range) <sup>1</sup>	2009 (2004-2013)
Funding Source, no.	
NIAAA	4
AMBRF/NIH	1
SAMHSA	1
US Dept of Education	1
NIDA	1
Unknown	5
Region, no.	
US Northeast	3
US Southeast	3
US Midwest	2
US Southwest	2
US Northwest	3
Sample, no.	
Undergraduate students	9
18-24 yr olds-employed	1
18-24 yr old Emergency Dept Patients	1
14-18 yr old Emergency Dept Patients-alcohol use/aggression	2
Type of institution, no.	
Public university	8
Private university	1
<i>Research design and implementation</i>	
Target group, no.	
Heavy drinkers (college students)	5
Alcohol violators (mandated college students)	4
18-24 yr olds-employed	1
18-24 yr old Emergency Dept Patients	1
14-18 yr old Emergency Dept Patients-alcohol use/aggression	2
Recruitment procedures, no.	
Non-mandated	9
Mandated	4
Post-intervention assessments	
Short Follow-up <i>M</i> (in months) (range)	2.22 (1-4)
Short Follow-up ( <i>k</i> )	10
Long Follow-up <i>M</i> (in months) (range)	9.83 (6-15)

Long Follow-up (*k*)

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Note. Short follow up was 4 months post baseline assessment. Long follow up was > 4 months post baseline assessment.

<sup>1</sup>One manuscript was available as an early online publication.

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**Table 2**  
**Sample characteristics by intervention modality**

	<b>In-person PFI</b>	<b>Computer-delivered PFI</b>
Sample size, baseline/follow-up	1240/1056	1201/1018
Age, <i>M (SD)</i>	18.98 (1.17)	18.99 (1.27)
Female, <i>M% (SD)</i>	48.68 (13.02)	52.66 (10.53)
Race/ethnic, <i>M%</i>		
White	74.25	73.08
Black	18.68	19.21
Hispanic/Latino	9.03	9.40
Asian/Pacific Islander	4.53	2.80
American Indian	1.48	2.30
Other/Prefer not to respond	6.24	5.85
<sup>a</sup> Year in school, <i>M%</i>		
Freshman	58.81	64.17
Sophomore	19.56	20.59
Junior	9.98	9.74
Senior	3.80	4.08

*Note.* PFI = Personalized Feedback Intervention. M = mean. SD = standard deviation. M% = mean percent.

<sup>a</sup> = for studies with college population sample only ( $k = 9$ ). Differences between groups were not statistically significant.

**Table 3**  
**Intervention characteristics by intervention modality**

	In-person PFI	Computer-delivered PFI
Intervention dose, <i>M</i> ( <i>SD</i> )		
<sup>a</sup> No. sessions	1.21 (0.43)	1
<sup>b</sup> No. minutes	48.18 (24.82)	25.03 (9.29)
Intervention content, no. (%)		
Decisional balance exercise	8	0
Goal Setting	9	2
<sup>c</sup> Personalized Feedback Components		
Normative drinking	14	14
Normative drinking (on campus)	4	4
Consumption	14	14
Normative drinking-Gender	10	10
Binge drinking frequency	3	3
Alcohol problems	12	12
Alcohol problems: gender specific	1	1
Alcohol expectancies	4	4
Alcohol related protective factors	3	3
Moderation training	3	3
BAC: typical/heavy	10	10
Time allocation	2	2
Calories from alcohol	10	10
Money spent on alcohol	9	9
Harm reduction strategies	6	6
Genetic risk	5	5
Motivation to change	1	1
Psychological symptoms	1	1
Resources	11	11

Note. PFI = Personalized Feedback Intervention. *M* = mean. *SD* = standard deviation. *M%* = mean percent.

<sup>a</sup> all computer-delivered PFIs were 1 session;

<sup>b</sup> no. minutes = intervention time; for IPFI= no. minutes = time with counselor discussing feedback, data available for 13 interventions; for computer-delivered PFI =time spent reviewing feedback, data available for 4 interventions.

<sup>c</sup> 14 intervention comparisons were made. Components of personalized feedback were the same across conditions within each study.

