



Process evaluation of a technology-delivered screening and brief intervention for substance use in primary care



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ABSTRACT

Psychotherapy process research examines the content of treatment sessions and their association with outcomes in an attempt to better understand the interactions between therapists and clients, and to elucidate mechanisms of behavior change. A similar approach is possible in technology-delivered interventions, which have an interaction process that is always perfectly preserved and rigorously definable. The present study sought to examine the process of participants' interactions with a computer-delivered brief intervention for drug use, from a study comparing computer- and therapist-delivered brief interventions among adults at two primary health care centers in New Mexico. Specifically, we sought to describe the pattern of participants' ($N = 178$) choices and reactions throughout the computer-delivered brief intervention, and to examine associations between that process and intervention response at 3-month follow-up. Participants were most likely to choose marijuana as the first substance they wished to discuss ($n = 114, 64.0\%$). Most participants indicated that they had not experienced any problems as a result of their drug use ($n = 108, 60.7\%$), but nearly a third of these ($n = 32, 29.6\%$) nevertheless indicated a desire to stop or reduce its use; participants who did report negative consequences were most likely to endorse financial or relationship concerns. However, participant ratings of the importance of change or of the helpfulness of personalized normed feedback were unrelated to changes in substance use frequency. Design of future e-interventions should consider emphasizing possible benefits of quitting rather than the negative consequences of drug use, and—when addressing consequences—should consider focusing on the impacts of substance use on relationship and financial aspects. These findings are an early but important step toward using process evaluation to optimize e-intervention content.

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1. Introduction

Computer-delivered behavioral interventions offer their authors a unique opportunity as well as a unique challenge. In terms of opportunity, they allow creation of an intervention in which every word, image, branch, color, and sound can be controlled—a stark contrast to person-delivered interventions in which only specific principles and techniques can be codified. However, this level of control can also be challenging in its implicit demand on the author to predict the characteristics, reactions, and preferences of future users. Evidence-based models offer little guidance in regard to such details as what choices to provide or when to provide them.

Process research models may offer such guidance. These models examine the content of interactions within intervention sessions, and compare those process variables with outcomes in an attempt to identify key mechanisms of change (e.g., Webb et al., 2012; Feeley et al.,

1999). Describing the choices that participants make in completing computer-delivered interventions can aid in development of future interventions; for example, being aware of topics that participants rate as most important can allow for those topics to be emphasized. In doing so, less salient topics can be avoided, increasing the perceived relevance and “fit” of the intervention. Further, evidence that certain kinds of in-session ratings are associated with better outcomes—although not evidence of causation—may provide important clues about possible mechanisms through which computer-delivered interventions may exert their effects.

Computer-delivered interventions are also uniquely amenable to process research. Each choice the participant makes, and the context in which he or she makes it, is available without the need for arduous coding of session tapes by raters trained to reliability. Many eHealth interventions also solicit participant ratings of satisfaction with the intervention and/or intention to change within the intervention itself, providing additional clues as to the user's experience of the intervention process and further data to compare against outcomes. For example, user satisfaction is often seen as a critical factor in the efficacy of an

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intervention, but its actual association with behavioral outcomes is unclear.

The present study uses a process research framework (e.g., Bertholet et al., 2014; Rhodes, 2012) to examine participant interactions with a computer-delivered brief intervention for drug use, from a prior study comparing computer- and therapist-delivered brief interventions among adults at two primary health care centers in New Mexico (Schwartz et al., 2014). We first describe the pattern of participants' choices and reactions throughout the highly interactive computer-delivered brief intervention. In a subsequent exploratory analysis, we examine associations between those process variables and intervention response at a 3-month follow-up. We were particularly interested in the extent to which problem recognition and self-ratings of the importance of change were associated with actual reductions in substance use at follow-up.

2. Materials and methods

2.1. Participants

Data for this secondary analysis study are drawn from a clinical trial comparing computer-delivered to in-person brief interventions among patients attending one of two primary health care centers in New Mexico; that trial and all related data collection were approved by the Institutional Review Boards of the Friends Research Institute and Christus Health. Participants were adults age 18 and older scoring in the moderate risk range (between 4 and 26) for illicit drug use on the Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST; Humeniuk and Ali, 2006), with self-reported use in the past three months but no treatment in the past year. All participants were recruited from the health centers' waiting area by research assistants and received \$20 for completing the baseline assessment interview. The present analysis focused on the 178 participants from that trial who were randomly assigned to and completed the computer-delivered single-session intervention for substance use. Details regarding the sample and the results of the clinical trial have been published previously (Schwartz et al., 2014; Gryczynski et al., 2015). Briefly, the computer-delivered brief intervention subgroup was primarily White ($n = 160$, 89.9%) and approximately half female and half of Hispanic ethnicity ($n = 82$ for both; 46.1%). Mean age was 36.6 years ($SD = 14.8$), and 106 (59.6%) were not employed at the time of study enrollment.

