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Immediate vs. delayed computerized brief intervention for illicit drug misuse

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Abstract

Objective—Computerized brief interventions are a promising approach for integrating substance use interventions into primary care settings. We sought to examine the effectiveness of a computerized brief intervention for illicit drug misuse, which prior research showed performed no worse than a traditional in-person brief intervention.

Methods—Community health center patients were screened for eligibility using the World Health Organization Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST). Participants were adult patients (ages 18–62; 53% female) with moderate-risk illicit drug use ($N=80$), randomized to receive the computerized brief intervention either immediately, or at their 3-month follow-up. Assessments were conducted at baseline, 3-, and 6-month follow-up, and included the ASSIST and drug hair testing.

Results—Most participants in the sample (90%) reported moderate-risk marijuana use. Although the sample as a whole reported significant decreases in ASSIST Global Drug Risk scores and ASSIST marijuana-specific scores, no significant differences were detected between Immediate and Delayed conditions on either of these measures. Likewise, no significant differences were detected between conditions in drug-positive hair test results at either follow-up.

Conclusions—This study did not find differences between immediate vs. delayed computerized brief intervention in reducing drug use or associated risks, suggesting potential regression to the mean or reactivity to the consent, screening, or assessment process. The findings are discussed in light of the study's limitations and directions for future research.

Keywords

brief intervention; computerized brief intervention; marijuana; primary care

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Conflicts of Interest: SJO is part owner of a company that markets computerized intervention authoring software, which was used as the platform for the computerized intervention in the present study. The other authors report no conflicts of interest. The authors alone are responsible for the content and writing of the manuscript.

INTRODUCTION

Most individuals with alcohol or drug problems do not seek treatment (SAMHSA, 2013). Moreover, most people who use substances do not meet diagnostic criteria for substance use disorders, although their substance use may nevertheless be characterized as risky or unhealthy (McLellan and Woodworth, 2014). For these individuals, traditional specialty addiction treatment may be inappropriate, but they may nevertheless benefit from intervention. Recent years have seen growing integration of substance use screening and brief intervention (SBI) into primary care settings (Madras et al., 2009; McCance and Satterfield, 2012). These efforts come on the heels of decades of research supporting primary care SBI for risky alcohol use (Moyer, 2013) and tobacco (US Preventive Services Task Force, 2009).

Although the US Preventive Services Task Force recommends that physicians provide alcohol SBI for adults in primary care (a level “B” recommendation; Moyer, 2013), the Task Force has deemed the evidence “Insufficient” to warrant recommending SBI for drug use. There continues to be some debate about the effectiveness of brief interventions (BIs) for drug use. Some randomized trials conducted in community health clinics have found reductions in drug use following receipt of brief intervention compared to controls (Bernstein et al., 2005; Gelberg et al., 2015; Humeniuk et al., 2012). However, several recent trials with large samples and high methodological rigor have found no such effect in primary care (Roy-Byrne et al., 2014; Saitz et al., 2014).

Computerized delivery of SBI offers some potential advantages over in-person delivery, at least in theory. Primary healthcare settings are increasingly stretched thin with respect to personnel and time, amid an abundance of recommended screenings and prevention services (Yarnall et al., 2003). Depending on how it is implemented, delivering SBI via computer could be a low-cost alternative to in-person BI and save considerable staff time in primary care (Mitchell et al., 2015).

Computerized SBI may also offer some advantages over in-person SBIs with respect to efficacy – again, in theory. For example, studies have found that disclosure of sensitive behaviors can be enhanced when questions are asked privately via computer rather than by human interviewers (Caldwell and Gryczynski, 2012; Islam et al., 2012; Metzger et al., 2000). Thus, it follows that patients may be more forthcoming about their substance use and associated risky behaviors when interacting with a computer than with a clinician, in that the computer removes from the equation a host of psychological forces that permeate interpersonal interactions and may undermine the veracity of self-reports. Unlike in-person BI, a computerized BI will have perfect fidelity to its programming—which can be either a liability or an asset. Computers will never forget to deliver an essential intervention component, but even highly advanced computerized interventions will not be as flexible as humans in dealing with complex circumstances or responding to clinical “curve balls.” Of course, that flexibility may or may not be associated with better outcomes, and is in fact one of the challenges in disseminating evidence-based brief interventions: clinicians deem many situations as requiring deviation from manual-driven interventions, without specific evidence of benefit (Waller, 2009).