Table 4

Characteristics of the studies included in the meta-analysis

Author, Year	Sample	Target Group	Description of Intervention (Name; Components; Dose)	PPI components	Follow-up	
					Short; Long	
Alfonso, Hall, & Dunn (2012)	Total N = 101 IPFI N = 53 CPFI N = 48 44% Female 79% White Mean age = 18.8	College students; mandated	IPFI: BASICS, individual, DB, GS, 50 mins; CPFI: ECHUG	NormG; Prob; AE; Pr; MT; BAC; Cal; Mo; HRS/PBS; RF; R	3 months; N/A	
Alfonso, Hall, & Dunn (2012)	Total N = 120 IPFI N = 72 CPFI N = 48 47% Female 81% White Mean age = 18.8	College students; mandated	IPFI: BASICS, group, DB, GS 120 mins; CPFI: ECHUG	NormG; Prob; AE; Pr; MT; BAC; Cal; Mo; HRS/PBS; RF; R	3 months; N/A	
Butler & Correia (2009)	Total N = 58 IPFI N = 28 CPFI N = 30 65% Female 89% White Mean age = 20.2	College students; heavy drinkers	IPFI: individual, GS, 41 mins; CPFI: 11 mins;	NormC; NormG; Binge; ProbG; BAC; Time; Cal; Mo; HRS; R	1 month; N/A	
Cunningham et al. (2012)	Total N = 491 IPFI N = 254 CPFI N = 237 56% Female 39% White Mean age = 16.8	14-18 yr old Level I Trauma patients (past year alcohol use and aggression)	IPFI: individual, GS, DB, 37 mins CPFI: 29 mins; GS	NormG; R	N/A; 12 months	
Doumas & Hannah (2008)	Total N = 123 IPFI N = 63 CPFI N = 60 49% Female 87% White	18-24 yr old employees	IPFI: individual, 15 mins; CPFI: Center for Addiction and Mental Health Feedback	Norm; Prob; Cal; Mo; RF	1 month; N/A	
Doumas, Workman, Smith, & Navarro (2011a)	Total N = 135 IPFI N = 54 CPFI N = 81 48% Female 82% White Mean age = 19.1	College students; mandated	IPFI: ECHUG, individual, 39 mins; CPFI: ECHUG	NormC; NormG; Prob; BAC; Cal; Mo; GR; RF; R	N/A; 8 months	
Doumas, Workman, Navarro, & Smith (2011b)	Total N = 156 IPFI N = 24 CPFI N = 32 40% Female 87% White Mean age = 19.2	College students; mandated	IPFI: ECHUG, individual, 42 mins; CPFI: ECHUG	NormC; NormG; Prob; BAC; Cal; Mo; GR; RF; R	1 month; N/A	

Author, Year	Sample	Target Group	Description of Intervention (Name; Components; Dose)	PFI components	Follow-up	
					Short; Long	
Juarez, Walters, Daugherty, & Radi (2006)	Total N = 35 IPFI N = 15 CPFI N = 20 52% Female 57% White Mean age = 19.4	College students; heavy drinkers	IPFI: CHUG, individual, DB, 60 mins; CPFI: CHUG, mailed	NormG; Prob; BAC; Cal; Mo; RF; R	2 months; N/A	
Monti et al. (2007)	Total N = 198 IPFI N = 98 CPFI N = 100 33% Female 66% White Mean age = 20.6	18-24 yr old Level I Trauma patients + alcohol use	IPFI: individual, DB, GS, 30-45 mins.; CPFI: booster session + IPFI, 20-30 mins booster; CPFI: 5 min booster	Norm; Prob; RF; MC; R	N/A; 12 months	
Murphy, Denhardt, Skidmore, Martens, & McDevitt-Murphy (2010)	Total N = 91 IPFI N = 46 CPFI N = 45 50% Female 65% White Mean age = 18.6	College students; heavy drinkers	IPFI: BASICS, individual, DB, GS, 50 mins; CPFI: ECHUG, 30 mins	NormG; Prob; AE; Pr; MT; BAC; Cal; Mo; HRS/PBS; RF; R	1 month; N/A	
Murphy et al., (2004)	Total N = 54 IPFI N = 26 CPFI N = 28 69% Female 94% White Mean age = 18.6	College students; heavy drinkers	IPFI: individual, DB, GS, 30-50 mins; CPFI: 30 mins	Norm; Binge; Prob; BAC; Time; Cal; HRS; GR; RF	N/A; 6 months	
Walters, Vader, Harris, Field, & Jouriles (2009)	Total N = 140 IPFI N = 73 CPFI N = 67 64% Female 84% White Mean age = 19.8	College students; heavy drinkers	IPFI: ECHUG; individual, GS, 50 mins; CPFI: ECHUG	NormC; Binge; Prob; BAC; Cal; Mo; GR; RF; R	3 months; 6 months	
Walton et al. (2010)	Total N = 491 IPFI N = 254 CPFI N = 237 56% Female 39% White Mean age = 16.8	14-18 yr old Level I Trauma patients (past year alcohol use and aggression)	IPFI: individual, DB, GS, 35 mins; CPFI: GS	NormG; R	3 months; N/A	
White, Mun, Pugh, & Morgan (2007)	Total N = 348 IPFI N = 180 CPFI N = 168 40% Female 81% White	College students; mandated	IPFI: individual; CPFI;	NormG; Prob; AE; BAC; HRS; GR; RF; Psych	4 months; 15 months	

