Interaction between ethnicity and smoker type with dependence: A comparison of daily and intermittent African-American and Caucasian smokers

Jessica Cheng[1], **Saul Shiffman**[1], **Wendy King**[1], and **Sarah Scholl**[1]

[1]University of Pittsburgh

Abstract

Introduction—Ethnic differences in smoking patterns and dependence have been observed between Caucasian and African American smokers: African Americans who smoke are more likely to be intermittent smokers (ITS), and among daily smokers (DS) consume fewer cigarettes, yet report more dependence.

Methods—Participants' (N=482, 67% Caucasian, 54% ITS) dependence was assessed by Primary and Secondary Dependence subscales of the Wisconsin Inventory of Smoking Dependence Motives, the Nicotine Dependence Syndrome Scale, the Hooked on Nicotine Checklist, the Fagerstrom Test of Nicotine Dependence, and time to first cigarette after waking. We tested associations with dependence for ethnicity, smoker type, and an ethnicity by smoker type interaction, using multivariable linear regression, with adjustment for age, sex and education. Additional models adjusted for cigarettes per day and history of daily smoking.

Results—There was a significant interaction between ethnicity and smoker type for five of six measures of dependence (each scale assessed separately), such that African American ITS reported more dependence than Caucasian ITS, whereas dependence did not differ by ethnicity among DS. African American ITS smoked more cigarettes per day and were more likely to have a history of daily smoking than Caucasian ITS; after further adjustments for these differences, there were no significant interactions of ethnicity and smoker type for any measure.

Conclusions—Among DS, dependence did not differ by race. African American ITS were more dependent than Caucasian ITS; this difference was explained by higher cigarette consumption and a higher proportion converted from DS to ITS among African Americans vs. Caucasians.

Keywords

Cigarette Consumption; Non-daily; Ethnicity; dependence

Correspondence concerning this article should be addressed to Jessica Cheng 130 N. Bellefield Ave, Suite 510, Pittsburgh, PA, 15213; jess.cheng@pitt.edu.
Jessica Cheng, Department of Epidemiology, University of Pittsburgh: Saul Shiffman, Department of Psychology, University of Pittsburgh: Wendy King, Department of Epidemiology, University of Pittsburgh: Sarah Scholl, Department of Psychology, University of Pittsburgh

Introduction

In the United States smokers demonstrate ethnic variations in smoking behavior and tobacco dependence. African Americans daily smokers (DS) smoke fewer cigarettes per day than Caucasians daily smokers (Trinidad et al., 2009). Furthermore, among DS, African Americans develop greater dependence at lower levels of cigarette consumption than Caucasians. One study found that when smoking the same number of cigarettes per day, African Americans showed more dependence than Caucasians as defined by a shorter time to first cigarette after waking (less than 30 minutes), a marker of severe dependence (Luo et al., 2008). In addition, African American smokers make more quit attempts than Caucasians smokers, but are less likely to remain abstinent (Kulak, Cornelius, Fong, & Giovino, 2016).

While a similar proportion of African Americans and Caucasians smoke cigarettes (Jamal et al., 2016), African American smokers are more likely to be intermittent smokers (ITS) who do not smoke every day (Hassmiller, Warner, Mendez, Levy, & Romano, 2003). According to the Surgeon General's Report, 68.6% of non-Hispanic Caucasian adults are daily smokers while 48.1% of non-Hispanic African American adults are daily smokers, with the remaining 31.4% and 51.9%, respectively, smoking non-daily (National Center for Chronic Disease, Health Promotion Office on, & Health, 2014).

Intermittent smoking represents a sustained smoking pattern, not simply a transition to heavier smoking or to quitting (Hassmiller et al., 2003). Nevertheless, ITS exhibit some characteristics of dependence, such as inability to remain abstinent. In a population analysis, 73% of native ITS (those who were always ITS) and 82% of converted ITS (those who had once been DS) who tried to quit, failed to remain abstinent for 90 days (Tindle & Shiffman, 2011). Research suggests converted intermittent smokers are more dependent than native intermittent smokers (Shiffman, Ferguson, Dunbar, & Scholl, 2012).

