



## Racial/ethnic differences in the longitudinal progression of co-occurring negative affect and cigarette use: From adolescence to young adulthood

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### ABSTRACT

**Aims:** This study examined the longitudinal progression of the co-occurrence of cigarette use and negative affect among the general population of U.S. adolescents and young adults and between racial/ethnic groups.

**Methods:** Data for this study consisted of Waves 4, 6, and 8 of the NLSY97 longitudinal study containing a nationally representative sample of U.S. adolescents and young adults. A total of 7979 adolescents (Mean age at Wave 4 = 17.98, SD = 1.44, 49% female) were included in the analyses. To investigate the co-morbidity between negative affect and cigarette use, a latent factor of negative affect and single indicator of cigarette consumption were examined at each wave. A three wave Bivariate Autoregressive Cross-Lagged Effect Model was estimated to test the conjoint trajectory of negative affect and smoking.

**Results:** For all racial/ethnic groups prior negative affect status influenced future negative affect between waves and prior negative affect was positively related to increases in smoking in subsequent waves. The longitudinal trajectory of negative affect for the three racial/ethnic groups was the same, but racial/ethnic group differences were observed in the strength of the longitudinal relationship between previous and future cigarette use. Specifically, the following racial/ethnic differences were observed, even after controlling for the effect of SES; White young adults were found to exhibit the strongest association between cigarette use in the first two waves, followed by Hispanic individuals and lastly by African Americans. In the last two waves, African American young adults were found to have the strongest association between cigarette use at the latter two waves, followed by White individuals.

**Conclusions:** Both negative affect and cigarette consumption influence each other during the transition between late adolescence and young adulthood but the magnitude of the associations between cigarettes use across waves differed between racial/ethnic groups. Implications for prevention and treatment programs include considering both cigarette use and negative affect as two factors that jointly impact each other and that should be targeted simultaneously.

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### 1. Introduction

The co-occurrence between mood disorders with substance use problems is widespread in the U.S. (Conway, Compton, Stinson, & Grant, 2006) with the prevalence of being a current smoker substantially higher among individuals who have a diagnosed mental disorder than among those who do not (Breslau, Kilbey, & Andreski, 1994). Results of the National Comorbidity Survey (NCS) suggest that 15% of the U.S. adult population with a diagnosis of 12-month drug abuse and 28.4% of those with a diagnosis of 12-month drug dependence had experienced at least one episode of major depression (Kessler et al., 1996). Although it has been estimated that about a third of lifetime smokers have a mood disorder (Griesler, Hu, Schaffran, & Kandel, 2011) and that mood disorders are associated

with the development of nicotine dependent use (Swendsen et al., 2010), the extent to which the association between mood disorders and smoking changes longitudinally and differs by racial/ethnic group is less clear (Mineur & Picciotto, 2009).

#### 1.1. Negative affect

Due to the overlap between anxiety and depressive disorders, some researchers have argued that the two disorders are related features of a common underlying disorder (Brady & Kendall, 1992; Hale, Raaijmakers, Muris, van Hoof, & Meeus, 2009; Laurent & Ettelson, 2001). In fact, neurobiological studies have implicated dysfunction of the hypothalamic–pituitary–adrenal (HPA) axis, involved in coordinating stress reactions, in both mood and anxiety disorders (Gallagher, Reid, & Ferrier, 2009; Kaufman & Charney, 2001; Risbrough & Stein, 2006). The controversy surrounding the relationship of these two disorders is highly salient among adolescent and young adult populations because of the implications for the

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development of persisting problems into adulthood (Ajdacic-Gross et al., 2009; Copeland, Shanahan, Costello, & Angold, 2009). An explanation for the co-occurrence of these disorders is that they share characteristics that are explained by the overall role that negative affect plays in these emotional disorders (Watson, 2005). Negative affect encompasses a range of negative emotions such as fear, anger, sadness, guilt, and disgust and is thought to reflect stable individual differences in emotionality (Clark, Watson, & Mineka, 1994; Miller, Vachon, & Lynam, 2009; Watson & Clark, 1984).

### 1.2. The relationship between negative affect and smoking

The examination of the co-morbidity between negative affect and the initiation of smoking is especially relevant during late adolescence and young adulthood because these are periods when smoking rates are among the highest across the lifespan (CDC, 2006; Flay, Phil, Hu, & Richardson, 1998). Further, young adulthood is a time when over a third of individuals have been found to initiate smoking and about a quarter of individuals progress from being experimental smokers to regular smokers (Chassin, Presson, Pitts, & Sherman, 2000; Choi, Harris, Okuyemi, & Ahluwalia, 2003).

Previous research on the relationship between negative affect and smoking has put forth several explanatory mechanisms. One suggested mechanism, the self-medication hypothesis, posits that deficits in mood predispose individuals to initiate smoking to alleviate the distressing symptoms they experience (Khantzian, 1985, 1997). Consistently studies have shown that negative affect exhibits a positive association with increases in smoking (Breslau, Kilbey, & Andreski, 1991; Escobedo, Reddy, & Giovino, 1998; McLeish, Zvolensky, Marshall, & Leyro, 2009; Pomerleau, Zucker, & Stewart, 2003). There is evidence that negative affect at age 16 is a predictor of smoking behavior two years later (Mason, Hitch, & Spoth, 2009). Using data from the National Longitudinal Study of Adolescent Health, Munafò, Hitsman, Rende, Metcalfe, and Niaura (2008) found that among individuals who had never smoked at baseline, increases in depressive symptoms lead to smoking initiation but not to becoming regular smokers (Munafò et al., 2008). Neurochemical changes in the brain caused by depression, specifically in the cholinergic system (Dagyte, Den Boer, & Trentani, 2011), may create a vulnerability to seek the rewarding effects of smoking (Lerman et al., 1998).