Note. Short follow up = 4 months post baseline assessment; Long follow up = > 4 months post baseline assessment; Total N = number of consenting participants included for the present analyses; IPFI = in-person personalized feedback intervention PFI; CPFI = computer-delivered PFI; BASICS = brief alcohol screening and intervention for college students; e-Chug = electronic check-up to go; DB = decisional balance; GS = goal-setting; PFI components = personalized feedback intervention components, note all components within a study are the same for both IPFI and CPFI conditions; PFI components: Norm = normative alcohol use; NormC = campus specific normative alcohol use; NormG= gender specific normative alcohol use; Binge= binge drinking frequency; Prob= alcohol-related problems; ProbG= gender specific alcohol-related problems; AE= alcohol expectancies; Pr= alcohol-related protective factors; MT= Moderation strategies/training; BAC = BAC for heavy/typical



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drinking; Time= time allocation; Cal= calories from alcohol; Mo= money spent on alcohol; HRS /PBS= harm reduction strategies/protective behavioral strategies; RF= general risk factors; GR= genetic risk; MC= motivation to change; Psych= psychological symptoms; R= resources

all participants were assigned to a 1 month booster session where drinking was reviewed with a counselor on the phone and a 3 month booster where all participants completed new assessment and received new feedback sheet

**Table 5**  
**Weighted mean effect sizes and homogeneity statistics for in-person and computer-delivered personalized feedback interventions by follow-up interval**

	k	N		Weighted means (SE)		d (95% CI)	Q	I <sup>2</sup>
		In Person PFI	Computer-delivered PFI	In Person PFI	Computer-delivered PFI			
<i>Short follow-up (&lt; 4 months)</i>								
Binge Episodes	4	448	427	2.56 (.96)*	2.43 (.70)*	-.04 (-.18, .11)	2.53	0
Drinks per Week	5	319	301	9.67 (2.22)	9.18 (1.90)	-.04 (-.29, .20)	7.70	48%
Frequency of Intoxication	2	56	59	1.74 (.56)	1.43 (.58)	-.21 (-.58, .16)	.02	0
Quantity	9	499	455	7.12 (2.14)	6.96 (1.39)	-.01 (-.12, .13)	7.97	0%
Frequency	6	504	486	2.47 (.56)*	2.35 (.53)*	-.07 (-.21, .06)	1.78	0
Quantity/Frequency Composite	10	714	660	5.43 (.93)*	5.37 (.98)*	-.03 (-.14, .08)	6.89	0
BAC	5	374	328	.09 (.02)	.09 (.02)	-.09 (-.24, .06)	2.67	0
Alcohol-Related Problems	8	633	584	5.82 (1.34)*	4.39 (.90)*	-.06 (-.24, .12)	12.47	44%
<i>Long follow-up (&gt;4 months)</i>								
Binge Episodes	5	455	464	2.15 (.25)*	2.51 (.24)*	.03 (-.15, .22)	6.67	40%
Drinks per Week	5	318	317	10.07 (1.67)	11.62 (1.53)	.19 (.03, .34)	.97	0
Frequency of Intoxication	--	--	--	--	--	--	--	--
Quantity	5	318	317	10.00 (2.64)	11.35 (1.44)	.18 (.02, .34)	1.03	0
Frequency	5	455	464	2.48 (.40)*	2.96 (.44)*	.07 (-.15, .28)	8.33	.08
Quantity/Frequency Composite	6	522	518	6.59 (1.29)*	7.50 (1.18)*	.05 (-.08, .17)	8.12	38%
BAC	2	180	160	.08 (.03)	.09 (.03)	.13 (-.08, .35)	.37	0
Alcohol-Related Problems	6	522	518	7.52 (1.80)*	8.21 (1.99)*	-.05 (-.09, .18)	3.73	0