Brief interventions for drug misuse delivered in whole or in part by computer have been found to have some promise, although here too, findings are mixed. For example, a study of internet-delivered SBI for illicit drug use found some short-term reductions in drug use compared to assessment only (Sinadinovic et al., 2012), but no significant reductions in drug use at 6- or 12-month follow-ups, although participants did report reductions in alcohol use (Sinadinovic et al., 2012; 2014). A trial of a marijuana BI for college students found no significant differences between intervention and control conditions, although moderator analyses found that certain subgroups may have benefitted from the intervention (Lee et al., 2010). A study of brief intervention for a variety of risk behaviors (including illicit drug use) that included a video doctor component found significant reductions in illicit drug use and other risk behaviors among patients in an HIV clinic (Gilbert et al., 2008). Likewise, a recent trial of brief intervention for illicit drug use in primary care, which also included a short video doctor component, found significant reductions in drug use among participants in the BI condition relative to controls. In a randomized trial with postpartum women, an interactive computerized brief intervention produced significant reductions in drug use compared to an assessment only condition (Ondersma et al., 2007). A subsequent replication confirmed these effects (Ondersma et al., 2014). Thus, technology-based interventions hold considerable promise, but much work remains to be done to establish their effectiveness and identify optimal components (Shingleton and Palfai, 2015).

Our group previously conducted a randomized trial comparing in-person BI delivered by Masters-level behavioral health counselors to an interactive computer BI (CBI) for patients with moderate-risk illicit drug use. That study found no significant differences between conditions on self-reported drug risk scores, or in drug use measured by hair testing at 3 month follow-up (Schwartz et al., 2014). There were some early advantages at 3 months for the CBI in self-reported marijuana- and cocaine-specific risks examined as secondary outcomes (Schwartz et al., 2014), but these advantages dissipated by 12-month follow-up (Gryczynski et al., 2015).

An important limitation of that trial was that both conditions represented active interventions, so we could not answer the important question of whether either BI was superior to assessment only. In light of the findings from the trial, we set out to investigate the hypothesis that CBI would be superior to assessment alone. Hence, we conducted a randomized trial comparing CBI delivered immediately vs. CBI delivered after a 3-month delay. This study is the subject of the present report.

METHODS

Setting and Context

This study was conducted at a community health center in rural New Mexico, which was one of the two sites that participated in the prior trial of in-person vs. computer BI (Schwartz et al., 2014). The current study was launched almost immediately after closing the prior trial.

Participants

Participants were male and female adults recruited from the community health center ($N=80$). The sample was 86% White race, 43% Hispanic ethnicity, and 53% female, with an average age of 35 ($SD=13$; range:18-62).

Recruitment

A research assistant approached patients in the clinic waiting room and invited them to be screened for a “health study.” Patients who were interested were accompanied to a private office where the research assistant screened patients for eligibility using the World Health Organization's Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST), a brief self-report instrument which triages patients into low, moderate, or high risk categories for tobacco, alcohol, marijuana, cocaine, amphetamine-like stimulants, hallucinogens, inhalants, sedatives, and opioids (Humeniuk et al., 2008). Patients were eligible if they were age 18 or older and scored in the “moderate-risk” range (score of 4-26) on the ASSIST for one or more illicit drugs (therefore, excluding tobacco and alcohol). Patients were excluded if they had participated in the parent study, reported substance use treatment within the past year, did not speak English, had plans to move out of New Mexico within 6 months, or reported receiving an in-person BI at the clinic within the past month from the on-site behavioral health counselor (who had delivered BIs as part of routine care under the SAMHSA-funded New Mexico SBIRT program at that site). Due to time constraints, we were not able to confirm participant reports against clinic records. The inclusion/exclusion criteria were the same as we used in the parent study. Patients who were eligible and agreed to participate provided written informed consent (which noted that they had been selected for the study because their screening results showed they may be at risk for a substance misuse problem), completed the baseline assessment, and were randomized on a 1:1 basis to receive the computer BI either immediately, or at their 3-month follow-up visit. The study was approved by the Institutional Review Boards of Friends Research Institute and Christus Health.

Study Flow

The study flow is shown in Figure 1. Eighty-nine patients were eligible for the study, of whom 8 declined to participate, and 81 enrolled. The first participant could not complete the computer BI because of a computer problem; the problem was remedied and the participant was withdrawn from the study and replaced. All remaining participants randomized to the Immediate condition received the allocated intervention, while 35/40 randomized to the Delayed condition received the allocated intervention 3 months after study enrollment (with 5/40 lost to follow-up). Follow-up rates were 89% (71/80) at 3 months and 84% (67/80) at 6 months.

