Original Investigation

Relationships of personality and psychiatric disorders to multiple domains of smoking motives and dependence in middle-aged adults

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Abstract

Introduction: Individual differences in psychopathology and personality may associate with dependence on smoking for specific motivational reasons. However, the associations among psychopathology, personality, and smoking dependence and motives have not been examined simultaneously in studies to date, leaving it unclear whether specific patterns of affective and behavioral functioning are associated with specific aspects of smoking dependence.

Methods: The present study examined these associations in 296 current smokers aged 35–43 years. Smoking dependence and motives were assessed with structured interview, the Fagerström Test for Nicotine Dependence, and the Wisconsin Inventory of Smoking Dependence Motives.

Results: Regardless of the measure of smoking dependence tested, a lifetime history of major depression and high levels of trait stress reaction were consistently related to greater current smoking dependence severity. Substance dependence showed significant associations with some measures of smoking dependence but had relatively few effects when entered in models along with depression history and trait stress reaction. In multivariate models, alcohol dependence and conduct disorder history did not show unique significant associations with smoking dependence nor did trait aggression, alienation, control, or harm avoidance.

Discussion: Results indicate little specificity in the associations of particular psychiatric diagnoses or personality traits with specific self-reported facets of smoking dependence. It appears that

a general vulnerability to depression and negative emotions is the most robust indicator of vulnerability to high levels of self-reported smoking dependence, regardless of which dimensions of smoking dependence are analyzed.

Introduction

Smoking is associated with elevated rates of psychiatric comorbidity with especially robust associations found between smoking and drug and alcohol use disorders, disruptive behavior and/or antisocial personality disorders, and major depressive disorder (Breslau, 1995; Breslau, Kilbey, & Andreski, 1991; Breslau, Peterson, Schultz, Chilcoat, & Andreski, 1998; Brown, Lewinsohn, Seeley, & Wagner, 1996; Degenhardt & Hall, 2001; John, Meyer, Rumpf, & Hapke, 2004; Kahler, Daughters, et al., 2009; Kahler et al., 2008; Kendler et al., 1999; Lasser et al., 2000; Rohde, Kahler, Lewinsohn, & Brown, 2004a, 2004b; Rohde, Lewinsohn, Brown, Gau, & Kahler, 2003). In addition, numerous studies report a link between smoking and personality traits including higher neuroticism, extraversion, hostility, alienation, aggression, novelty seeking, impulsiveness, excitement seeking, and sensation seeking and lower agreeableness, conscientiousness, self discipline, and constraint (Calhoun, Bosworth, Siegler, & Bastian, 2001; Etter, Pelissolo, Pomerleau, & De Saint-Hilaire, 2003; Kahler, Daughters, et al.; Kubicka, Matejcek, Dytrych, & Roth, 2001; Munafo & Black, 2007; Munafo, Zettler, & Clark, 2007; Terracciano & Costa, 2004; Vollrath & Torgersen, 2008; Welch & Poulton, 2009; Whiteman, Fowkes, Deary, & Lee, 1997). Likewise, tobacco dependence has been related to higher lifetime rates of major depression,

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conduct problems, and substance dependence (Breslau; Breslau et al., 1991; Dierker & Donny, 2008; Rohde et al., 2004a); to greater neuroticism (Breslau, Kilbey, & Andreski, 1993; Kawakami, Takai, Takatsuka, & Shimizu, 2000; Kendler et al.; McChargue, Cohen, & Cook, 2004; Spielberger & Jacobs, 1982); and to greater trait stress reaction, aggression, and alienation and lower traditionalism, harm avoidance, well-being, and social closeness (Welch & Poulton).

Although relationships of both psychiatric history and personality traits to smoking and smoking dependence have been demonstrated, the interrelationships among these variables have not been fully defined. Two primary methodological limitations account for a lack of clarity in this area. First, few studies have simultaneously assessed both personality and psychopathology and their unique and overlapping associations with smoking. Theory and empirical research suggest that there is substantial overlap between psychiatric disorders and personality traits (Krueger, 1999; Krueger, Caspi, Moffitt, Silva, & McGee, 1996). Thus, personality and psychopathology may show related patterns of association with smoking, but these hypotheses have not been examined in depth.

