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Cluster subtypes appropriate for preventing postpartum smoking relapse ☆

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ABSTRACT

Objective: While the majority of women quit smoking either before or during pregnancy, 60 to 80% relapse in the postpartum period. The objective of this research was to examine postpartum women who quit smoking during their pregnancies and to determine the predictive factors for relapse in the postpartum period by identifying different subgroups that predict risk of relapse.
Method: One hundred forty four postpartum women who were abstinent at the time of delivery were recruited. Data regarding the Acquisition Stage of Change, Decisional Balance and Situational Temptations to Smoke were assessed in the immediate postpartum period. Based on their intention to remain abstinent, 121 women identified in the acquisition-Precontemplation (aPC) group comprised the study sample. Smoking status was assessed again at 2 months postpartum.
Results: A cluster analysis was performed to idenitfy subgroups of the acquisition-Precontemplation (aPC) group. Four subgroups were identified and were labeled Most Protected, Ambivalent, Risk Denial, and High Risk. Logistic regression was performed to establish external validity of the clusters. The clusters and exclusive breastfeeding were the only statistically significant variables associated with relapse at 2 months postpartum.
Conclusions: The results confirmed the clusters identified in previous prevention research with both adolescents and postpartum women, The cluster profiles can serve to guide the development of a tailored intervention program.

1. Introduction

It is universally accepted that cigarette smoking is the single most preventable risk factor for death and disease (US Department of Health and Human Services, 2010). The additional risk factors associated with smoking for childbearing women call for a greater focus in this area. While the majority of women quit either prior to or during pregnancy, the relapse rates are 60 to 80% in the postpartum period (McBride et al., 1999; Stotts, DiClemente, Carbonari, & Mullen, 2000). A return to smoking has an impact not only on a woman's health but also on her infant and family (Marble, 1996; Schoenborn, Vickerie, & Barnes, 2003). The period of cessation is typically 6 to 12 months (USDHHS, 2000). This suggests that the problem should not be viewed from the typical relapse model but rather from a prevention perspective. The purpose of this study was to examine postpartum women who quit smoking during their pregnancies from a prevention perspective and determine the predictive factors for relapse in the postpartum period

1.1. Cessation and relapse during pregnancy

Pregnancy, considered the "golden opportunity" for cessation, is associated with a marked increase in quit attempts. Approximately 26% of pregnant women are current smokers (Coleman & Joyce, 2003). Studies have claimed as high as 40–50% self-reported cessation rates during pregnancy with the use of various interventions (Coleman & Joyce, 2003; Fingerhut, Kleinman, & Kendrick, 1990; Kahn, Certain, & Whitaker, 2002; Walsh, Redman, Brinsmead, Byrne, & Melmeth, 1997). These have included self-help programs, telephone and face-to-face counseling, support groups, newsletters, kits and booklets. Unfortunately the 60–80% relapse rate occurs regardless of the cessation interventions employed (Fingerhut et al., 1990; McBride et al., 1999; Stotts et al., 2000). One consistently strong predictor of continued smoking and/or relapse, in pregnancy-related smoking cessation, is being partnered with a smoker (Gulliver, Hughes, Solomon, & Dey, 1995; Hakansson, Lendhals, & Petersson, 1999; McBride et al., 1999; Woodby, Windsor, Snyder, Kohler, & DiClemente, 1999; Ziebland & Fuller, 2001). Mullen (2004) synthesized the findings from the intervention trials, predictor studies and qualitative work undertaken between 1985 and 2003. Her review confirmed the need for examination of this transition from pregnancy to postpartum in relation to smoking relapse. Mullen made specific recommendations for future research, including attending to partner

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smoking status and support, research involving low socioeconomic status women, development of a standard for cessation, exploration of intrinsic and extrinsic motivators, and use of staging criteria for postpartum smoking prediction rather than relapse prevention alone.

1.2. Transtheoretical model

The Transtheoretical Model (TTM) is one of the most widely used models of behavior change. One application involves tailoring messages to the individual, which has proved very effective in smoking cessation, increasing exercise, improving diet, decreasing UV exposure, and increasing adherence to mammography use in general populations (Greene et al., 1998; Hollis et al., 2005; Prochaska, DiClemente, Velicer, & Rossi, 1993; Prochaska, Velicer, Fava, Rossi, & Tsoh, 2001; Prochaska, Velicer, Fava, Ruggiero, et al., 2001; Prochaska et al., 2004; Rakowski et al., 1998; Velicer & Prochaska, 1999; Velicer, Prochaska, Fava, La Forge, & Rossi, 1999; Velicer, Prochaska, & Redding, 2006). Stage of change is the central organizing construct of the model. Stage of change represents the temporal or evolutionary dimension integrating current behavior and intention to engage in the new health behavior (Prochaska, Velicer, DiClemente, & Fava, 1988; Velicer et al., 2000). The five stages are Precontemplation — the person has no intention to change behavior in the foreseeable future, Contemplation — the person is aware that a problem exists but has not yet made a commitment to change behavior, Preparation — the person is intending to take action in the next 30 days and has made an attempt to change behavior in past year, Action — the person is involved in overt behavior change, and Maintenance — the person has been successful in behavior change for six months and is actively working to prevent relapse. The other dimensions of the model are the independent variable dimension, including the processes of change, and the intermediate variable dimension, which includes the decisional balance, and situational temptations. Tailored interventions can use a sequential approach, providing feedback based on the TTM variables, typically in order of largest effect size, or simultaneously (Velicer et al., 1993, 2006). In the simultaneous case, the feedback is based on the profile of the individual across different TTM variables (Levesque, Driskell, & Prochaska, 2008).