Randomization

After completing the baseline assessment, the research assistant would open a prepared opaque envelope to reveal the participant's random assignment to either Immediate CBI or CBI after a 3-month delay. Assignments were generated using a block randomization procedure where for each block of 4 participants, 2 were assigned to each condition.

Intervention

The intervention consisted of the same Computer BI used in the prior study and described previously (Schwartz et al., 2014). It was developed by our team to mirror the essential elements of the motivational interviewing intervention delivered by behavioral health counselors in New Mexico's SAMHSA SBIRT initiative. This was a short, single-session interactive program led by an animated talking avatar. Participants' choice was emphasized throughout, and participants were free to choose which substances to focus on (up to two) and what kinds of behavioral changes they were willing to make. The computer BI included questions about substance use problems, gender-specific normative feedback messaging, rating importance to change, and rating confidence (self-efficacy) to change. Participants received tailored messages and options based on their responses. The average duration of the computerized BI as timed by the software was 8.7 minutes (SD= 4.3 minutes; range 1.5-21.1 minutes).

Assessments

Structured face-to-face assessments were conducted at baseline, 3-, and 6-month follow-up. The follow-ups were research visits and were not coordinated with any medical services at the clinic. Self-reported substance use risks were measured via the ASSIST (as part of eligibility screening at baseline, and repeated at each follow-up). Participants were also asked to provide a hair sample (1.5 inches cut from the scalp, corresponding to an approximately 3-month time frame), which was sent to an independent commercial laboratory and tested for marijuana (carboxy-tetrahydrocannabinol), cocaine (cocaine and metabolites benzoylecgonine, norcocaine, and cocaethylene), amphetamines (amphetamine, methamphetamine, and MDMA), and opioids (morphine, codeine, and heroin metabolite) via assay screening with gas chromatography/mass spectrometry (GC/MS) confirmation. There was considerable missing data on hair test results. At baseline, usable results were available for only 46% of the sample. Among the 80 participants, 2 refused to provide a hair sample, 28 had hair of insufficient length, and 13 samples that were collected were nonetheless rejected by the laboratory due to insufficient quantity.

Although there were no significant differences between those lost-to-follow-up and those retained in the study with respect to age, gender, race, Hispanic ethnicity, or baseline hair test results (all $p>.05$), the 9 participants who were lost-to-follow-up at 3 months had lower mean ASSIST Global Drug Risk scores (20.8 (SD=9.7) vs. 31.5 (SE=12.3); $p=.014$) and ASSIST Marijuana scores (6.2 (SD=4.2) vs. 11.0 (SD=5.6); $p=.017$) than the 71 participants who completed the follow-up.

Power

Sample size was calculated for detecting a pre-post change in means between Immediate and Delayed CBI (assessment only) conditions. In the parent study comparing two active interventions of CBI and In-person BI, the mean pre-post change (SD) in the global ASSIST score was 3.2 (14.7). Setting $\alpha=.05$, we determined that a sample size of 80 would yield power of .80 to detect a pre-post mean difference approximately twice the magnitude found in the parent study. Although our sample size was also constrained by resources and time, we believed this was a reasonable mean difference given that the parent study involved two

active interventions and the current study involved an Immediate vs. Delayed intervention (assessment only for the first 3 months). Moreover, examining change over three assessment points (baseline, 3- and 6-months) and providing a delayed intervention would likely improve power beyond the simple mean differences approach.

Statistical Analysis

Data were analyzed using generalized linear mixed models to examine between-group differences in ASSIST scores over time. Given the immediate vs. delayed study design, we would expect a true intervention effect to manifest as predictable slope differences, with each group experiencing a decrease in substance use risks following receipt of the computer BI. In other words, the Immediate group would decrease substance use risks from baseline to 3 months (and either maintain improvement or rebound by 6 months), while the Delayed group would remain stable from baseline to 3 months but experience a decrease in risks from 3 months to 6 months (or perhaps, due to regression to the mean, experience reductions in drug risks at 3 months that would nevertheless be of lower magnitude than those experienced by the Immediate group). The dependent variables were the ASSIST Global Drug Risk score and the ASSIST Marijuana-Specific Risk Score. Models were fit with three predictors: Condition (Immediate vs. Delayed computer BI), Time (Baseline vs. 3 months vs. 6 months), and their interaction. The effect of interest is represented by the omnibus test of the Condition $\times$ Time interaction, representing differential change in the outcome for those in the Immediate vs. Delayed condition. [Because of a baseline imbalance on the ASSIST Global Drug Risk Score (described below), we also conducted additional analyses of this outcome variable. First, we repeated the analysis while excluding outliers. Second, we conducted 3-month and 6-month endpoint analyses controlling for the baseline value using linear regression.] Between-condition differences in drug-positive hair test results were examined for each time point using Fisher's exact test.