A second limitation is that, with a few notable exceptions (Gilbert, Sharpe, Ramanaiah, Detwiler, & Anderson, 2000), prior investigations have typically utilized a limited assessment of smoking dependence, relying on either a dichotomous diagnosis of dependence or a unidimensional continuous measure of dependence severity, such as the Fagerström Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991). It may be profitable to assess not only “primary” aspects of dependence (e.g., tolerance, craving, or loss of control) that tend to correlate highly with dependence diagnosis and the FTND but also “secondary” aspects of dependence that reflect motivational factors that are distinct from, yet contribute to, dependence (Piper et al., 2008). These smoking dependence motives may show specific associations with individual differences in behavioral and affective functioning (Gilbert, 1995). For example, individuals high in neuroticism and those with elevated depressive symptoms are more likely to report smoking to alleviate negative affect (Gilbert et al.; Joseph, Manafi, Iakovaki, & Cooper, 2003; Papakryzi & Joseph, 1998). Introverted smokers report greater smoking to enhance social skills (Joseph et al.; Papakryzi & Joseph), and trait hostility has been positively associated with smoking to manage social situations (Kahler, Strong, Niaura, & Brown, 2004). A comprehensive investigation of relationships between personality traits, psychiatric history, and smoking dependence motives may shed further light into which aspects of dependence are most related to personality and psychiatric history and which are relatively independent of such individual differences.

The purpose of this study was to examine the extent to which psychiatric history and personality traits account for variability in smoking dependence and motives. Data came from adults, aged 35–43 years, participating in a large cohort study in southeastern New England (Kahler, Daughters, et al., 2009). For this study, we assessed traits related to negative emotionality and behavioral constraint using the Multidimensional Personality Questionnaire (MPQ; Tellegen, 1982) and used structured interview to assess the four most common lifetime psychiatric disorders that have been most strongly associated with smoking in previous research: alcohol dependence, substance depen-

dence, major depressive disorder, and conduct disorder. We used structured interview and the FTND to assess smoking dependence and the multidimensional Wisconsin Inventory of Smoking Dependence Motives (WISDM; Piper et al., 2004) to assess smoking motives. In a prior publication from this study, we found that current smokers reported greater stress reaction, alienation, and aggression and lower harm avoidance than both former and never-smokers and that those with lifetime tobacco dependence reported greater stress reaction than those who never met dependence criteria (Kahler, Daughters, et al.). Controlling for differences in lifetime psychiatric disorders reduced but did not eliminate these differences in personality traits. These analyses did not address how personality and psychopathology are related to levels of smoking dependence and dependence motives among current smokers. Exploring these associations in a sample of active smokers is important for elucidating interindividual variation in the smoking dependence syndrome. In the present study, we examined zero-order correlations among personality, psychiatric history, and smoking dependence measures among current smokers. We then examined these associations in a multivariate context to determine which personality traits and lifetime psychiatric diagnoses showed the most robust unique associations with specific measures of smoking dependence.

Methods

Participants

Participants were offspring of pregnant women enrolled in the Collaborative Perinatal Project between 1959 and 1966 (Broman, 1984; Niswander & Gordon, 1972). The Transdisciplinary Tobacco Use Research Center: New England Family Study (TTURC:NEFS) was established in 1999 to locate and interview a subsample of these offspring at the Providence, Rhode Island, and Boston, Massachusetts sites (see Kahler, Daughters, et al., 2009, for further details). Participants were selected as part of the TTURC:NEFS using a multistage sampling procedure that oversampled families in which multiple siblings participated. Screening questionnaires were mailed to 4,579 of the 15,721 Boston and Providence TTURC:NEFS offspring who survived until age 7. Of the 3,121 questionnaires returned (68.2%), 2,271 were selected for participation as meeting eligibility criteria for one or more of the three substudies of the overall TTURC:NEFS project. Of these, we enrolled 1,674 offspring (73.7%); the remaining subjects either could not be relocated or scheduled, or refused to complete the full study assessment. Data from 49 individuals were excluded from the final sample because they received a pilot version of the survey ($n = 11$) or because of problems with the interview administration ($n = 38$), resulting in a final interviewed sample of 1,625 adults. We report here only on those who were currently smoking at the time of the interview and who completed all diagnostic and smoking assessments and the MPQ.

Current smokers were defined as individuals who had smoked at least 100 cigarettes and who were currently smoking cigarettes at least 1 day/week. We excluded smokers who currently smoked less than once per week and those who currently smoked only cigars and/or pipes. Of the 1,625 participants, 497 (30.6%) reported current cigarette smoking. The MPQ and WISDM were self-administered after the in-person interviews and were completed by 296 (59.6%) of current smokers. Men’s

completion rate was significantly lower than women's (50.3% vs. 65.3%, $\chi^2[1, N = 497] = 10.9, p < .001$). Completion rate was not significantly associated with age, education, marital status, race/ethnicity, or psychiatric disorder history.

