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The role of smoking expectancies in the relationship between PTSD symptoms and smoking behavior among women exposed to intimate partner violence

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Abstract

Intimate partner violence (IPV) is a public health problem associated with negative health consequences, including higher rates of tobacco smoking. Smoking expectancies are related to motivation to quit and relapse. IPV-exposed women endorse higher rates of PTSD symptoms, which are related to smoking and smoking expectancies. The present study sought to examine the relationship among smoking behavior, smoking expectancies, and PTSD symptoms among IPV-exposed women. Participants were 83 women who reported experiencing IPV within the last month, smoked an average of 12 cigarettes per day, and reported moderate levels of nicotine dependence (FTND mean = 4.4). Participants completed baseline and follow-up interviews. Multiple regression analyses assessed the relationships among smoking expectancies and PTSD symptoms to cigarettes smoked per day and nicotine dependence. Findings demonstrated that **Stimulation/State Enhancement** expectancies were positively related to cigarettes per day, whereas **PTSD arousal symptoms** were negatively related to cigarettes per day, p 's < .05. Neither smoking expectancies nor PTSD symptoms were significantly related to nicotine dependence. Supplemental analyses revealed that **PTSD re-experiencing symptoms** were negatively related and **PTSD avoidance/numbing symptoms** were positively related to **Stimulation/State Enhancement** expectancies, p 's < .05. This study extends findings regarding the association between PTSD symptoms and smoking among an understudied population – IPV-exposed women. The relationship between PTSD symptoms and smoking differed across PTSD symptom clusters and expectancy scales, which may have implications for treatment development. The fact that expectancies and PTSD symptoms are related to smoking behavior among IPV-exposed women may be important for enhancing prevention and intervention efforts.

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Contributors

Dr. Sullivan designed the study and developed and implemented the protocol. Regarding this manuscript, Dr. Sullivan provided substantial guidance to Ms. Ashare, the lead author. Ms. Ashare conducted data analyses and literature searches and wrote the first draft of the manuscript. Drs. McKee and Weinberger contributed to the statistical analysis and summaries of previous related work. All authors were involved in writing and revising the manuscript and all have approved the final manuscript.

Conflict of Interest

All other authors declare that they have no conflicts of interest.

Keywords

cigarette smoking; smoking expectancies; intimate partner violence; PTSD

1. Introduction

Intimate partner violence (IPV) is a worldwide public health problem (e.g., Coker, et al., 2002; Golding, 1999) that is associated with negative health consequences and greater substance abuse (Black & Breiding, 2008; Lemon, Verhoek-Oftedahl, & Donnelly, 2002). Therefore, it is surprising that few studies have examined IPV-exposed women's smoking behavior since nearly 70% of this population smoke (Ackerson, Kawachi, Barbeau, & Subramanian, 2007; Black & Breiding, 2008; Yoshihama, Horrocks, & Bybee, 2010). Better characterization of smoking behavior among IPV-exposed women is necessary to develop more effective cessation strategies.

Factors associated with smoking, such as PTSD symptoms or smoking expectancies, may help to explain smoking behavior. Individuals with PTSD report higher smoking rates. Among IPV-exposed women, PTSD severity is related to nicotine dependence specifically (Fu, et al., 2007; Weaver & Etzel, 2003). The relationship between IPV and substance use may be mediated by specific PTSD symptom clusters (Sullivan, Cavanaugh, Buckner, & Edmondson, 2009; Sullivan & Holt, 2008) and there may be a similar relationship between IPV and smoking. Smoking outcome expectancies are beliefs about the consequences of smoking (e.g., smoking increases stimulation and reduces negative affect) that influence all aspects of smoking behavior (Brandon, Juliano, & Copeland, 1999) including the escalation of smoking, motivation to quit, and relapse (Pulvers, et al., 2004; Wahl, Turner, Mermelstein, & Flay, 2005; Weinberger, McKee, & George, 2010). Smokers with PTSD, relative to controls, may have stronger expectancies that smoking reduces cravings or enhances stimulation (Marshall, et al., 2008) which may be associated with expectancies that smoking will alleviate PTSD avoidance/numbing symptoms (Beckham, et al., 1997; Feldner, Babson, Zvolensky, et al., 2007). Therefore, PTSD symptoms may contribute to higher smoking rates among IPV-exposed women, which may be partially explained by the relationship between PTSD and expectancies.

To our knowledge, no studies have examined relationships among smoking expectancies, IPV, PTSD symptoms, and smoking behavior. We predict that greater smoking expectancies and more severe PTSD symptoms will be related to smoking behavior. We also will examine whether PTSD symptom clusters are associated with smoking expectancies. If PTSD symptoms and expectancies are associated with smoking behavior, these may represent targets for treatment among IPV-exposed women.