A second mechanism proposes that the use of cigarettes is a precursor to the development of mood disorders. Several studies have found that smoking increases the likelihood of developing mood disorders such as depression and anxiety (Brook, Cohen, & Brook, 1998), even after controlling for prior levels of depression (Steuber & Danner, 2006). Studies have shown that nicotine use changes neurochemical systems in the brain associated with the onset of mood disorders, specifically depression (Dagyte et al., 2011), via cholinergic receptors (Pomerleau, 1986) and the neuronal nicotinic acetylcholine receptors (Tuesta, Fowler, & Kenny, 2011). In addition, the effect of nicotine on dopamine involves increases in attentional bias towards negative affect stimuli (Rzettelny et al., 2008) and further, among smokers who tend to use a ruminative coping style, nicotine appears to heighten the salience of negative thoughts which in turn increase negative mood (Richmond, Spring, Sommerfeld, & McChargue, 2001).

A third mechanism suggests that a third factor may be involved in the development of these co-occurring problems. Support for this mechanism comes from studies providing evidence that depressive disorders and cigarette use share similar, if not the same, environmental and genetic precursors (Fergusson, Boden, & Horwood, 2011; Hu, Davies, & Kandel, 2006; Mykletun, Overland, Aaro, Liabo, & Stewart, 2008; Rohde, Lewinsohn, Brown, Gau, & Kahler, 2003). Furthermore, exploration of the mechanisms responsible for the co-morbidity between negative affect and smoking suggests that once one of the two manifest itself, the relationship between them may be bidirectional (Berlin, Covey, & Glassman, 2009). For example,

high levels of negative affect during mid-adolescence have been found to predict higher levels of smoking four years later (Audrain-McGovern, Rodriguez, & Kassel, 2009) while daily smokers, compared to individuals who have never smoked, have been found to be 1.8 times more likely to have a mood disorder (John, Meyer, Rumpf, & Hapke, 2004; Kendler et al., 1993).

As the extant literature shows, extensive research exists describing the ways by which negative affect and cigarette use may be co-occurring. However, considerably less is known about how the relationship between these two potentially long-term problems may differ among racial/ethnic groups particularly when these are examined longitudinally.

### 1.3. Racial/ethnic differences in smoking and negative affect among U.S. populations

Racial/ethnic differences in measures of psychological distress among adolescents suggest that racial/ethnic minorities experience higher rates of psychological distress (Anderson & Mayes, 2010). In particular, several studies have found that Hispanic adolescents report higher depressive symptoms than Whites or African American youth (Adkins, Wang, Dupre, van den Oord, & Elder, 2009; McLaughlin, Hilt, & Nolen-Hoeksema, 2007; Roberts, Chen, & Roberts, 1997; Roberts, Roberts, & Chen, 1997; Schraedley, Gotlib, & Hayward, 1999; Twenge & Nolen-Hoeksema, 2002).

During adolescence the prevalence of cigarettes smoking has been found to be higher among Whites than Hispanics or African Americans (Johnston, O'Malley, Bachman, & Schulenberg, 2009). Although some studies suggest that White adolescents are more likely to persist in smoking after the initiation stage and to become dependent on nicotine than Hispanic or African American adolescents (Gritz et al., 1998), others have found that Hispanic adolescents initiate smoking earlier (Kandel, Kiros, Schaffran, & Hu, 2004), and have higher rates of lifetime cigarette use than White adolescents (Shih, Miles, Tucker, Zhou, & D'Amico, 2010). Other studies have found that Hispanic adolescents have higher rates of smoking than African American adolescents (Brook, Pahl, & Ning, 2006) but lower than Whites (Griesler, Kandel, & Davies, 2002; Kandel & Chen, 2000). By the time adolescents are in 8th grade, Hispanic and White youth are smoking at twice the rate as their African American peers (Kelder et al., 2003).

Among adults in the United States, Whites report higher rates of negative affect and depressive disorders (Anderson & Mayes, 2010; Riolo, Nguyen, Greden, & King, 2005) and African Americans have lower rates of depression than White adults (Mezuk et al., 2010). For adults, the positive relationship between negative affect and smoking has been found for Whites but not for African American or Hispanics (Kiviniemi, Orom, & Giovino, 2011). Given the differences in rates of smoking and in psychological distress experienced by adolescents and young adults of different racial and ethnic groups, in the present study differences were expected in the longitudinal relationship between negative affect and smoking behavior among racial and ethnic groups.

### 1.4. The present study

This study examined the co-occurrence of cigarette use and negative affect longitudinally. Longitudinal modeling allows researchers to learn about patterns of co-variation among variables by studying their behavior over time. Modeling data from multiple time points allows for examining the possible directions of causality that are more difficult to test in cross-sectional designs. The purpose of the current study was to understand the longitudinal co-variation between and within these problems over time in U.S. adolescents as they age into young adulthood.

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