



## A further investigation of the relations of anxiety sensitivity to smoking motives

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### ABSTRACT

Prior research has shown that anxiety sensitivity (AS) is associated with smoking to reduce negative affect (e.g., [Comeau, N., Stewart, S.H., & Loba, P., (2001). The relations of trait anxiety, anxiety sensitivity and sensation seeking to adolescents' motivations for alcohol, cigarette, and marijuana use. *Addictive Behaviors*, 26, 803–825.]). However, given limitations in the measurement of smoking motives in previous AS studies, it has yet to be definitively established that AS is specifically related to negative reinforcement smoking motives. Moreover, the overall AS construct is comprised of three lower-order components: physical, psychological, and social concerns (e.g., [Stewart, S.H., Taylor, S., & Baker, J.M., (1997). Gender differences in dimensions of anxiety sensitivity. *Journal of Anxiety Disorders*, 11, 179–200.]). Previous investigations generally have not examined the relative contributions of each of these three AS components to smoking for negative reinforcement motives. The present study attempted to address each of these gaps in the literature. A sample of 119 smokers attending a tobacco intervention program (see [Mullane, J.C., Stewart, S.H., Rhyno, E., Steeves, D., Watt, M., & Eisner, A., (2008). Anxiety sensitivity and difficulties with smoking cessation. In A.M. Columbus (Ed.), *Advances in Psychological Research* (vol. 54A, pp. 141–155). Hauppauge, NY: Nova Science Publishers.]) completed the Anxiety Sensitivity Index (ASI; [Peterson, R.A., & Reiss, S., (1992). *The Anxiety Sensitivity Index manual* (2nd ed.). Worthington, OH: International Diagnostic Services.]) and the Reasons For Smoking scale (RFS; [Ilkard, F.F., Green, D.E., & Horn, D., (1969). A scale to differentiate between types of smoking as related to the management of affect. *International Journal of the Addictions*, 4, 649–659.]) at pre-treatment. In a principal components analysis (PCA) of the RFS items, stringent parallel analysis supported a two-factor solution (negative and positive reinforcement smoking motives) as opposed to the intended six factors ([Ilkard, F.F., Green, D.E., & Horn, D., (1969). A scale to differentiate between types of smoking as related to the management of affect. *International Journal of the Addictions*, 4, 649–659.]). ASI total scores were significantly positively correlated with both RFS factors in bivariate correlational analyses. In partial correlations, the relation between the ASI and the RFS negative reinforcement factor remained significant when controlling for RFS positive reinforcement smoking motives, but the correlation of ASI with RFS positive reinforcement motives was not significant after controlling for RFS negative reinforcement motives. At the level of AS components, AS psychological concerns were related to both negative and positive reinforcement motives, while AS physical concerns were more strongly related to negative reinforcement motives. Implications for designing targeted tobacco interventions for high AS smokers are discussed.

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People who smoke do so for a variety of reasons, or “motives”. Understanding why individuals are motivated to smoke may be helpful in predicting a variety of smoking-relevant behaviors and outcomes, including smoking frequency (Russell, Peto, & Patel, 1974), and smoking relapse among those trying to quit (Pomerleau, Adkins, & Pertschuk, 1978). Despite the importance of smoking motives to the understanding of smoking behavior, there is a lack of agreement on how to best conceptualize smoking motives. Ikard, Green and Horn (1969) developed the Reasons For Smoking (RFS) scale, which when administered to a large sample of smokers and analyzed using exploratory factor analysis (EFA), yielded six smoking motive factors: habitual (i.e., smoking motivated by automatic processes), addictive or “craving” (i.e., smoking to regulate nicotine levels and to relieve aversive withdrawal states), negative affect reduction or “crutch” (i.e., smoking to decrease unpleasant emotions), pleasurable relaxation (i.e., smoking to increase positive emotions), stimulation (i.e., smoking for arousal-enhancement) and sensorimotor manipulation or “handling” (i.e., smoking to enjoy the taste, smell, or handling of a cigarette). This 6-factor structure for the RFS has since been replicated (e.g., Rossi, Prochaska, & DiClemente, 1988) and factor analyses of other smoking motive questionnaires have also generally revealed six or seven factor solutions (e.g., Tate, Pomerleau, & Pomerleau, 1994).

Although studies have generally described a six- or seven-factor structure for smoking motives, high inter-correlations among certain factors are common. For example, Ikard et al. (1969) found a high correlation between the addictive and the negative affect reduction factor in an EFA of the RFS. Similarly, Costa, McCrae, and Bossé (1980) found that the addictive motives scale and the negative affect reduction motives scale merged into a single factor using PCA on a slightly modified version of the RFS. This lack of stability of the factor structure might be because the RFS contains only 23 items to tap a presumable six underlying factors, resulting in fewer than four items per intended factor, which is below the recommended minimum necessary to produce replicable factor structures (Thurstone, 1947). It is likely that the six- and seven-factor structures for the RFS and related measures represent factor over-extraction given the liberal factor extraction rules that have been used in many studies.