2. Methods and Materials

2.1. Participants

A summary of study criteria is listed below (For more details regarding participant characteristics and procedures, see Sullivan, Khondkaryan, Dos Santos, & Peters, 2011). Participants were recruited from a Northeast urban community and deemed eligible via a phone screen. Primary inclusion criteria were: female gender; age 18 or older; any use of drugs/alcohol (past month); current involvement in a heterosexual intimate relationship; and physical victimization of the woman (past month) by her current male partner.

Overall, 137 women completed the study, including baseline and follow-up assessments, and daily assessments of IPV and substance use. The present study focuses on baseline and follow-up assessments among daily smokers (> 5 cigarettes per day; $n = 83$).

2.2. Procedures

Participants provided informed consent and completed: (a) a baseline, semi-structured, computer-assisted interview; (b) 90 days of daily data collection and; (c) a follow-up interview on or after day 91.

2.3. Measures

2.3.1. Tobacco use—Smoking characteristics including cigarettes per day, age of onset of daily smoking, and nicotine dependence were assessed during the baseline interview. Nicotine dependence was assessed with the 6-item Fagerstrom Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991).

2.3.2. Smoking expectancies—Smoking expectancies were assessed during the follow-up interview with the Negative Affect Reduction¹, Stimulation/State Enhancement, and Craving/Addiction scales from the Smoking Consequences Questionnaire – Adult (SCQ-A; Copeland, Brandon, & Quinn, 1995). Items were rated on a scale from 0 (“not likely at all”) to 9 (“extremely likely”) and averaged to compute subscale scores.

2.3.3. Posttraumatic Diagnostic Scale (PDS)—The PDS (Foa, 1995) is a 49-item self-report measure assessing posttraumatic stress symptomatology using DSM-IV criteria (APA, 2000). During the follow-up interview, participants reported whether any instances of IPV were considered traumatic according to DSM criterion A. The frequencies of 17 IPV-related PTSD symptoms experienced in the past month were rated on a 4-point scale (0=“not at all/only one time” to 3=“five or more times a week/almost always”). The PDS indexes separate symptom clusters: Re-experiencing, Avoidance/Numbing, and Arousal.

2.3.4 Intimate Partner Violence (IPV)—IPV victimization was assessed at baseline using a 3-month time period. Physical, sexual, and psychological IPV were measured by the 78-item CTS-2 (Straus, Hamby, Boney-McCoy, & Sugarman, 1996). Psychological and sexual IPV were also measured with the Psychological Maltreatment of Women Inventory (PMWI; Tolman, 1989) and Sexual Experiences Survey (SES; Koss & Oros, 1982), respectively. For the current analyses, IPV severity was assessed as: physical IPV (sum of the CTS-2 12-item physical assault scale); psychological IPV (sum of the 48-item PMWI); and sexual IPV (sum of the 10-item SES).

2.4. Data analysis

2.4.1 Linear multiple regressions—Two linear multiple regressions assessed relationships of smoking expectancies and PTSD symptoms to smoking behavior. Dependent variables were (a) cigarettes smoked per day and (b) nicotine dependence scores. Six independent variables were entered simultaneously and included Stimulation/State Enhancement, Negative Affect Reduction, and Craving/Addiction expectancies and PTSD re-experiencing, avoidance/numbing, and arousal symptom clusters. IPV scales were not correlated with either dependent variable (see Table 1) and were excluded from regression models.

¹One item (“Cigarettes help me reduce anxiety”) was erroneously omitted from the Negative Affect Reduction scale.

2.4.2 Supplemental multiple regressions—To investigate whether expectancies partially explained the relationship between PTSD and smoking, supplemental regression models examined expectancies that were significantly related to smoking behavior. PTSD clusters were entered as independent variables to examine their relationship to expectancies.

3. Results

3.1. Participant characteristics and correlations

Table 1 contains descriptive statistics and correlations for study variables. Sixty women were African-American, 11 were White, 7 were Latina, and 1 identified as multiracial. On average, women began smoking at age 16 ($SD = 4$), reported an income of \$14,240/year ($SD = \$14,443$) and most were unemployed (73%) and high school educated (70%). The average relationship length at the time of the interview was 6.5 years ($SD = 6.4$) and most were married/cohabitating (60%).