The final analytic sample of 296 current smokers was 67.9% women and 37.5% were married. The mean age was 38.8 years ($SD = 1.9$, range = 35–43). The sample was 81.8% non-Hispanic White, 8.4% Black, 1.7% Hispanic/Latino, and 8.1% of other backgrounds. Five percent of participants completed less than high school education, 27.7% completed high school or GED only, 48.6% completed some postsecondary education, 8.9% completed college, and 2.7% completed a graduate degree. The sample included 249 subjects with no siblings in the analytic sample, 22 sibling pairs, and 1 sibling trio from a total of 272 families. Participants smoked an average of 17.6 ($SD = 10.7$, range = 1–60) cigarettes/day, their mean score on the FTND was 4.25 ($SD = 2.67$), and 52.1% had a current diagnosis of tobacco dependence.

Measures

Smoking measures

Smoking histories were obtained by the Lifetime Interview of Smoking Trajectories and the Quitting Methods Questionnaire, developed for the TTURC:NEFS. Tobacco dependence according to *DSM-IV* criteria (American Psychiatric Association, 1994) was assessed using a modified version of the Composite International Diagnostic Interview (CIDI; World Health Organization, 1990), described in detail in Dierker et al. (2007).

Severity of smoking dependence was assessed using the FTND (Heatherton et al., 1991). Smoking dependence motives were assessed using the WISDM (Piper et al., 2004), a 68-item measure that assesses 13 smoking dependence motives: affiliative attachment to smoking, automaticity of smoking, loss of control over smoking, behavior choice–melioration (smoking despite constraints), cognitive enhancement, craving, cue exposure (strength of association between nonsocial smoking cues and craving), smoking for negative reinforcement, smoking for positive reinforcement, social/environmental goads (stimuli) that encourage smoking, taste/sensory properties of smoking, tolerance, and smoking for weight control. The WISDM has shown good psychometric properties and fit to the hypothesized multidimensional structure in the TTURC:NEFS sample (Shenassa, Graham, Burdzovic, & Buka, 2009). Four of the WISDM subscales (automaticity, craving, loss of control, and tolerance) assess core components of tobacco dependence that are necessary and sufficient for severe dependence (Piper et al., 2008) and are most strongly associated with measures conceptually related to dependence, such as cigarettes per day, age of daily smoking, increases in craving upon quitting, and smoking relapse. The remaining WISDM scales are considered secondary or “optional” aspects of dependence that do not have to be present among those with severe smoking dependence.

Diagnostic measures

Lifetime psychiatric diagnoses were assessed with structured diagnostic interviews that were modified slightly for the TTURC:NEFS study (see Kahler, Daughters, et al., 2009). In the present study, we examined psychiatric disorders as underlying vulnerabilities for specific smoking motives. Thus, we focused on lifetime disorders rather than on current disorders, which are considerably rarer and reflect primarily current functioning. To limit the large assessment battery, only four diagnoses were cho-

sen to be assessed based on their prevalence and high association with smoking. The CIDI was used to assess lifetime major depressive disorder and alcohol dependence. We used the Diagnostic Interview Schedule (*DIS-IV*; Robins, Helzer, Croughan, & Ratcliff, 1981) to assess lifetime dependence on substances other than alcohol or tobacco because the DIS provides a particularly efficient assessment of multiple classes of drugs. We assessed lifetime conduct disorder with an interview that combined the conduct disorder sections of the CIDI and *DIS-IV*.

Personality

Personality traits were measured with five selected MPQ subscales (Tellegen, 1982). These scales assess specific facets of negative emotionality (stress reaction, alienation, and aggression) and behavioral undercontrol (harm avoidance and control) that we expected would associate with smoking dependence. All scales were Z-scored for analysis purposes. Stress reaction indicates a tendency to be easily upset, nervous, sensitive, and prone to worry and guilt. Aggression indicates a tendency to hurt, frighten, and victimize others. Alienation indicates a tendency to feel betrayed, mistreated, victimized, and unlucky. Harm avoidance reflects a desire to avoid injury, dangerous situations, and risk. Control reflects a tendency to be cautious, planful, reflective, organized, and rational.