RESULTS

Participant Characteristics

As shown in Table 1, there were no significant differences between Conditions in participant demographics; hair testing results, or substance-specific ASSIST scores, including marijuana scores (the most common drug used in the sample, with 90% scoring as moderate risk for marijuana). However, despite randomization, there was a significant baseline difference between conditions in ASSIST global drug scores ($p < .01$). The global drug score is a composite of problems across all illicit drug categories reported on the ASSIST. Further inspection revealed that this baseline imbalance appeared to be the cumulative effect of higher ASSIST scores for drugs other than marijuana in the Delayed condition, driven by a small number of outliers with polydrug use and high scores.

ASSIST Global Drug Risk Scores

In the analysis of ASSIST Global Drug Risk scores, there was a significant effect for Time ($p < .01$), indicating significant decreases for the sample as a whole. However, the Condition $\times$ Time interaction was not significant ($p = .06$), thereby failing to reject the null hypothesis of no differences in how study Conditions change over time. It is important to note that the

direction of change did not appear to favor the intervention. As noted above and shown in Figure 2, there was a baseline imbalance between conditions on this variable, and it is the downward movement from baseline to 3 months for the Delayed condition that shows the most precipitous drop in scores, decreasing by 2.0 v. 6.4 points in the Immediate and Delayed conditions, respectively. This might reflect regression to the mean for the Delayed condition, which started out with higher scores at baseline. Complicating the picture, from 3 to 6 months, participants in the Delayed Condition (who received the Computer BI at the 3 month time point) had a slight decrease in scores of 0.67 points, whereas the Immediate Condition had an increase of 1.97 points over this period (potentially consistent with a “rebound”).

Recognizing that the decision of which outliers to exclude is somewhat arbitrary, we simply excluded the 5 cases with the highest scores at baseline (all were in the Delayed condition). With these 5 cases excluded, baseline differences were nonsignificant ($p>.05$), although the Delayed condition continued to have nominally higher scores than the Immediate condition (30.4 and 26.4, respectively). The Condition $\times$ Time interaction, the effect of interest, remained non-significant ($p=.22$).

In endpoint analysis controlling for the baseline value of the outcome, there were no significant differences by condition at 3 months (Delayed Condition $b=-2.0$, $SE=2.7$; $p=.46$) or 6 months (Delayed Condition $b=-3.9$; $SE=3.4$; $p=.25$).

ASSIST Marijuana Scores

Marijuana was the most commonly used drug in the sample, and 90% of participants qualified for the study on the basis of their ASSIST Marijuana scores. Both conditions had a decrease in ASSIST Marijuana scores ($p<.001$). However, there were no differences between study conditions ($p=.89$), with the trend lines for both Immediate and Delayed intervention conditions running essentially parallel (Figure 3).

Hair Test Results

Results of drug hair testing showed no significant differences between Conditions at any time point, either for any drug or for marijuana specifically (Table 2). There was likewise no pattern suggestive of intervention effects; In fact, rates of drug-positive hair testing nominally increased following receipt of computer BI, although this is likely statistical noise driven by small cell sizes.

DISCUSSION

This study compared a computerized brief intervention for drug misuse delivered immediately vs. after a 3-month delay. Finding no significant differences between Immediate and Delayed study conditions in ASSIST Global Drug Risk Scores, ASSIST marijuana-specific risk scores, or drug hair testing, we did not find that the intervention was effective in reducing illicit drug use or self-reported substance use risks/problems. The findings for the ASSIST Global Drug Risk scores are difficult to interpret due to the unanticipated baseline imbalance on this variable. We consider this limitation of the study to be an important one, as it raised the issue of statistical conclusion validity, as randomization

failed to achieve its primary purpose. Nevertheless, additional analyses excluding outliers and adjusting for baseline differences statistically likewise did not find significant differences between conditions. The baseline imbalance may be due to a combination of the study's small sample size, the broad inclusion criteria targeting a heterogeneous mix of drugs, and the way in which the ASSIST Global Drug Risk scores are calculated, such that a small number of poly-drug users can drive up mean scores considerably. The findings for hair test results should also be interpreted with caution due to a large amount of missing data. In contrast, the findings for ASSIST Marijuana scores are more readily interpretable, and likewise show no significant intervention effect. Reflecting the patient population, marijuana was by far the most common drug reported. These null findings are in contrast to our earlier, larger trial comparing this same Computer BI to an In-Person BI, which found significant – albeit low-magnitude and short-lived – advantages for computer BI with respect to ASSIST marijuana scores (Schwartz et al., 2014).

