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Short communication

Readiness-to-change as a moderator of a web-based brief intervention for marijuana among students identified by health center screening

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ABSTRACT

Introduction: Electronic screening and brief intervention has been identified as a low cost strategy to address marijuana use among students, however there is little known about who may be most responsive to this intervention approach. This study examined whether readiness-to-change moderated the influence of a web-based intervention on frequency of use at 3-month outcomes.
Methods: One-hundred twenty-three students who smoked marijuana at least monthly were identified by screening in a student health center. Baseline and 3-month outcome assessments were conducted on-line. Participants were randomly assigned to either eCHECKUP TO GO-marijuana or a control condition after completing marijuana measures and the Readiness-to-Change Questionnaire (RTCQ). Negative binomial regression analyses were conducted to examine whether the effect of the intervention on marijuana use at 3-month outcomes was moderated by the Action and Problem Recognition dimensions of the RTCQ, adjusting for baseline use.
Results: Analyses showed a significant Intervention × Action interaction. Probing of interaction effects showed that among those with high scores on the Action scale participants in the intervention group reported significantly fewer days of use than those in the control condition at follow-up (IRR = 0.53, 95%CI: 0.94, 2.08). The Problem Recognition dimension did not moderate the influence of the intervention on outcomes.
Conclusion: These results suggest that this eSBI may bolster change efforts among students who have begun taking steps toward changing their marijuana use.

1. Introduction

Marijuana use presents a significant risk to the health and well-being of university students. Students with more frequent marijuana use are more likely to experience a variety of consequences that compromise their academic performance, physical health, and relationships (Caldeira et al., 2008). Despite this, students typically do not recognize their marijuana use as problematic or presenting risks and therefore do not seek resources to promote change (Stephens et al., 2007).

One way to address this has been through screening and brief intervention. Drawing from the success of electronic screening and brief intervention (eSBI) for alcohol use among college students (Carey et al., 2012), investigators have begun to examine the utility of marijuana eSBI among adolescents and young adults (e.g., Cunningham and van Mierlo, 2009; Lee et al., 2010; Walton et al., 2013). This approach allows health care providers and administrators to overcome a number of potential barriers to implementing interventions for marijuana use including insufficient staff resources and low rates of substance-related treatment seeking among this population (Kypri and Lee, 2009). Although there have been increased efforts to develop web-based marijuana eSBIs, relatively few of these have been empirically evaluated (see Tait et al., 2013). Moreover, the few studies that have evaluated interventions among non-treatment seeking student marijuana users have provided limited evidence that they reduce marijuana use or consequences (e.g., Elliott and Carey, 2012; Elliott et al., 2014; Lee et al., 2010).

Given the equivocal evidence for the efficacy of eSBI for marijuana, identification of moderators may help specify those who may benefit most from this approach and provide insight about how to improve eSBI approaches. Although empirical support for

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readiness-to-change as a moderator has varied across substance use intervention studies (see Burke et al., 2002), this construct has been used as a key target in the development of motivational interventions (e.g., Stephens et al., 2004) and a tailoring variable for a variety of substance use interventions (Connors et al., 2001). Unfortunately, there has been little research that has examined whether readiness-to-change moderates the influence of marijuana eSBI among students. Lee et al. (2010) found that, among first-year students recruited on-line in their transition to college, those who were higher on the Contemplation scale of the Readiness to Change Questionnaire reduced marijuana use more than those lower on Contemplation when exposed to an eSBI. However, it is currently not known whether web-based interventions delivered to a broader population of undergraduates students (e.g., students across all 4-years) in other contexts (e.g., in student health services) are more efficacious for those higher on indices of readiness-to-change.

The current study examined this question among marijuana using students presenting to a student health center (Palfai et al., 2014). Undergraduate students who presented to student health services (SHS) participated in a brief electronic health behaviors screener. Those who were regular marijuana users (i.e., use at least monthly) were asked to participate in a study in which they would complete online assessments and receive health-related feedback. Students were randomized to receive either the eCHECKUP TO GO for marijuana intervention (described below) or a control intervention that consisted of feedback on general health-related behaviors. Results showed little evidence of an overall effect of the intervention on 3-month frequency of use (Palfai et al., 2014). In this secondary analysis, it was hypothesized that baseline ratings of readiness-to-change would moderate the influence of the intervention such that evidence of an intervention effect on frequency of use would be observed among those who were higher on indices of readiness-to-change.