Analysis plan

We first examined correlations of tobacco dependence diagnosis, the FTND, and the WISDM subscales with psychiatric diagnoses and personality traits. We then examined correlations between psychiatric disorders and personality traits to assess the extent to which they overlapped with each other in this sample. We then ran two sets of regression models. In the first, we regressed the smoking dependence measures on the set of four lifetime psychiatric diagnoses. In the second, we regressed the smoking dependence measures on the set of five personality traits. Based on these results, we selected specific diagnoses and personality traits to enter into final models predicting the smoking dependence and motives measures.

In regression models, we used generalized estimating equations (GEE) to account for the nonindependence in our data due to the inclusion of siblings. All GEE models controlled for sex. Because we examined four diagnoses and five traits, we used an alpha level of .01 to reduce risk of Type I error when examining a specific dependence measure. However, we did not do an alpha correction to account for the multiple dependence measures examined. Although this approach carries the risk of spurious associations being detected, we were primarily interested in the pattern of results across the measures.

Results

Bivariate correlations

Table 1 presents zero-order correlations between measures of smoking dependence and assessments of psychiatric disorders and personality. Due to missing data on specific interview questions, some diagnoses were missing: eight for tobacco dependence, three for depression, one for alcohol dependence, seven for substance dependence, and two for conduct disorder. A history of major depressive disorder showed a consistent, significant, and positive association with every measure of smoking

Table 1. Zero-order correlations of smoking dependence measures with lifetime psychiatric diagnoses and MPQ subscales among 296 adult participants in the New England Family Study

Variable	Lifetime psychiatric diagnosis				Personality traits from the MPQ				
	MDD	AD	SD	CD	SR	AG	AL	CN	HA
Current tobacco dependence (no vs. yes)	0.21	0.12	0.15	0.15	0.26	−0.02	0.12	−0.09	0.01
FTND	0.17	0.15	0.18	0.09	0.21	0.12	0.19	−0.14	−0.06
Wisconsin Inventory of Smoking Dependence Motives subscales									
Affiliative attachment	0.28	0.16	0.28	0.14	0.36	0.20	0.31	−0.22	−0.13
Automaticity	0.27	0.09	0.06	0.09	0.23	0.07	0.16	−0.19	−0.04
Loss of control	0.28	0.14	0.20	0.14	0.26	−0.01	0.11	−0.14	0.03
Behavioral choice/melioration	0.26	0.12	0.22	0.10	0.34	0.17	0.28	−0.19	−0.06
Cognitive enhancement	0.26	0.11	0.16	0.13	0.25	0.12	0.20	−0.22	−0.09
Craving	0.29	0.14	0.22	0.09	0.27	0.03	0.17	−0.11	−0.02
Cue exposure/associative processes	0.30	0.15	0.20	0.15	0.22	0.07	0.10	−0.13	−0.04
Negative reinforcement	0.31	0.07	0.19	0.10	0.29	0.05	0.15	−0.12	−0.04
Positive reinforcement	0.24	0.04	0.16	0.09	0.28	0.09	0.18	−0.12	−0.04
Social/environmental goads	0.17	0.05	0.07	0.03	0.20	0.10	0.21	−0.01	0.01
Taste/sensory properties	0.21	0.09	0.14	0.10	0.13	0.04	0.10	−0.09	−0.14
Tolerance	0.24	0.09	0.15	0.07	0.22	0.10	0.20	−0.11	−0.06
Weight control	0.17	0.00	0.13	0.01	0.20	0.00	0.12	−0.16	−0.05

Note. Correlations greater than .15 or less than −.15 are in bold and are significant at $p < .01$. AD = lifetime alcohol dependence, 19.7% of sample; AG = aggression; AL = alienation; CD = lifetime conduct disorder, 9.5% of sample; CN = control; FTND = Fagerström Test for Nicotine Dependence; HA = harm avoidance; MDD = lifetime major depressive disorder, present for 33.1% of sample; MPQ = Multidimensional Personality Questionnaire; SD = lifetime substance dependence, 23.5% of sample; SR = stress reaction.

dependence ranging from $r = .17$ (FTND, social/environmental goads, and weight control) to $r = .31$ (negative reinforcement motives). Although both alcohol dependence and substance dependence history showed positive and significant associations with some smoking dependence measures, these associations were less robust and less consistently significant. Conduct disorder history showed minimal associations with smoking dependence measures.