In light of the current findings and our previous research demonstrating the overall comparability of computer BI and in-person BI, we are left with several possibilities. First, it is possible that neither the CBI nor the in-person BI used in the original study are effective in decreasing drug use or associated problems. This conclusion would be consistent with some recent studies (Roy-Byrne et al., 2014; Saitz et al., 2014). A second possibility is that, with its relatively small sample size, the current study was underpowered, and/or suffered from other limitations that precluded detection of an intervention effect or increased possibility of type II error. This explanation might be more compelling if the direction of changes had been suggestive of an advantage for CBI. Finally, there may exist a subset of individuals who respond well to CBI, but perhaps were under-represented in our sample, which was a small sample recruited from a single clinic.

The computer BI in this study was truly a very brief intervention, representing a single session encounter of ultra-short duration, delivered in an opportunistic fashion during a healthcare visit. There is some evidence that BIs benefit from somewhat greater duration or from additional sessions (e.g., Burke et al., 2003), raising the possibility that this intervention may have been too brief to elicit positive effects. However, longer BIs may not necessarily be more effective. For example, one study of alcohol BI found that neither 5 minutes of structured brief advice nor an additional 20 minute session of lifestyle counseling improved drinking outcomes beyond simple feedback with a written informational leaflet (Kaner et al., 2013). In the future, studies that succeed in detecting effects for BIs should characterize response patterns that underlie the average group-level improvement. For example, it would be important to know if an intervention with evidence of effectiveness has effects nearly across the board, or works very well in only a subset of individuals. Future research should investigate BIs of longer duration and with multiple contacts.

It is also important to note that both conditions in the present study reported reductions in substance use risks over time as measured by ASSIST scores, signaling potential regression to the mean, or reactivity to certain elements of the research (e.g., screening and brief assessment). It is not known whether such changes would have occurred in the absence of assessment. The ASSIST asks respondents to reflect on not only their substance use patterns, but also on a range of problems related to their substance use. It is possible that the simple

act of asking such questions could prompt participants to engage in a type of self-reflection process that leads to genuine self-modulation of substance use behavior. This would imply that substance misuse screening could carry inherent clinical benefits rather than simply acting as a mechanism for triaging patients for subsequent intervention. It is likewise possible that any such beneficial effects could be enhanced with the expectation that participants will be asked about their behaviors again (e.g., as in a scheduled research follow-up), and with the additional promise of subsequent biological testing of drug use. There is a fairly robust literature documenting such reactivity effects (e.g., McCambridge and Kypri, 2011; Ondersma et al., 2012), including from randomized trials of assessment vs. screening only (Kypri et al., 2007).

Further, there is suggestive evidence for artifacts of the research process to be associated with change, including the consent process itself (Epstein et al., 2005; McCambridge et al., 2014). The authors of the WHO ASSIST brief intervention trial noted that requirements for an extended consent process in the US may have contributed to lack of effectiveness for BI at that site (Humeniuk et al., 2012). Participants in the current study were fully informed that their screening results indicated they may be at risk of drug misuse problems, and that they would be receiving a computerized BI focused on drugs. Various procedures common in research studies, including screening, informed consent, assessment, and interaction with sympathetic research interviewers could unintentionally prompt behavior change. An important question for future research is whether these common research-based experiences contribute to change.

The current study has a number of limitations. First, the sample size of 80 participants may be too small to detect subtle changes resulting from exposure to what is a very brief intervention. Another significant limitation is the unanticipated baseline imbalance on the primary outcome of ASSIST global drug risk scores, a problem that was compounded by the small sample. Future studies, particularly those with small samples, could prevent this problem by balancing randomization on the primary outcome. Participants who could not be reached for follow-up tended to have lower baseline drug risks than those who were retained in the study. There was also considerable missing data for hair samples. Even the available samples may have limited utility, as standard detection thresholds can fail to identify moderate-level irregular drug use (Gryczynski et al., 2014). The study was conducted in a single clinic in rural New Mexico, and may not generalize to other settings and populations. Given these limitations, this study should not be viewed as offering definitive evidence against the effectiveness of computer BIs in general. Even though we could not demonstrate an intervention effect in the current study, computer BIs can come in many different configurations. Different content and presentation decisions may yield more favorable results.

