



Changing multiple health risk behaviors in CHOICES

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ABSTRACT

Multiple health behavior change (MHBC) intervention trials to date have only considered behaviors that were *directly* targeted. Research has yet to consider how untargeted behaviors can affect change in behaviors directly targeted by an intervention or how changes in targeted behaviors might lead to changes in other, untargeted behaviors. This study addresses these gaps with a secondary analysis of change in risk drinking (targeted behavior) and smoking (behavior that was not addressed) in the efficacy trial of CHOICES, an intervention for the prevention of alcohol-exposed pregnancies. Measures included the Timeline Followback for daily alcohol consumption and questions about smoking behavior. Participants were women of childbearing age who were at risk of alcohol-exposed pregnancy at baseline. Baseline smokers were less likely to change their drinking behavior than baseline non-smokers at nine months ($n = 579$) with Odds Ratio (OR) of 0.681 (95% CI = 0.471–0.985); 41.1% of smokers vs 50.6% of non-smokers reduced drinking to below risk levels (< 5 drinks/day and < 8 drinks per week). Meanwhile, smokers who had changed their drinking behavior were more likely than smokers who had not changed their drinking behavior to have also quit smoking at nine months (OR = 2.769; 95% CI = 1.533–5.000); 19.5% vs. 8.1%, respectively. Together, these findings suggest a natural tendency towards change of multiple related behaviors and indicate that while the presence of unaddressed risk behaviors may make a targeted behavior change more difficult, change in one behavior may facilitate change in related behaviors, even when they are not addressed.

1. Introduction

Health-risk behaviors such as risky alcohol use and cigarette smoking are a leading cause of preventable morbidity and mortality (Asarnow et al., 2014; Eaton et al., 2012; Eaton et al., 2010). There is a tendency for health-risk behaviors to occur in combination (Evers and Quintiliani, 2013), and their clustering has been shown to have a synergistic, negative impact on health (Poortinga, 2007; Spring et al., 2012; Prochaska and Prochaska, 2011). There has been a recent shift away from studying individual behaviors as separate risk factors, towards investigation of how changes in multiple behaviors may be interrelated (Cairney et al., 2014; Johnson et al., 2014; Paiva et al., 2010; Yin et al., 2013). Multiple health behavior change (MHBC) interventions are increasingly considered an avenue to comprehensive health promotion efforts that maximize impact and cost-effectiveness (Prochaska and Prochaska, 2011; Ickovics, 2008). The purpose of this secondary data analysis is to explore MHBC of two related behaviors (risk drinking and smoking) in the efficacy trial of Project CHOICES.

Mounting evidence suggests that changes in one health behavior may bolster rather than detract from changes in another health

behavior. It has been suggested that some of the components involved in changing a behavior (e.g. motivation to change, action steps, self-efficacy) may influence a changer's choices about other similar or related behaviors (Lippke et al., 2012; Prochaska et al., 2008). A study by Johnson et al. (2014) documented a coaction effect (i.e. an effect wherein changing one treated behavior increases a person's odds of changing a second treated behavior) in clinical trials of Transtheoretical Model (TTM)-based MHBC interventions. Using data from three randomized trials of MHBC interventions for weight-related behaviors, the authors found that treatment group participants who progressed to the Action/Maintenance stage of change for one weight-related behavior were 1.4–5 times more likely to make progress on second behavior, as compared to treatment group participants who did not progress to Action/Maintenance. Coaction effects were more common among the treatment conditions of these trials, as compared to the control conditions (Johnson et al., 2014).

Yin et al. (2013) used data from five randomized trials of computer-tailored, TTM-based MHBC interventions to assess paired action across 12 behavior pairs. Paired action refers to the rate at which participants change both behaviors in a behavior pair, as opposed to just one

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behavior (Yin et al., 2013). Yin et al. (2013) found that the intervention conditions of the trials they considered consistently produced more paired action than the control conditions of the same trials. Together, findings by Johnson et al. (2014) and Yin et al. (2013) highlight the effectiveness of TTM-based MHBC interventions in sparking changes in multiple behaviors.

While many scholars have explored the benefits of targeting multiple health risk behaviors in a single intervention, there has been little attention to the impact of untargeted risk behaviors on a person's ability to change the behaviors that are targeted in a MHBC intervention. Additionally, previous studies have focused on change in multiple behaviors that were directly targeted in MHBC interventions (Johnson et al., 2014; Yin et al., 2013). Little is known about how change in a targeted behavior may be associated with change in related but untargeted behaviors. There is a need for research that explores how components of a facilitated change process may bring about changes in related but untargeted health behaviors. The results of such research may have implications in enhancing the efficiency of MHBC interventions.

This study used data from the efficacy trial for Project CHOICES to explore singular and paired action in risk drinking (a change that was directly targeted in the CHOICES intervention) and smoking cessation (a related but untargeted behavior change). CHOICES is a motivational interviewing and TTM-based intervention that targets change in the dual behaviors that put a woman at risk of alcohol-exposed pregnancy (AEP; i.e. risk drinking and no or ineffective use of contraception) (Floyd et al., 2007; Johnson et al., 2015; Velasquez et al., 2010). Smoking was measured at each assessment time point [baseline, three months (end of treatment), nine months] but was not targeted for change in the CHOICES intervention. Definitions of change in risk drinking and smoking are explained in the measures section of this manuscript.