3.2. Relationship between cigarettes per day, smoking expectancies and PTSD symptoms

The regression testing the effect of expectancies and PTSD clusters was significant when cigarettes per day was the dependent variable, $F(6,76) = 4.1, p < 0.01$ (see Table 2). Controlling for other variables, Stimulation/State Enhancement expectancies were the strongest predictor of cigarettes per day, $\beta = 0.32, p < 0.02$. PTSD arousal symptoms were negatively related to cigarettes per day, $\beta = -0.19, p < 0.05$.

3.3 Relationship between nicotine dependence, smoking expectancies and PTSD symptoms

The regression testing the effect of expectancies and PTSD clusters was marginally significant when nicotine dependence was the dependent variable, $F(6,76) = 2.3, p = .05$ (see Table 2).

3.3 Supplemental analysis

To follow-up on the finding that Stimulation/State Enhancement expectancies predicted cigarettes per day, a supplemental model regressed Stimulation/State Enhancement expectancies on to separate PTSD clusters. The overall model was significant, $F(3,79) = 5.5, p < 0.01$. PTSD re-experiencing symptoms were negatively related, $\beta = -0.36, p < 0.05$ and PTSD avoidance/numbing symptoms were positively related to Stimulation/State Enhancement, $\beta = 0.64, p < 0.01$.

Surprisingly, Negative Affect Reduction expectancies were unrelated to cigarettes per day, nicotine dependence, and PTSD clusters (Beckham, et al., 1997). To further understand this finding, exploratory t -tests compared the expectancy scales in the current sample of IPV-exposed women to community smokers (Copeland et al., 1995). Negative Affect Reduction expectancies in the current sample (mean = 6.4, $SE = 0.22$) were higher than the mean reported in that study (5.61), $t(82) = 3.6, p < 0.01$. Stimulation/State Enhancement and Craving/Addiction means were not different, $ps > 0.25$.

4. Discussion

To our knowledge, this is the first study to provide evidence that smoking expectancies were positively associated with smoking behavior among IPV-exposed women. Specifically, greater Stimulation/State Enhancement expectancies were related to more cigarettes smoked per day, consistent with existing research among trauma-exposed smokers and smokers with PTSD (Feldner, Babson, Zvolensky, et al., 2007; Hapke, et al., 2005; Marshall, et al., 2008). Further, supplemental analyses supported the hypothesis that expectancies may partially

explain the relationship between PTSD symptoms and smoking. Greater PTSD avoidance/numbing symptoms were associated with stronger Stimulation/State Enhancement beliefs. Within an affect regulation model (Brandon, 1994), IPV-exposed women who endorse avoidance/numbing symptoms (e.g., avoiding trauma-related thoughts, feelings, or conversations, anhedonia, and flattened affect; APA, 2000) may smoke more because they have strong beliefs that smoking will stimulate and energize them (Feldner et al., 2007). Therefore, addressing Stimulation/State enhancement expectancies may be a useful smoking cessation strategy among IPV-exposed women who endorse these symptoms.

The relationship among PTSD, smoking, and expectancies varied by PTSD symptom cluster. For instance, greater PTSD arousal symptoms (e.g., difficulty sleeping, anger and concentration problems, and hypervigilance; APA, 2000) and re-experiencing symptoms (e.g., flashbacks, nightmares, and hyper-reactivity to trauma-related cues; APA, 2000) were associated with smoking fewer cigarettes per day and weaker Stimulation/State Enhancement expectancies, respectively. Despite the direct relationship between Stimulation/State Enhancement expectancies and cigarettes per day, the different patterns across PTSD symptom clusters suggests that the type and severity of PTSD symptoms may partially explain why IPV-exposed women smoke. Although we cannot establish causality, we speculate that women who report higher levels of PTSD arousal and re-experiencing symptoms experience the stimulant effects of nicotine as aversive and smoke less as a result.

Contrary to expectation (Beckham, et al., 1997; Copeland, et al., 1995), Negative Affect Reduction expectancies were unrelated to smoking behavior and avoidance/numbing symptoms. Repeated trauma exposure associated with IPV is related to more negative affect and nicotine dependence (Feldner, Babson, & Zvolensky, 2007), suggesting that IPV-exposed women may have stronger Negative Affect Reduction expectancies. When we compared Negative Affect Reduction scores among IPV-exposed women to those reported by Copeland and colleagues (1995), we found that the current sample reported higher Negative Affect Reduction scores. Although tentative, the lack of an association among Negative Affect Reduction expectancies, PTSD symptoms, and smoking behavior may be partly due to restriction of range.