For smoking cessation, a series of cluster analysis studies starting with Velicer, Hughes, Fava, Prochaska, and DiClemente (1995) have found consistent subtypes within each stage of change. The subtypes have been replicated across multiple samples for smoking cessation (Anatchkova, Velicer, & Prochaska, 2005, 2006a, 2006b; Dijkstra, Bakker, & deVries, 1997; Kremers, Mudde, & deVries, 2001; Norman, Velicer, Fava, & Prochaska, 2000). Recently the same typology has also been replicated with other behaviors (Santiago Rivas, Velicer, Redding, Prochaska, & Paiva, 2010; Santiago Rivas, Velicer, Redding, Prochaska, & Paiva, in press).

1.3. Prevention subtypes

The model has also been applied to the development of prevention programs for smoking, alcohol use, and other behaviors. Parallel to the stages of change for cessation, a staging algorithm has been developed for prevention, called the Acquisition Stages of Change. Three Stages of smoking Acquisition (Pallonen, Prochaska, Velicer, Prokhorov, & Smith, 1998) have been identified: Acquisition Precontemplation (aPC) —the person has no intention of acquiring this behavior, Acquisition Contemplation (aC) — the person is considering acquiring this behavior but not within the next six months, and Acquisition Preparation (aPR) — the person intends to acquire the behavior in the next 30 days. Other researchers have employed the same or similar stage of acquisition idea (Aveyard, Lancashire, Almond, & Cheng, 2002; Otake & Shimai, 2002; Kremers, deVries, Mudde, & Candel, 2004), including the susceptibility concept of Pierce et al. (Unger, Johnson, Stoddard, Nezami, & Chou, 1997; Pierce, Choi, Gilpin, Farkas, & Merritt, 1996).

School-based smoking prevention programs are typically identical for all students. Tailoring prevention materials to focus on individual needs with an emphasis on students at highest risk is a promising alternative. Recent prevention programs have tailored materials based on the Stages of Acquisition, an extension of the Stages of Change used to tailor smoking cessation materials effectively for adults However, about 90% of nonsmoking adolescents classify themselves in the aPC stage, which limited the degree of tailoring that could be done. The interventions have resulted in only minor gains (Hollis et al., 2005).

Velicer et al. (2007) performed a cluster analysis within the acquisition Precontemplation group, using the Decisional Balance and Situational Temptations scales, for three random subsamples of adolescents within the aPC stage ($N_1 = N_2 = N_3 = 514$). Four distinct subtypes were identified in each subsample: High Risk, Most Protected, Ambivalent, and Risk Denial. External validity was established using family support for nonsmoking, peer variables, and stage classification at follow-up assessment (12, 24, and 36 months). Family support for nonsmoking was related to subtype much more strongly than peer interactions. Subjects in the Most Protected subgroup were the most likely to remain in the aPC stage at each follow-up assessment. Velicer et al. (2009) replicated the same four types for both smoking and alcohol in five subsamples of middle school students. Subtype membership, along with membership in the aC and aPR stages, provides important additional information for tailoring smoking prevention materials. Tailored interventions can focus on those adolescents at highest risk and limit or avoid expending resources on those at very low risk.

Most recently Thyrian et al. (2006) replicated the four subtypes within the acquisition Precontemplation stage among ex-smoking postpartum women. During the study 1128 women identified as smokers at the beginning of pregnancy. The sample included the 317 women who claimed to have quit during pregnancy and were smoke free at the time of delivery. Examining the self-efficacy, pros and cons of remaining a nonsmoker, Thyrian et al. identified the 4-cluster solution as most interpretable. A logistic regression was performed to identify variables that would predict smoking status at 12 months postpartum. Cluster assignment was predictive of smoking status, whereas partner smoking status, age, education, breastfeeding and treatment group assignment were not significant. Members of the “high-risk group” were 5.77 times ($p<.01$), “risk-denial group” were 5.01 times ($p<.01$), and the “ambivalent group” were 3.26 times ($p<.01$) more likely to return to smoking at the 12-month follow up than those in the “most protected” group.

1.4. Study overview

Utilizing the TTM as a conceptual framework, the purpose of this prospective longitudinal survey research was to examine the stage of change, decisional balance and temptation to smoke among postpartum women who quit prior to or during their pregnancy. A cluster analysis of the postpartum women, who claimed an intention to remain abstinent postpartum, was conducted to identify subgroups of this sample that could benefit from different tailored interventions for relapse prevention. Data from two months after the baseline assessment was employed to provide initial external validity. The information gained from this study may lead to development of a tailored intervention program to improve rates of continuous abstinence for postpartum women.

2. Method

2.1. Sample

Eligible women were of any race, age, ethnicity, and marital status, in the immediate postpartum period (defined as the first week