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Notes: WHO ASSIST= World Health Organization Alcohol, Smoking, and Substance Involvement Screening Test; CBI= Computerized Brief Intervention.

Figure 1.
Study Flow.

Analyses excluding baseline outliers on the ASSIST Global Drug Risk Score

Excluding 5 highest scores at baseline ($N = 75$)

Omnibus Test of the Condition X Time Interaction: $\chi^2 (2) = 3.05; p = .22$.

Endpoint analysis controlling for baseline value of the ASSIST Global Drug Risk Score

3 months: Delayed Condition b (SE) = -2.0 (2.7); $p = .46$.

6 months: Delayed Condition b (SE) = -3.9 (3.4); $p = .25$.

Figure 2.
Change in ASSIST Global Drug Risk Scores.

Omnibus Test of the Condition X Time Interaction: $\chi^2 (2) = 0.23; p=.89$.

Figure 3.
Change in ASSIST Marijuana Risk Scores.

Table 1 Baseline characteristics ($N=80$).

	Immediate ($N=40$)	Delayed ($N=40$)
Demographics		
White race, % (n)	82.5 (33)	90.0 (36)
Hispanic ethnicity, % (n)	37.5 (15)	47.5 (19)
Female gender, % (n)	62.5 (25)	42.5 (17)
Age, mean (SD)	34.3 (12.4)	36 (13.8)
Mean ASSIST Scores		
Global Drug Risks ¹ , mean (SD)	26.4 (9.5)	34.2 (13.8)
Alcohol, mean (SD)	7.1 (6.3)	9.9 (8.4)
Marijuana, mean (SD)	9.6 (5.5)	11.2 (5.7)
Cocaine, mean (SD)	.4 (1.3)	.8 (2.3)
Amphetamines, mean (SD)	1.2 (3.4)	1.8 (3.8)
Opioids, mean (SD)	1.8 (4.0)	4.0 (7.5)
Moderate Risk on ASSIST		
Alcohol, % (n)	27.5 (11)	47.5 (19)
Marijuana, % (n)	87.5 (35)	92.5 (37)
Cocaine, % (n)	2.5 (1)	7.5 (3)
Amphetamines, % (n)	12.5 (5)	20.0 (8)
Opioids, % (n)	20.0 (8)	27.5 (11)
Drug-Positive Hair Tests²		
Any drug, % (n)	47.6 (10)	37.5 (6)
Marijuana, % (n)	28.6 (6)	31.3 (5)
Cocaine, % (n)	4.8 (1)	0 (0)
Amphetamines, % (n)	23.8 (5)	12.5 (2)
Opiates, % (n)	4.8 (1)	0 (0)

¹There was a significant baseline difference between groups on the ASSIST Global Drug Risk Score, $p=.004$; independent-samples t-test). There were no other significant between-group differences on these variables (all other $p>.05$). The median and interquartile range for the ASSIST Global Drug Risk Score was 25.5 and 12.5 (Immediate) and 32.5 and 13.5 (Delayed), respectively.

² $N=37$ (21 Immediate; 16 Delayed) for hair tests due to missing data (2 refused to provide hair, 28 had insufficient hair, and 13 samples could not be analyzed by the laboratory due to insufficient quantity of the collected specimen).

Table 2

Illicit drug-positive hair test results by condition.

	Immediate	Delayed	p
Drug-Positive Hair Tests (any drug)¹			
Baseline, % (<i>n</i>)	47.6 (10)	37.5 (6)	.74
3 months, % (<i>n</i>)	68.4 (13)	37.5 (6)	.10
6 months, % (<i>n</i>)	66.7 (14)	57.1 (8)	.72
Marijuana-Positive Hair Tests²			
Baseline, % (<i>n</i>)	28.6 (6)	31.3 (5)	1.0
3 months, % (<i>n</i>)	50.0 (9)	31.3 (5)	.32
6 months, % (<i>n</i>)	42.9 (9)	42.9 (6)	1.0

¹*N*= 37 (21 Immediate; 16 Delayed), 35 (19 Immediate; 16 Delayed), and 35 (21 Immediate; 14 Delayed) at baseline, 3-, and 6-month follow-up, respectively.

²*N*= 37 (21 Immediate; 16 Delayed), 34 (18 Immediate; 16 Delayed), and 35 (21 Immediate; 14 Delayed) at baseline, 3-, and 6-month follow-up, respectively.