The proportion of ITS among US adult smokers has grown in recent decades (Jamal et al., 2016). About 38% of US adult smokers smoke intermittently (National Center for Chronic Disease et al., 2014). ITS' behavior challenges traditional ideas of smoking as being primarily motivated by the need to smoke every few hours to maintain nicotine levels high enough to avoid withdrawal (Stolerman & Jarvis, 1995). The emergence of ITS also challenges what has been reported about ethnic differences in dependence. At once, African American DS are thought to be more dependent than Caucasian DS, yet as an ethnic group are more likely to be ITS who are a less-dependent subgroup of smokers.

There is a dearth of research aimed at understanding if and how ethnic differences in dependence vary by smoker type. Better understanding of ethnic differences in smoking behavior may help better address smoking cessation efforts within ethnic groups. The purpose of this study was to assess interactions between ethnicity and smoker type on dependence, specifically evaluating the effect of cigarette consumption, given the discordance between cigarettes per day and dependence among African Americans. In addition, given evidence of differences in dependence between converted and native intermittent smokers, this study also evaluated the effect of history of daily smoking.

Methods

Sample

Adults were recruited to participate in this observational study from the Pittsburgh, PA area via community advertisement. Eligible participants were at least 21 years old, smoking for at least 3 years, smoking at their current rate for at least 3 months, and not planning to quit within the next month. Potential participants had to meet specific criteria for DS (i.e., smoking every day, averaging 5-30 cigarettes per day) due to selection criteria for another component of the study not reported on here or meet criteria for ITS (i.e., smoking 4-27 days per month with no restrictions on the number of cigarettes smoked per day) as previously defined in the literature (Shiffman et al., 2013). Converted intermittent smokers were ITS who had previously smoked daily for at least 6 months; native intermittent smokers had not.

African Americans were oversampled via targeted advertisements because of their likelihood of being ITS. The University of Pittsburgh Institutional Review Board approved the study and participants provided informed consent. The data used for these analyses has been described previously (Shiffman et al., 2013); none of those reports examined ethnic differences.

Assessment

Demographic information was collected. To be classified as African American, participants had to report African American ethnicity only. Similarly, to be classified as Caucasian, participants had to identify as Caucasian only. Participants of other ethnicities and mixed ethnicities were excluded from this report due to low prevalence.

We assessed dependence using multiple measures, as the literature suggests that the correlations among them are modest, and the scales differ in the constructs assessed (Megan E. Piper, McCarthy, & Baker, 2006). Additionally, which aspects of the various dependence scales are most relevant for ITS, or for African Americans is unknown.

First, the Wisconsin Inventory of Smoking Dependence Motives has been shown to be significantly related to smoking heaviness and symptoms of dependence as defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (M. E. Piper et al., 2004). Latent profile analysis and exploratory factor analysis have revealed a primary dependence phenotype consisting of automaticity, craving, loss of control, and tolerance subscales which have been shown to be particularly strong components of the scale in predicting relapse and withdrawal (M. E. Piper et al., 2008). This primary dependence motives subscale is distinct from the remaining nine subscales (Affiliative Attachment, Behavioral Choice/Melioration, Cognitive Enhancement, Cue Exposure/Associative Processes, Negative Reinforcement, Positive Reinforcement, Social/Environmental Goads, Taste/Sensory Properties, and Weight Control) that make up the secondary dependence motives (M. E. Piper et al., 2008). Both the primary dependence motives and secondary dependence motives subscales are scored 1 through 7.

The second measure used was the Nicotine Dependence Syndrome Scale (NDSS), which is able to discriminate between heavy smokers and tobacco chippers, those who smoke no

more than 5 cigarettes on smoking days, and within chippers, number of smoking days per week, suggesting utility in measuring dependence at the low end of the spectrum (Shiffman & Sayette, 2005). NDSS scores are expressed as T-scores (Shiffman et al., 2012).

The Hooked on Nicotine Checklist (HONC) was scored continuously from 0 to 1, representing the proportion of the 10 items endorsed. Higher scores on the HONC are related to shorter abstinence (Wellman et al., 2005).

The Fagerstrom test of nicotine dependence (FTND) is an improved version of the Fagerstrom Tolerance Questionnaire and is related to biochemical indices of heaviness of smoking (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991). For this report, the FTND was scored without the cigarettes per day item as cigarettes per day was considered a separate covariate in analysis (Shiffman et al., 2012). Because cigarettes per day was excluded, the possible scores on this scale range from 0 to 7. Cigarettes per day was calculated the same way for DS and ITS—using timeline follow-back data as the average cigarettes per day, across all days, including those with no cigarettes.