Stress reaction showed a consistent, significant, and positive association with every measure of smoking dependence ranging from $r = .20$ (social/environmental goads and weight control) to $r = .36$ (affiliative attachment), with the lone exception of taste/sensory properties, $r = .13$, $p = .02$. Alienation showed a similar pattern of associations with smoking dependence but with generally weaker associations that less often reached statistical significance. Control showed significant associations with affiliative attachment, cognitive enhancement, automaticity, and behavioral choice/melioration, while aggression and harm avoidance showed minimal associations with smoking dependence.

Correlations among psychiatric disorders and personality traits

Correlations between psychiatric disorders and personality traits are presented in Table 2. There were small- to medium-sized correlations among the psychiatric disorders with the exception of the relatively high correlation between alcohol and substance dependence diagnoses. Correlations among stress reaction, aggression, alienation, and control were of medium to large magnitude, and their correlations with psychiatric disorders

were of small to medium magnitude. Harm avoidance showed relatively weak correlations with other personality traits and no significant associations with psychiatric disorders.

Predicting smoking dependence with lifetime psychiatric diagnoses

The strong association between major depression and smoking dependence was supported in multivariate GEE analyses in which the four lifetime psychiatric diagnoses were entered simultaneously along with sex (results not shown here). A history of major depression showed significant unique associations with all smoking dependence measures except tobacco dependence diagnosis, FTND, and weight control motives. Substance dependence history (excluding alcohol and tobacco) was significantly associated in these models with affiliative attachment, behavior choice/melioration, craving, and negative reinforcement, whereas alcohol dependence and conduct disorder history showed no significant associations with smoking dependence measures.

Predicting smoking dependence with personality traits

In GEE models predicting dependence measures with the five personality traits simultaneously entered, stress reaction showed a significant association with tobacco dependence diagnosis and with affiliative attachment, loss of control, behavior choice/melioration, craving, cue exposure, negative reinforcement, and positive reinforcement (results not shown). No other personality traits significantly and independently related to smoking dependence when entered as a set along with sex.

Table 2. Zero-order correlations between lifetime psychiatric diagnoses and Multidimensional Personality Questionnaire subscales

Variable	MDD	AD	SD	CD	SR	AG	AL	CN	HA
MDD	—	0.21	0.22	0.12	0.41	0.07	0.25	−0.14	0.06
AD		—	0.50	0.31	0.14	0.15	0.14	− 0.24	−0.10
SD			—	0.26	0.22	0.14	0.18	− 0.23	−0.11
CD				—	0.12	0.22	0.21	− 0.19	−0.10
SR					—	0.38	0.65	− 0.36	0.04
AG						—	0.56	− 0.51	− 0.26
AL							—	− 0.38	−0.12
CN								—	0.27
HA									—

Note. Correlations greater than .15 or less than −.15 are in bold and are significant at $p < .01$. AD = lifetime alcohol dependence; AG = aggression; AL = alienation; CD = lifetime conduct disorder; CN = control; HA = harm avoidance; MDD = lifetime major depressive disorder; SD = lifetime substance dependence; SR = stress reaction.

Predicting smoking dependence with personality and psychiatric diagnoses

Given that only stress reaction, depression history, and substance dependence history showed significant associations with dependence measures, we ran the final set of models predicting dependence measures using these three independent variables along with sex. Results are shown in Table 3. Both stress reaction and depression history showed significant associations with five of the smoking dependence measures, but in no cases were both stress reaction and depression history significantly associated with the same smoking dependence measure. Substance dependence history was significantly associated with greater affiliative attachment and craving.

As an exploratory analysis, we examined whether the associations between the independent variables and smoking dependence measures differed by sex by adding to the models interaction terms between sex and depression history, substance dependence history, and stress reaction. In no cases were interactions significant at $p < .01$.