2. Materials and methods

2.1. Participants

Participants were 123 undergraduates who presented to SHS and reported using marijuana at least monthly over the past 90 days (Mean number of days used = 34.99, SD = 28.87). Because the efficacy of this eSBI approach was not known, those whose marijuana-specific ASSIST scores indicated a high likelihood of substance risk (i.e., marijuana ASSIST $\geq$ 27) were not enrolled in the trial. The study was approved by the Boston University Institutional Review Board and informed consent was obtained for both screening and study participation.

2.2. Measures

2.2.1. NIDA-modified ASSIST-marijuana. The NIDA-modified ASSIST (Humeniuk et al., 2008; NIDA, 2009) provides an indication of level of substance use risk (i.e., low, medium high) and has been validated in primary care populations. Coefficient alpha for the ASSIST was 0.62.

2.2.2. Frequency of marijuana use-90 days. Number of marijuana use days in the past 90 days was asked with the following question, "During the past 90 days, on how many days did you use any kind of marijuana, blunts, or hashish?" This question has been adapted for use among adolescents and young adults (Lee et al., 2010). The item was accompanied by a 3 month calendar starting from the present date to provide anchors.

2.2.3. Readiness to Change Questionnaire (RTCQ). This 12-item measure (Budd and Rollnick, 1996) that is modified for marijuana use (Stephens et al., 2007) was employed to assess the level of motivation to change marijuana use. Because previous work has shown both two and three factor solutions for the RTCQ (Crackau et al., 2010; Raes et al., 2010), we first conducted a principal component analysis (PCA) of the 12 items using orthogonal (varimax) rotation forcing three and two component structures. Determination of the scale component structure was based on Kaiser's rule (i.e., eigenvalue > 1), item component loading >0.4, item factorial complexity of one, and interpretability. A two-factor solution representing Problem Recognition (i.e., awareness that marijuana use may be excessive) and Action (i.e., engaging in behaviors to reduce marijuana use) was identified. One item did not load on either factor resulting in a 7-item Problem Recognition Factor (loadings 0.51–0.82) and a 4-item Action factor (loadings 0.68–0.86). Coefficient alphas for the scale scores were 0.87 for Problem Recognition and 0.82 for Action.

2.3. Intervention conditions

Following completion of baseline assessment, students were randomly assigned to Intervention (n = 61) or Control (n = 62) conditions. The intervention was eCHECKUP TO GO-marijuana which is a commercially available web-based intervention that is used widely in universities and colleges in the US and Canada (San Diego State Research Foundation, 2014). The intervention consists of an assessment section followed by personalized feedback about marijuana use including costs, descriptive norms, risks, consequences, and potential alternative activities. Students are also provided with a series of harm and frequency reduction strategies (e.g., deciding which days not to use, leaving a party early). Those in the Control condition were given minimal, non-personalized health feedback regarding recommended national guidelines for sleep, exercise, and nutrition (see Palfai et al., 2014 for details of study methods).

2.4. Procedures

Students who visited SHS were asked by the research assistant to complete a one minute electronic screening questionnaire on undergraduate student health behaviors. Those who agreed were presented with the 9-item screening measure that included the marijuana frequency question from the ASSIST. Students who reported at least "monthly" marijuana use in the past 90 days were identified as potentially eligible for the study. After completing the full ASSIST and baseline measures, eligible students were randomized to intervention condition (Marijuana eCHECKUP TO GO vs. control). Students were compensated $25 for their participation in baseline assessment procedures and $25 for 3-month online assessment participation.

3. Results

3.1. Readiness to change as a moderator of intervention

Negative binomial regression analyses were used to examine the interaction between readiness-to-change indicators and the intervention condition on number of days using marijuana in the past 90 days at 3-month outcome. Because these count data were not normally distributed, we used the robust maximum likelihood estimator (MLR) to accommodate missing data. Intervention condition was coded as an indicator variable [0,1] with 1 representing the active intervention condition. Readiness-to-change was operationalized as Problem Recognition (items from Contemplation and reversed scored Precontemplation subscales) and Action. Mean ratings for subscale scores (possible range −2 to 2) were −0.74

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