Lastly, the first item from the FTND, "How soon after waking up do you smoke your first cigarette?" was used to assess time from waking to first cigarette in minutes. Responses of zero minutes were converted to one minute in order for time to first cigarette to be expressed via natural logarithmic transformation in analyses.

Data Analysis

Correlation coefficients between the various scales and cigarettes per day were computed separately for DS and ITS because the differences between DS and ITS might have otherwise exaggerated the correlations.

A series of linear regression models were tested to assess potential associations between ethnicity and smoker type with tobacco dependence where each dependence scale was assessed separately. The models included ethnicity, smoker type, and an ethnicity smoker type interaction, controlling for age, sex, and education, as these demographic measures have been shown to be related to smoking prevalence (Jamal et al., 2016) and differed by ethnicity. Controlling for menthol cigarette smoking was considered, but it was removed from the model because 96.3% and 96.1% of African American DS and ITS, respectively, smoked menthol cigarettes (compared to 46.0% and 35.7% of Caucasian DS and ITS) and because when included in the models, menthol smoking was not significant. Using the Kruskal Wallis H test, differences in cigarettes per day by ethnicity were tested separately for DS and ITS. In a second stage of modeling, cigarettes per day was added to the linear regression models to see if cigarettes per day accounted for the interaction. A Chi-Square test was used to evaluate if the distribution of native vs. converted intermittent smokers among ITS differed by ethnicity. A third set of models controlled for the potential effect of a differential proportion of converted intermittent smokers among African Americans and Caucasian ITS, by equally weighting converted and native intermittent smokers within each ethnicity, using contrasts. *P* values for the interaction between ethnicity and smoker type are reported for each dependence measure from all three models. Adjusted least-square mean

scores by ethnicity with smoker groups (DS and ITS) are reported for the second set of models only.

Analyses were conducted using SAS version 9.4 (SAS Institute, Cary, NC, USA). All reported p values are two-sided; p values less than 0.05 were considered to be statistically significant. Because this was an exploratory analysis, adjustment for the number of analyses was not conducted.

Results

In our sample, almost half (48.1%; 77 of 160) of African American smokers and 57.5% (185 of 322) of Caucasian smokers were ITS. Demographic information is reported in Table 1. Table 2 shows correlations between the cigarettes per day and the dependence scales separated by smoker type. Almost all the correlations were significant, but many were modest to moderate in magnitude, with only a few associations showing even 50% shared variance between pairs of measures (i.e., r 0.71).

In the first set of models, controlling for age, sex, and education, there was a significant interaction between smoker type and ethnicity for the primary dependence motives subscale, NDSS, HONC, FTND, and time to first cigarette, but not the secondary dependence motives subscale (Table 1) such that African American ITS were more dependent than Caucasian ITS, while African American DS were equally or less dependent than Caucasian DS.

On tests of cigarettes per day, African American ITS smoked more than Caucasian ITS (median 4.0 vs. 2.7 cigarettes per day; p<.0001), whereas African American DS smoked less than Caucasian DS (median 13.2 vs. 16.7 cigarettes per day; p<.0001).

To adjust for this, we conducted a second set of models that controlled for cigarettes per day. The interactions observed in the first set of models were attenuated for NDSS, FTND, HONC, and time to first cigarette scores such that they were no longer significant; the interaction between smoker type and ethnicity remained significant only for the primary dependence motives subscales (Table 1). Adjusted least-square mean dependence scores by smoker type and ethnicity groups are shown in Table 1. The primary dependence motives subscale scores were higher among African American vs. Caucasian ITS but not significantly different for African American vs. Caucasian DS.

African American vs. Caucasian ITS were more likely to be converted intermittent smokers, with a past history of daily smoking (68.8% vs. 52.4%; p=.02). In a third set of models, which additionally controlled for native/converted intermittent smoker status, interactions between ethnicity and smoker type were further attenuated (Table 1) such that there was no longer a significant interaction for the primary dependence motives subscales (p=.08).

Discussion

The purpose of this study was to examine differences in dependence between African American and Caucasian smokers in the contrasting groups of DS and ITS. On five of six dependence measures examined, African American ITS reported more dependence than

Caucasians; conversely, among DS, Caucasians were equally or more dependent than African Americans. Put another way, the differences in dependence between DS and ITS were smaller for African American smokers than for Caucasian smokers.