Several limitations should be noted. First, future research should examine the relationships among expectancies, PTSD symptoms, and smoking while considering other substance use. Second, women in the current sample were relatively light smokers, which may limit the generalizability of the findings. Nevertheless, it is important to understand expectancies since they predict motivation to quit among light smokers (Thomas, et al., 2009), and smoking even one cigarette per day has health consequences (Bjartveit & Tverdal, 2005). Third, it may be important to assess the full range of expectancies beyond the three SCQ-A scales administered in the current study. Fourth, evidence supporting the association between smoking for stimulation and PTSD symptoms is mixed and may be due, in part, to differences across samples and chronicity of the trauma exposure (Feldner et al., 2007). Although the current findings need replication, perhaps the repeated trauma exposure experienced by IPV-exposed women reduces the likelihood of managing PTSD symptoms with stimulants, such as nicotine.

In summary, we extend evidence regarding the association between PTSD symptoms and smoking among a relatively understudied population – IPV-exposed women. Compared to the general population, IPV-exposed women smoke more and have more difficulty engaging in treatment due to IPV-related factors (Black & Breiding, 2008). Importantly, we demonstrated that this relationship may differ across PTSD symptom clusters and expectancy scales. Targeting stimulating and state enhancing smoking expectancies may be an important component of smoking cessation interventions among IPV-exposed women.

Highlights

- Smoking behavior among women exposed to intimate partner violence was examined.
- Women with expectancies that smoking stimulates them smoked more cigarettes per day.
- Women who endorsed PTSD arousal symptoms smoked fewer cigarettes per day.
- Smoking behavior differed across PTSD symptom clusters and expectancy scales.
- These findings may inform cessation programs for women exposed to partner violence.

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Table 1Descriptive statistics and correlations among smoking behavior, smoking expectancies, IPV, and PTSD symptoms ($N = 83$)

| | Mean (SD) | Nicotine Dependence | Negative Affect Reduction | Stimulation/ State Enhancement | Craving/ Addiction | Physical IPV | Psychological IPV | Sexual IPV | Re- experiencing | Avoidance/ Numbing | Arousal |
|-------------------------------|-----------|------------------------|---------------------------------|--------------------------------------|-----------------------|-----------------|----------------------|---------------|---------------------|-----------------------|---------|
| Cigarettes per day | 12 (7) | .309** | .271* | .396** | .318** | .120 | .035 | .097 | -.029 | .077 | -.237* |
| Nicotine Dependence | 4.4 (2) | | .323** | .115 | .329** | .052 | .020 | .145 | .076 | .033 | .018 |
| Negative Affect Reduction | 6 (2.3) | | | .529** | .623** | .109 | -.012 | .090 | .058 | .144 | .100 |
| Stimulation/State Enhancement | 3.2 (2.4) | | | | .438** | .279* | .189 | .216 | .142 | .351** | .017 |
| Craving/Addiction | 6.2 (2) | | | | | .121 | .024 | -.002 | .021 | .160 | -.023 |
| Physical IPV | 22.3 (35) | | | | | | .382** | .696** | .374** | .342** | -.060 |
| Psychological IPV | 39.7 (12) | | | | | | | .200 | .486** | .453** | .052 |
| Sexual IPV | 8 (24.7) | | | | | | | | .334** | .315** | -.071 |
| PTSD Re-experiencing | 3.9 (3.8) | | | | | | | | | .791** | .129 |
| PTSD Avoidance/Numbing | 5.5 (4.7) | | | | | | | | | | .105 |
| PTSD Arousal | 9.6 (8.4) | | | | | | | | | | |

**
 $p < .01$;*
 $p < .05$;

FTND = Fagerstrom Test for Nicotine Dependence

Table 2

Relationship among smoking expectancies and PTSD on cigarettes per day and nicotine dependence

| Primary Analyses | Dependent Variable | | | | | |
|-------------------------------|--------------------|---------|-------|---------------------|---------|------------------|
| | Cigarettes per day | | | Nicotine dependence | | |
| Independent Variables | Model R^2 | β | t | Model R^2 | β | t |
| Negative Affect Reduction | .24** | .032 | .23 | .16 ⁺ | .229 | 1.6 |
| Stimulation-State Enhancement | | .324 | 2.5* | | -.077 | -.56 |
| Craving/Addiction | | .153 | 1.2 | | .255 | 1.9 ⁺ |
| PTSD Re-experiencing | | -.046 | -.27 | | .195 | 1.1 |
| PTSD Avoidance/Numbing | | -.004 | -.02 | | -.163 | -.84 |
| PTSD Arousal | | -.236 | -2.3* | | .026 | .24 |

**
 $p < .01$;*
 $p < .05$;+
 $p < .08$; β = standardized beta coefficient