Note. PFI = Personalized Feedback Intervention. d = Cohen's d for between group differences at follow-up. SE = standard error. Positive ES favor in-person PFI. Bold indicates significant effects ( $p < .05$ ). Frequency of intoxication was not reported for any study at a long follow-up.

\* = one study had data in the form of odds ratios that was able to be included in the overall effect size (*d*) but was not included in the group weighted means and SEs.

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**Table 6**  
**Weighted mean effect sizes and homogeneity statistics for in-person vs. computer-delivered personalized feedback interventions at follow-ups**

Study	Sample Size		Computer-delivered PFI	Weighted effect sizes (d)			<i>d<sub>problems</sub></i>
	In Person PFI	Computer-delivered PFI		<i>d<sub>drinksweek</sub></i>	<i>d<sub>quantity</sub></i>	<i>d<sub>frequency</sub></i>	
<i>Short Follow-up</i>							
Alfonso, Hall, & Dunn (2013)	53	48	--	0.22	--	0.10	-0.17
Alfonso, Hall, & Dunn (2013)	72	48	--	-0.04	--	-0.17	-0.37
Butler & Correia (2009)	28	30	-0.31	-0.31	-0.08	--	0.09
Doumas & Hannah (2008)	40	38	--	-0.11	-0.19	--	--
Doumas, Workman, Navarro, & Smith (2011b)	21	16	-0.75	-0.53	-0.24	--	-0.71
Juarez, Walters, Daugherty, & Radi (2006)	15	20	--	-0.36	--	--	0.38
Murphy, Dennhardt, Skidmore, Martens, & McDevitt-Murphy (2010)	41	38	0.22	0.22	0.07	0.27	--
Walters, Vader, Harris, Field, & Jouriles (2009)	70	58	0.13	0.13	--	-0.08	-0.07
Walton et al. (2010)	204	201	--	--	-0.14	--	-0.01
White, Mun, Pugh, & Morgan (2007)	164	154	0.03	0.03	0.01	-0.17	0.16
Random-effects <i>d+</i> (95% CI)			-0.04 (-.29, .20)	-0.01 (-.12, .13)	-0.07 (-.21, .06)	-0.09 (-.24, .06)	-0.06 (-.24, .12)
<i>Long Follow-up</i>							
Cunningham et al. (2012)	204	201	--	--	-0.21	--	-0.02
Doumas, Workman, Smith, & Navarro (2011a)	36	47	0.19	0.13	0.24	--	-0.09
Monti et al. (2007)	78	83	0.30	0.30	0.26	--	0.02
Murphy et al., (2004)	24	27	0.02	0.02	-0.10	--	0.01
Walters, Vader, Harris, Field, & Jouriles (2009)	67	54	0.18	0.18	--	0.04	-0.07
White, Mun, Pugh, & Morgan (2007)	113	106	0.15	0.15	0.17	0.18	0.27
Random-effects <i>d+</i> (95% CI)			<b>0.19</b> <b>(0.03, 0.34)</b>	<b>0.18</b> <b>(0.02, 0.34)</b>	0.07 <b>(-0.15, 0.28)</b>	0.13 <b>(-0.08, 0.35)</b>	0.05 <b>(-0.09, 0.18)</b>

Note. PFI = Personalized Feedback Intervention. -- indicates that data was not provided on the outcome. Positive effect sizes favor in-person (IPFIs). Bold indicates significant effects ( $p < .05$ ).