Controlling for cigarette per day eliminated the significant interaction between ethnicity and smoker type for four of five measures of dependence (NDSS, HONC, FTND, and time to first cigarette). Thus our analysis suggests this interaction can be largely explained by differential ethnic differences in cigarette consumption by smoker type, with African Americans smoking more than Caucasians among ITS, but smoking less among DS. Further control for converted/native intermittent smoker status eliminated the significant interaction for the primary dependence motives subscale, suggesting ethnic differences in smoking history among ITS (i.e., a higher proportion converted intermittent smokers among African Americans vs Caucasian ITS) also help explain this phenomenon.

It is unclear why our results differ from previous studies which found that African American DS are more dependent than Caucasians at similar levels of cigarette consumption (Kulak et al., 2016 and Luo et al., 2008). This difference may reflect that the Kulak et al. study measured dependence in terms of abstinence, while our study did not, or differences in study samples. Luo et al. found significant ethnic differences in dependence for time to first cigarette when controlling for CPD with the biggest difference seen among those who smoked 15-19 CPD. The reason our results differ may be because our sample was comprised primarily of lighter smokers (African American DS smoked a median of only 13.2 CPD and Caucasian DS a median of 16.7 CPD) among whom an ethnic difference in dependence might be less pronounced.

The finding that compared to Caucasians, African Americans show smaller differences in dependence between DS and ITS, is not negated by the findings that this can be accounted for by ethnic differences in smoking rates and history of daily smoking. Rather, these findings suggest that the observed differences in dependence are rooted in more fundamental differences in smoking behavior and history, which are themselves poorly understood. Cigarette consumption may be driven by influences other than dependence, such as social norms, or by biological differences in nicotine metabolism (Perez-Stable & Benowitz, 2011) or dopamine D4 receptor genotypes that predict cessation outcomes in African Americans but not Caucasians (Shields et al., 1998). Also, some important aspects of dependence or other factors that promote smoking and nicotine-seeking may not be captured by current measures of dependence. More research is needed to understand the dependence profiles among African Americans and Caucasians.

Strengths and Limitations

A strength of our study was that dependence was measured using multiple validated dependence scales. One limitation of the study was that we were unable to assess ethnic variation among other ethnic groups, as they were not well represented in our local convenience sample. Comparisons with Asians/Pacific Islanders and Hispanics/Latinos – among whom intermittent smoking is more common– are warranted (Trinidad et al., 2009). Our sample also limited DS to certain smoking levels, and ITS to certain smoking frequencies, so our results might not generalize to the full range of smokers. In addition, we

focused on non-daily smokers, contrasting them to daily smokers, without also examining light daily smokers, another important group that differs from relatively heavier daily smokers (Okuyemi et al., 2007). In future work, further grouping smokers into intermittent, light daily, and moderate-heavy daily smokers might reveal interesting differences in dependence and potential interactions with ethnicity.

With the number of ITS on the rise, more research is needed to understand the nature of dependence among ITS, and to evaluate the reasons behind differing cigarette consumption and dependence in individuals of different ethnicities.

Acknowledgments

References

Hassmiller KM, Warner KE, Mendez D, Levy DT, Romano E. Nondaily smokers: who are they? American Journal of Public Health. 2003; 93(8):1321–1327. [PubMed: 12893622]

Heatherton TF, Kozlowski LT, Frecker RC, Fagerstrom KO. The Fagerstrom Test for Nicotine Dependence: a revision of the Fagerstrom Tolerance Questionnaire. British Journal of Addiction. 1991; 86(9):1119–1127. [PubMed: 1932883]

Jamal A, King BA, Neff LJ, Whitmill J, Babb SD, Graffunder CM. Current Cigarette Smoking Among Adults – United States, 2005-2015. MMWR: Morbidity and Mortality Weekly Report. 2016; 65(44):1205–1211. DOI: 10.15585/mmwr.mm6544a2 [PubMed: 27832052]

Kulak JA, Cornelius ME, Fong GT, Giovino GA. Differences in Quit Attempts and Cigarette Smoking Abstinence Between Whites and African Americans in the United States: Literature Review and Results From the International Tobacco Control US Survey. Nicotine & Tobacco Research. 2016; 18(Suppl 1):S79–87. DOI: 10.1093/ntr/ntv228 [PubMed: 26980868]

Luo Z, Alvarado GF, Hatsukami DK, Johnson EO, Bierut LJ, Breslau N. Race differences in nicotine dependence in the Collaborative Genetic study of Nicotine Dependence (COGEND). Nicotine & Tobacco Research. 2008; 10(7):1223–1230. DOI: 10.1080/14622200802163266 [PubMed: 18629733]

National Center for Chronic Disease, P., Health Promotion Office on, S., & Health. Reports of the Surgeon General The Health Consequences of Smoking-50 Years of Progress: A Report of the Surgeon General. Atlanta (GA): Centers for Disease Control and Prevention (US); 2014.