Discussion

Results followed a consistent pattern across tobacco dependence diagnosis and continuous self-report smoking dependence measures. A history of major depressive disorder and high levels of trait stress reaction were associated with higher levels of

Table 3. Model coefficients and SEs for generalized estimating equation models predicting tobacco dependence, FTND, and WISDM subscales

Dependent variable	MDD	SD	Stress reaction
Current tobacco dependence (no vs. yes) ^a	1.48 (0.44)	1.59 (0.50)	1.50 (0.21)
FTND	0.15 (0.14)	0.23 (0.14)	0.16 (0.06)
WISDM subscales			
Affiliative attachment	0.22 (0.14)	0.46 (0.15)	0.26 (0.07)
Automaticity	0.43 (0.13)	−0.02 (0.14)	0.13 (0.07)
Loss of control	0.43 (0.13)	0.33 (0.13)	0.13 (0.06)
Behavioral choice/melioration	0.20 (0.14)	0.32 (0.14)	0.27 (0.07)
Cognitive enhancement	0.29 (0.15)	0.22 (0.15)	0.16 (0.07)
Craving	0.40 (0.12)	0.33 (0.13)	0.15 (0.06)
Cue exposure/associative processes	0.49 (0.13)	0.28 (0.14)	0.09 (0.07)
Negative reinforcement	0.43 (0.13)	0.27 (0.13)	0.17 (0.07)
Positive reinforcement	0.26 (0.14)	0.21 (0.15)	0.22 (0.07)
Social/environmental goads	0.29 (0.14)	0.07 (0.14)	0.14 (0.07)
Taste/sensory properties	0.31 (0.13)	0.23 (0.15)	0.05 (0.07)
Tolerance	0.31 (0.13)	0.19 (0.14)	0.14 (0.06)
Weight control	0.20 (0.14)	0.25 (0.15)	0.12 (0.07)

Note. SEs of the model coefficients are in parentheses. Coefficients in bold are significant at $p < .01$. All dependent variables, other than current tobacco dependence, were standardized as was the continuous predictor, stress reaction. MDD and SD were dummy coded with those not having a history of that disorder coded as 0, the reference group; the coefficients for the dichotomous variables represent the difference in SD units between those with versus those without that disorder history. FTND = Fagerström Test for Nicotine Dependence; MDD = lifetime major depressive disorder; SD = lifetime substance dependence; WISDM = Wisconsin Inventory of Smoking Dependence Motives.

^aCurrent tobacco dependence was modeled using a binomial distribution and logit link function. Odds ratios and their SEs are presented.

current dependence on smoking. There was essentially no evidence of specificity in these associations as correlations across dependence measures were uniformly of small to medium magnitude. When predicting smoking dependence measures in a multivariate context, there were no instances in which both depression history and stress reaction had significant unique effects, indicating that these measures were competing for variance in the dependent variables due to their substantial collinearity. Which of these two measures was significantly associated with specific smoking dependence measures in the multivariate models appeared largely arbitrary. For example, depression history and not stress reaction was significantly and uniquely associated with three of the primary measures of dependence from the WISDM, including automaticity, loss of control, and craving. However, stress reaction and not depression history was significantly and uniquely associated with tobacco dependence diagnosis and with the FTND, despite the fact that the FTND is generally the dependence measure that correlates most highly with the primary dependence WISDM subscales (Piper et al., 2008; Shenassa et al., 2009). The general lack of patterning in the results of both bivariate and multivariate analyses suggests that a general vulnerability to depression and negative emotions is broadly related to a general vulnerability to smoking dependence rather than to vulnerability to specific facets of smoking dependence.

Of the psychiatric disorders assessed, substance dependence history was the only diagnosis beyond depression that showed a number of significant associations with smoking dependence. However, in multivariate models, substance dependence history was uniquely and significantly associated with only 2 of 15 smoking dependence measures examined, affiliative attachment and craving. Overall, a history of substance dependence may indicate some vulnerability to more severe smoking dependence, but this association is modest when compared with the effects of depression and trait negative emotionality.

A history of alcohol dependence showed weaker and less consistent associations with smoking dependence than substance dependence did. Overall, a history of alcohol dependence appears to tell little about an individual's current level of smoking dependence or ability to quit (Hughes & Kalman, 2006; Leeman, Huffman, & O'Malley, 2007). Lifetime conduct disorder showed no significant association with smoking dependence. However, it was a relatively rare diagnosis potentially limiting power to detect associations. Nonetheless, these results, combined with our earlier results comparing never-, past, and current smokers in this cohort (Kahler, Daughters, et al., 2009), suggest that conduct disorder may predispose individuals to start smoking but is not specifically associated with level of smoking dependence.

Alienation was significantly correlated with a number of smoking dependence measures, whereas aggression showed weak and limited associations with dependence. Alienation showed weaker associations with levels of dependence among current smokers than did stress reaction, and the collinearity between these measures ($r = .65$) meant that alienation was not uniquely associated with smoking dependence when controlling for stress reaction. These results contrast with those of a recent prospective study that found that alienation was a stronger predictor of later tobacco dependence than stress reaction (Welch & Poulton, 2009). That result, however, may reflect the fact that

alienation was a robust predictor of smoking persistence in that study. It was not reported whether alienation predicted higher odds of a current smoking dependence diagnosis among current smokers above and beyond the effects of stress reaction.