The selection of risk drinking and smoking as a behavior pair is justified by the well-established association between alcohol and tobacco use (Lippke et al., 2012; Miller et al., 2007). Indeed, drinking and smoking are often embedded in a person's social life (Kelly and Barker, 2016), and it has been suggested that use of one of these substances can trigger a person to also use the other (Friend and Pagano, 2005). Like drinking, smoking is not only a leading cause of mortality and morbidity, but a behavior that is linked directly to negative birth outcomes (Sepinwall, 2002). Recent clinical trials have honed in on the need to prevent tobacco-exposed pregnancies alongside AEPs (Velasquez et al., 2017).

The current study was guided by three research questions:

- 1) *Does the presence of an additional untargeted health behavior at baseline hinder a person's ability to change a related, targeted health behavior?* We hypothesized that baseline smokers in CHOICES would be less likely than baseline non-smokers to change the targeted behavior of risk drinking at the three-month (end of treatment) and nine-month follow-ups.
- 2) *Is a person who changes a targeted behavior in a MHBC intervention more likely than a person who does not change that behavior to also change related, untargeted health behaviors?* We hypothesized that women who were baseline tobacco smokers and had reduced their drinking to below risk levels at the three- and nine-month follow ups would be more likely than their non-changing counterparts at each time point to have ceased smoking.
- 3) *Is paired action more common in the treatment condition of a MHBC intervention, as compared to the control condition, when one of the behaviors in a pair is not targeted for change?* Given the effectiveness of CHOICES in impacting the targeted behaviors of risk drinking and no or ineffective use of contraception,¹ the question became

whether the impact of the CHOICES intervention extended to smoking as a behavior that is related to risk drinking but was not targeted in the intervention. Given a tendency towards greater paired action in the treatment conditions of TTM-based MHBC interventions (Yin et al., 2013), we hypothesized that paired action in risk drinking and smoking cessation would be more common among women receiving the CHOICES intervention, as compared to women in the control condition.

2. Methods

The CHOICES efficacy trial was funded by the Centers for Disease Control and Prevention (CDC; U84 CCU614576) and involved a collaboration among the CDC, Nova Southeastern University, the University of Texas Health Science Center at Houston, and Virginia Commonwealth University (Prochaska et al., 2008). Study protocols were approved by the Institutional Review Boards at the CDC and at each participating university and are described in Floyd et al. (2007). The authors declare no conflicts of interest. The CHOICES efficacy trial is described in detail by Floyd et al. (2007). The CHOICES intervention is a four-session motivational intervention designed to reduce AEP risk and is described in detail by Velasquez et al. (2010).

2.1. Recruitment settings and methods

CHOICES efficacy trial participants were recruited using six settings that had been identified in the previous epidemiological study of Project CHOICES (Project CHOICES Research Group, 2002) as opportunistic settings for identifying and treating women who are at risk of AEP. These settings included jails, drug and alcohol treatment centers, suburban primary care practices, a hospital-based gynecology clinic, a Medicaid health maintenance organization, and a media-recruited sample (Floyd et al., 2007). Recruitment methods included posting and mailing out flyers and airing newspaper and radio announcements (Floyd et al., 2007). Additionally, presentations were made to groups of potential participants in the jails and treatment center settings (Floyd et al., 2007).

2.2. Sample

In the CHOICES efficacy trial, 830 women of childbearing age who were at risk of AEP were randomized to treatment (n = 416) and control conditions (n = 414). Women in the treatment condition received the CHOICES intervention. Women in the control group received information on alcohol use and women's health, along with referrals to local resources. All participants were fertile women (no tubal ligation or other cause of infertility) of childbearing age (18–44 years) who were drinking at risk levels at baseline and had been sexually active without consistent use of effective contraception during the 90 days prior to baseline (Velasquez et al., 2010). Participants had to be neither pregnant nor planning to become pregnant in the next nine months at the baseline assessment (Floyd et al., 2007; Project CHOICES Intervention Research Group, 2003).

Analyses were restricted to participants who completed a three-month or nine-month assessment (N = 654). Attrition rates at the three- and nine-month time points were 14.7% and 11.5% respectively.

(footnote continued)

AEP at nine months, with odds ratios at each follow up time point pointing to two-folds greater likelihood of risk reduction in the intervention group as compared to the control group (Floyd et al., 2007). Among the current sample (N = 654), women in the intervention group were more likely to change their risk drinking behavior than women in the control condition at both the three- and nine-month follow ups [44.4% of the treatment group at three months, as compared to 33.8% of the control group (chi = 6.652, d.f. = 1, p = 0.01); 52.4% of the intervention group at nine months, as compared to 35.2% of the control group (n = 101/290; chi = 17.511, d.f. = 1, p < 0.001)].

¹ In CHOICES, 69.1% of women in the treatment condition had reduced their risk of

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