Okuyemi KS, Pulvers KM, Cox LS, Thomas JL, Kaur H, Mayo MS, Ahluwalia JS. Nicotine dependence among African American light smokers: a comparison of three scales. Addictive Behaviors. 2007; 32(10):1989–2002. DOI: 10.1016/j.addbeh.2007.01.002 [PubMed: 17307303]

Perez-Stable EJ, Benowitz NL. Do biological differences help explain tobacco-related disparities? American Journal of Health Promotion. 2011; 25(5 Suppl):S8–10. DOI: 10.4278/ajhp.25.5.c2 [PubMed: 21510792]

Piper ME, Bolt DM, Kim SY, Japuntich SJ, Smith SS, Niederdeppe J, Baker TB. Refining the tobacco dependence phenotype using the Wisconsin Inventory of Smoking Dependence Motives. Journal of Abnormal Psychology. 2008; 117(4):747–761. DOI: 10.1037/a0013298 [PubMed: 19025223]

Piper ME, McCarthy DE, Baker TB. Assessing Tobacco Dependence: A Guide to Measure Evaluation and Selection. Nicotine & Tobacco Research. 2006; 8(3):339–351. DOI: 10.1080/14622200600672765 [PubMed: 16801292]

Piper ME, Piasecki TM, Federman EB, Bolt DM, Smith SS, Fiore MC, Baker TB. A multiple motives approach to tobacco dependence: the Wisconsin Inventory of Smoking Dependence Motives (WISDM-68). Journal of Consulting and Clinical Psychology. 2004; 72(2):139–154. DOI: 10.1037/0022-006x.72.2.139 [PubMed: 15065950]

Shields PG, Lerman C, Audrain J, Bowman ED, Main D, Boyd NR, Caporaso NE. Dopamine D4 receptors and the risk of cigarette smoking in African-Americans and Caucasians. Cancer Epidemiology, Biomarkers and Prevention. 1998; 7(6):453–458.

Shiffman S, Dunbar M, Kirchner T, Li X, Tindle H, Anderson S, Scholl S. Smoker reactivity to cues: effects on craving and on smoking behavior. Journal of Abnormal Psychology. 2013; 122(1):264–280. DOI: 10.1037/a0028339 [PubMed: 22708884]

Shiffman S, Ferguson SG, Dunbar MS, Scholl SM. Tobacco dependence among intermittent smokers. Nicotine & Tobacco Research. 2012; 14(11):1372–1381. DOI: 10.1093/ntr/nts097 [PubMed: 22529224]

Shiffman S, Sayette MA. Validation of the nicotine dependence syndrome scale (NDSS): a criterion-group design contrasting chippers and regular smokers. Drug and Alcohol Dependence. 2005; 79(1):45–52. DOI: 10.1016/j.drugalcdep.2004.12.009 [PubMed: 15943943]

Stolerman IP, Jarvis MJ. The scientific case that nicotine is addictive. Psychopharmacology. 1995; 117(1):2–10. discussion 14-20. [PubMed: 7724697]

Tindle HA, Shiffman S. Smoking cessation behavior among intermittent smokers versus daily smokers. American Journal of Public Health. 2011; 101(7):e1–3. DOI: 10.2105/ajph.2011.300186

Trinidad DR, Perez-Stable EJ, Emery SL, White MM, Grana RA, Messer KS. Intermittent and light daily smoking across racial/ethnic groups in the United States. Nicotine & Tobacco Research. 2009; 11(2):203–210. DOI: 10.1093/ntr/ntn018 [PubMed: 19246433]

Wellman RJ, DiFranza JR, Savageau JA, Godiwala S, Friedman K, Hazelton J. Measuring adults' loss of autonomy over nicotine use: the Hooked on Nicotine Checklist. Nicotine & Tobacco Research. 2005; 7(1):157–161. DOI: 10.1080/14622200412331328394 [PubMed: 15804688]