Of the two measures of behavioral constraint in the present study, only control was significantly associated with smoking dependence. That control showed its strongest association with cognitive enhancement raises the possibility that those with greater impulsivity smoke to enhance concentration. However, control was not significantly associated with any smoking dependence measure when controlling for other personality measures, and both stress reaction and alienation showed associations with cognitive enhancement that were of similar magnitude. Therefore, these results should be interpreted cautiously. That harm avoidance was not significantly associated with smoking dependence measures is consistent with prior research that has examined the closely related trait, sensation seeking (Harmen, Bischof, Brooks, Hohagen, & Rumpf, 2006; Kahler, Spillane, Metrik, Leventhal, & Monti, 2009).

Limitations

Several limitations of the study are notable. First, only four psychiatric conditions and five personality traits were examined. Also, although we measured a number of facets of smoking dependence, other smoking dependence or smoking motives measures might yield different results. The age range in the sample was 35–43 years. Thus, the study addressed dimensions of smoking dependence in middle-aged adults. There may be more variability in dependence motives in adolescence or early adulthood before smoking patterns become entrenched, and differential associations with personality and psychopathology may be more evident in that age range. Individuals completing the self-report measures were more likely than those not completing them to be women. There was no indication, however, that sex interacted with stress reaction, major depression, or substance dependence in predicting smoking dependence. Lastly, the sample was derived from a subset of smokers from a cohort study in New England and thus may not generalize to the U.S. population as a whole.

Conclusions

Study findings indicate that a history of depression and vulnerability to negative emotions are associated with greater self-reported smoking dependence but that specific personality traits and psychiatric disorders do not show differential associations with distinct dimensions of dependence. Such findings call into question whether self-report assessments of multiple dimensions of smoking dependence are likely to yield substantial advances in understanding how individual differences in personality and psychopathology relate to smoking dependence. Prior studies have shown similar results in regards to personality traits using different measures of smoking motivation (Gilbert et al., 2000; Papakirazi & Joseph, 1998). For example, in the Gilbert et al. study, trait depression correlated most highly with smoking to reduce depression subscales; however, depression was equally correlated with smoking to control weight/appetite.

Although it may be difficult to find differential associations among psychopathology, personality, and self-report smoking dependence measures, personality and psychopathology may show

differential associations with other variables conceptually related to smoking dependence, such as persistence of smoking, relapse to smoking following a quit attempt, and craving/withdrawal during abstinence. For example, alienation appears more strongly related to persistence of smoking than stress reaction (Kahler, Daughters, et al., 2009; Welch & Poulton, 2009), and trait hostility appears to predict poor smoking cessation outcome more strongly than stress reaction and depression history (Kahler, Spillane, Leventhal, et al., 2009); high hostility also predicts greater effects of smoking on negative mood recovery following a stressor but does not predict reactions to overnight abstinence (Kahler, Leventhal, et al., 2009). Likewise, sensation seeking and impulsivity predict poor smoking cessation outcome (Doran, Spring, McChargue, Pergadia, & Richmond, 2004; Kahler, Spillane, Metrik, et al., 2009; MacKillop & Kahler, 2009), and different aspects of impulsivity show differential associations with cue-induced smoking craving (Doran, Cook, McChargue, & Spring, 2009). Finally, harm avoidance and novelty seeking predict unique variance in acute nicotine abstinence effects (Leventhal et al., 2007).

Taken together, findings indicate that although psychopathology and personality may differentially relate to some aspects of smoking behavior, self-report measures of smoking dependence are most strongly associated with susceptibility to depression and negative emotions. Future studies are needed to elucidate whether these results reflect (a) a causal role of negative emotions in the development of dependence, (b) a tendency for neurotic individuals to overreport smoking dependence symptoms and motives across measures, and/or (c) reflect the effects of smoking dependence on emotional functioning. Studies that combine self-report with longitudinal or experimental assessments (e.g., examination of smoking deprivation effects, cue reactivity, persistence of smoking, or smoking relapse) are needed to provide further insight on the role of negative emotionality in the phenomenology of smoking dependence.

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Declaration of Interests

None declared.

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