Indeed, some researchers have suggested that there may be two higher-order factors for smoking motives (e.g., Pomerleau, Fagerström, Marks, Tate, & Pomerleau, 2003). In the context of other addictive behaviors (e.g., drinking, gambling), distinct negative and positive reinforcement motive dimensions have been commonly demonstrated (e.g., Cooper, 1994; Stewart & Zack, 2008). It has been suggested that smoking motives may be divisible along these same two higher-order dimensions. For example, Pomerleau et al. (2003) conducted an EFA using data from 429 current smokers who completed a 21-item smoking motives questionnaire. Results supported a 3-factor solution, representing negative and positive reinforcement motives factors and a third automaticity/smoking pattern factor. Many items used in the Pomerleau et al. (2003) questionnaire are similar to those found on the RFS, with the exception of items concerning smoking patterns. Therefore, as a next step, it is important to explore whether the RFS contains a higher-order factor structure consistent with the broader literature on motives for addictive behaviors, consisting of negative and positive reinforcement factors, respectively.

Another set of variables that have been gaining interest in relation to smoking are personality traits that might confer increased propensity to begin smoking and/or to continue smoking once started. Recent investigations in the area of addiction have begun to link personality traits to specific motives for engaging in addictive behaviors (e.g., Stewart, Zvolensky, & Eifert, 2002). One such trait-like variable is “anxiety sensitivity” (AS) which is described as a fear of anxious emotions and anxiety-related sensations due to beliefs that these emotions and sensations could lead to harmful consequences (Peterson & Reiss, 1992). Zvolensky, Schmidt, and Stewart (2003) outlined a model of smoking maintenance which positioned AS as an important factor for explaining continued smoking in some smokers. They suggested that high AS smokers should have particular difficulty in the early stages of quitting when anxiety and nicotine withdrawal symptoms are at their peak. They also suggested that due to their fear of anxiety-related states and arousal sensations, high AS smokers should be particularly likely to be motivated to smoke to relieve negative emotions and to quell aversive nicotine withdrawal symptoms, placing them at increased risk for relapse when experiencing anxiety or nicotine withdrawal.

In terms of research support for this model, high AS smokers experience more intense nicotine withdrawal symptoms (e.g., Zvolensky, Lejuez, Kahler, & Brown, 2004), more severe state anxiety (Mullane et al., 2008), and earlier lapses to smoking (e.g., Brown, Kahler, Zvolensky, Lejuez, & Ramsey, 2001) when trying to quit, and display poorer overall success in smoking cessation treatment (Mullane et al., 2008) relative to low AS smokers. These findings emphasize the need to understand more specifically what motivates high AS smokers to continue to smoke, which would assist in the development of smoking cessation programs that target their unique needs.

Previously, it was found that AS was positively related to smoking to cope with negative emotions and to conform to peer pressure (e.g., Comeau et al., 2001) – both negative reinforcement motives – using a 4-factor categorization of smoking motives (cf., Cooper, 1994). Using the RFS, Brown et al. (2001) looked at the connection between AS and smoking motives in a sample of 60 smokers enrolled in a smoking cessation program. AS was significantly positively associated with the negative affect reduction subscale of the RFS, and marginally positively correlated with the addiction and pleasurable relaxation scales. Also using the RFS, Leyro, Zvolensky, Vujanovic, and Bernstein (2008) examined levels of AS and motives for smoking in 144 smokers. AS was a significant predictor of the addictive, negative affect reduction, and habitual subscales of the RFS. This pattern of findings across studies is largely consistent with the model proposed by Zvolensky et al. (2003) in that AS seems fairly specifically related to negative reinforcement smoking motives. Nonetheless, the observed relations of AS to smoking for habit motives (Leyro et al., 2008) and to smoking for pleasurable relaxation (Brown et al., 2001) were theoretically unexpected and raise questions about the specificity of the relation of AS to negative reinforcement smoking motives. The issue of specificity is further complicated when one considers current conceptualizations of the structure of AS.

AS is commonly measured using the Anxiety Sensitivity Index (ASI; Peterson & Reiss, 1992), which contains one higher-order, general AS factor and three lower-order components: physical concerns (i.e., beliefs that somatic arousal sensations may lead to harmful physical consequences); psychological concerns (i.e., beliefs that cognitive anxiety-related sensations

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