Table 1

Demographics and Adjusted Tobacco Dependence Scores by Ethnicity/Smoker Type Groups

	African American ITS N=77	Caucasian ITS N=185	African American DS N=83	Caucasian DS N=137	P-value of the Interaction	P-value of the Interaction	P-value of the Interaction
	%/Median (S.E.)	%/Median (S.E.)	%/Median (S.E.)	%/Median (S.E.)	–	–	–
Demographics							
Age, years	44.4 (1.2)	32.7 (0.8)	43.5 (1.1)	39.3 (1.0)	–	–	–
Male	49.4	49.7	45.8	61.3	–	–	–
Education					–	–	–
Less than high school	11.69	1.08	16.05	9.49			
High School	32.47	7.57	35.80	24.82			
Some College	33.77	41.08	40.74	45.26			
College or more	22.08	50.27	7.41	20.44			
Cigarettes per day	4.02 (0.30)	2.74 (0.19)	13.23 (0.59)	16.66 (0.51)	–	–	–
Converted ITS	53 (68.8)	97 (52.4)	–	–			
Tobacco Dependence[+]					Model 1 *	Model 2 **	Model 3 ***
Primary Dependence	3.31 (0.14)	2.87 (0.12)	3.75 (0.13)	3.75 (0.13)	<.0001	.04	.08
Secondary Dependence	3.16 (0.13)	3.06 (0.11)	3.65 (0.12)	3.64 (0.12)	.09	.63	.88
NDSS (T-score)	37.91 (1.19)	35.88 (0.97)	40.74 (1.24)	41.72 (1.14)	<.01	.10	.17
FTND (without CPD item)	2.68 (0.19)	1.18 (0.15)	3.66 (0.17)	3.15 (0.18)	<.01	.19	.45
HONC (proportion of items endorsed)	0.56 (0.03)	0.54 (0.03)	0.62 (0.03)	0.64 (0.03)	.03	.43	.83
Time to first cigarette (minutes)	30.72 (1.19)	66.07 (1.16)	17.10 (1.18)	22.57 (1.18)	<.01	.07	.13

[+] Least-square means from Model 2 reported. A higher value indicates greater dependence, with the exception of TTFC where fewer minutes indicates greater dependence.

* Model 1: Ethnicity, smoker type, and an interaction between the two with each tobacco dependence measure adjusted for age, sex, and education.

** Model 2: Model 1 with additional adjustment for cigarettes per day.

*** Model 3: Model 2 with additional adjustment for CITS/NTS status.

Acronym Key: DS=daily smoker ITS=intermittent smoker NDSS=Nicotine Dependence FTND=Fagerstrom Test of Nicotine Dependence Syndrome Scale HONC=Hooked on Nicotine Checklist.

Table 2

Pearson Correlation Coefficients for Dependence Scales by Smoker Type

	CPD	NDSS (T-score)	FTND (without CPD item)	PDM	SDM	HONC (proportion of items endorsed)	Time to first cigarette (log-transformed)
Daily Smokers							
CPD							
NDSS (T-score)	0.47 *						
FTND (without CPD item)	0.36 *	0.55 *					
PDM	0.43 *	0.63 *	0.45 *				
SDM	0.24 *	0.58 *	0.39 *	0.75 *			
HONC (proportion of items endorsed)	0.25 *	0.52 *	0.35 *	0.59 *	0.51 *		
Time to first cigarette (log-transformed)	−0.38 *	−0.45 *	−0.72 *	−0.38 *	−0.31 *	−0.19 *	
Intermittent Smokers							
CPD							
NDSS (T-score)	0.57 *						
FTND (without CPD item)	0.48 *	0.51 *					
PDM	0.67 *	0.67 *	0.54 *				
SDM	0.37 *	0.59 *	0.20 *	0.68 *			
HONC (proportion of items endorsed)	0.34 *	0.48 *	0.25 *	0.60 *	0.56 *		
Time to first cigarette (log-transformed)	−0.37 *	−0.37 *	−0.82 *	−0.41 *	−0.11	−0.16 *	

*
$p < .05$

Acronym Key: CPD=cigarettes per day NDSS=Nicotine Dependence Syndrome Scale FTND=Fagerstrom Test of Nicotine Dependence PDM=Primary Dependence Scale SDM=Secondary Dependence Scale HONC=Hooked on Nicotine Checklist.