2.2. Intervention

Also described in detail in Schwartz et al. (2014), the brief computer-delivered intervention used in this trial was designed to be highly interactive, making use of a talking animated narrator as well as branching and/or reflections in response to participants' choices. Taking approximately seven minutes to complete, the intervention began by offering participants a choice of which substance they wished to hear more about. Participants were then offered personalized, gender-specific normed feedback regarding how their use of that substance compared to adults in the US (using data from the National Survey on Drug Use and Health); this material emphasized the large proportion of lifetime users of each drug that had not used it recently (i.e., to convey that cessation of drug use is in fact normative among lifetime drug users). Participants were then offered the opportunity to endorse, from a list, which negative consequences they had personally experienced as a result of using that substance. Those who endorsed at least one negative consequence were asked to rate the importance of changing, and—if indicating moderate or high importance—were helped to consider possible changes. Those who failed to endorse any negative consequences were asked whether or not they were interested in stopping or reducing their use of that substance, and were helped with setting change goals, as appropriate. All participants were also offered the opportunity to go through

the intervention a second time, focusing on a different substance. See Fig. 1 for more detail regarding the structure of the brief intervention.

2.3. Measures

Variables for this analysis were taken from the brief intervention itself. Key variables are noted in Fig. 1, and fell into two primary types. First were basic descriptive variables regarding choices participants made during the brief intervention. These included which substance participants chose to discuss, whether or not they endorsed negative consequences of their substance use, and whether or not they chose to go through the intervention a second time focusing on a different substance. The second type consisted of variables that could potentially reflect processes through which the brief intervention could have an effect, including perceptions of the usefulness of the normed feedback, and responses regarding the importance of changing their use. That is, evidence of an association between these variables and later substance use could lead to further research regarding whether interventions focusing on increasing problem recognition or the perceived relevance of feedback might lead to better effects.

Outcome was defined primarily in terms of changes in two variables derived from the ASSIST, which were created by subtracting follow-up from baseline scores on two key measures: (1) the overall ASSIST Global Continuum of Illicit Drug Risk (GCIDR) score, which captures risk associated with any drugs the participant reports using and thereby can measure both polydrug use as well as switching from one drug to another; and (2) participant responses to ASSIST item 2, which asks about the frequency of substance use in the past three months using a Likert scale ranging from "Never" to "Daily or Almost Daily."

2.4. Statistical analysis

The present analyses focused first on descriptive statistics regarding the above-noted process variables, and subsequently on associations between those process variables and change in drug use frequency/consequences. Regarding the outcome variables, for ASSIST item 2 (drug use frequency), we created a difference score representing the participant's baseline and follow-up scores for the substance they chose to examine first (see Fig. 1); thus, this score represented changes in marijuana use frequency for those who chose marijuana as the first drug to consider, changes in cocaine use frequency for those who chose to focus on cocaine use first, etc. For this outcome variable as well as for ASSIST GCIDR, the subtraction of the follow-up response from the baseline response yielded a change score on which a score of zero indicated no change, a negative score indicated increased use or overall risk from baseline to follow-up, and a positive score indicated a reduction in use or overall risk from baseline to follow-up. The GCIDR change score variable was highly skewed and leptokurtotic, and could not be rendered normally distributed via transformations; it was therefore converted to an ordinal variable with ten levels. The pre-post use frequency variable was also treated as ordinal; outlying levels with few cases were collapsed, yielding an ordinal variable with seven levels ranging from -3 to 3 .

After characterizing process variables using descriptive statistics, and after creating the two outcome variables as described above, we subsequently examined associations between process variables and the two ordinal outcome variables using non-parametric statistics (Siegel and Castellan, 1988): the Mann-Whitney U test (a non-parametric analogue of the independent values t test, for use with dichotomous predictors and ordinal outcomes) and Kruskal-Wallis one-way analysis of variance (a non-parametric analogue of a one-way ANOVA, for use with categorical predictors and ordinal outcomes). Correlations between outcomes and ratings of the importance of change/satisfaction with feedback (each being ordinal) were conducted using the Spearman rank-order correlation.

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