URGENCY PREDICTS DIFFERENCES IN CIGARETTE CONSUMPTION

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ABSTRACT

Smokers have been classified into three separate groups based on cigarette consumption where regular smokers consume more than 5 cigarettes a day, chippers consume 5 cigarettes a day or less, and social smokers only smoke when they drink alcohol. The current study examined smoking group differences by self-regulation, alcohol use, and alcohol-related problems. Participants ($n = 535$) completed an online survey. A 3-step multinomial logistic regression was used to analyze the data. When compared to regular smokers, chippers exhibited lower negative urgency (RRR $= 0.94$, $p = .035$). Social smokers consumed more alcohol (RRR $= 2.37$, $p <$ .001), and exhibited lower negative urgency (RRR $= 0.93$, $p = .004$) than regular smokers. Compared to chippers, social smokers consumed more alcohol (RRR $= 1.71$, $p = .001$). These findings suggest there are notable differences between smoking classes. The results highlight the importance of examining different classes of smokers.

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INTRODUCTION

Problem

Smoking is a significant public health problem in the United States (Centers for Disease Control and Prevention, 2010). Even though smoking rates have decreased for four decades, 19.3% of people continue to smoke in the United States (Centers for Disease Control and Prevention, 2012). Smoking is a known carcinogen and has been related to lung, esophageal, head and neck, liver, stomach, pancreatic, and bladder cancers (Kuper, Boffetta, & Adami, 2002). Smoking cigarettes also increases the risk for developing heart disease (Huxley & Woodward, 2011) and chronic obstructive pulmonary disease (Devereux, 2006). Smoking continues to be the greatest cause of preventable death in the United States (Centers for Disease Control and Prevention, 2008). Smoking was responsible for 440,000 deaths annually from 1995 to 1999 with similar rates today (Centers for Disease Control and Prevention, 2008).

With so many health risks, quitting smoking is a common goal for smokers (Centers for Disease Control and Prevention, 2011b). Many current smokers have attempted to quit (Centers for Disease Control and Prevention, 2011a). Sixty-eight percent reported a desire to quit smoking, and 52.4% of smokers made a quit attempt in the last year (Centers for Disease Control and Prevention, 2011a). Only 6.2% of smokers reported quitting in the last year, but smoking prevalence continues to slowly decrease (Centers for Disease Control and Prevention, 2012). Until 1992, light smokers and non-daily smokers were not considered a true smoking class (CDC, 1994), but now these lighter smokers are the largest growing class, with 25-33% of smokers not smoking every day (Centers for Disease Control and Prevention, 2007; Office of Applied Studies, 2003). An argument may be made that these smokers are transitioning to heavier smoking, but this does not seem to be the case (Shiffman, Tindle, et al., 2012). Many of

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these lighter smokers have been smoking in this manner for years (Shiffman, Tindle, et al., 2012). Another argument may be made that lighter smokers are actually daily smokers who are not being truthful, but cotinine levels support these numbers (O'Connor et al., 2006). These lighter smokers are also not quitting, and 65% reported a quit failure in the last six months (Kotz, Fidler, & West, 2012). These lighter smokers are also less responsive to smoking messages about cancer risk because they perceive their risk to be less than regular smokers (Debevec & Diamond, 2012).

Different types of smokers

Smokers often tend to be grouped into one category. However, there is growing evidence that a number of different subgroups exist (Shiffman, Kirchner, Ferguson, & Scharf, 2009). One group of smokers that is receiving increased attention is intermittent smokers (Shiffman, 2009). These smokers consume far fewer cigarettes than regular smokers and may not even smoke every day. Even among intermittent smokers, however at least two subgroups can be identified (Shiffman et al., 2009). One subgroup, referred to as chippers, includes smokers who do not smoke daily and smokers who consume up to five cigarettes a day (Shiffman, Paty, Kassel, Gnys, & Zettler-Segal, 1994). The other subgroup, often referred to as social smokers, includes smokers who smoke cigarettes to enhance experiences typically while around others or while drinking (Shiffman et al., 2009). It is not clear what makes these subgroups of intermittent smokers different from each other. Often, they are lumped together and examined only as chippers or non-daily smokers, but there may be important differences between these groups (Shiffman et al., 2009). For example, social smokers do not typically identify as smokers and report almost exclusively smoking with others and while drinking (Debevec & Diamond, 2012), while chippers may identify as smokers who are not addicted to cigarettes but smoking cigarettes

is reinforcing for social and other reasons (Shiffman et al., 1994). Social smokers consume cigarettes on fewer days than chippers, are more likely to smoke several cigarettes at a time, and are more likely to smoke late at night (Shiffman et al., 2009).

Differences between regular smokers and chippers

Chippers encapsulate smokers who only smoke a few cigarettes a day, or even less than a cigarette a day, and were considered social smokers until recently (Shiffman, 1989; Shiffman et al., 1994). However, half of the cigarettes smoked by chippers are smoked alone (Shiffman & Paty, 2006). Chippers also report avoiding common smoking areas more than regular smokers, but chippers smoke with other smokers at a similar rate to regular smokers (Shiffman & Paty, 2006).

Chippers also differ from regular smokers in other ways. Shiffman et al. (1994) found chippers who had maintained their limited smoking behavior for 19 years, on average, have smoked 46,000 cigarettes but are not as nicotine dependent as heavy smokers who have smoked roughly 200,000 cigarettes in that time. Regular smokers and chippers differ significantly in their withdrawal symptoms when attempting to quit smoking (Shiffman et al., 1994). Regular smokers report problems with concentration, increased craving, nervousness, and irritability when they are deprived of nicotine. Among chippers, three-fourths never feel nervous when deprived of a cigarette, and two of three chippers never experience irritability when they have not smoked for a day or more. Eighty-one percent of chippers never experience concentration issues after being deprived of nicotine. The only common symptom of withdrawal found by Shiffman et al. (1994) is craving. Shiffman, Paty, Gnys, and Kassel (1995) also compared differences in withdrawal symptoms between regular smokers and chippers. When regular smokers are nicotine deprived, they experience sleep disturbances such as waking up during the night more often and report a

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poorer quality of sleep than chippers who are nicotine deprived. Regular smokers experience increased mood disturbance during abstinence such as tension, frustration, and feeling less calm than abstinent chippers. Regular smokers also have increased reaction times on cognitive performance tasks during abstinence suggesting that nicotine may improve cognitive functioning for regular smokers though not for chippers.

Chippers' smoking behavior differs from regular smokers in that they report casual abstinence from smoking (i.e., they stop smoking for a day or more) (Shiffman et al., 1994). Among chippers, 46% report abstinence for at least one day over the past 4 weeks, and 26% report at least one day of abstinence per week. There is also some variability among chippers' smoking as these smokers have light smoking days and heavy smoking days. A quarter of chippers report days where they smoke up to ten cigarettes, and these are not weekend days which would suggest social motivation for smoking. Chippers actually smoked less on the weekend compared to weekdays whereas regular smokers saw little difference in the number of cigarettes they smoked during the weekend and weekdays (Shiffman et al., 1994).

Daily smoking patterns also differ between chippers and regular smokers (Shiffman et al., 1994). Chippers smoke their first cigarette of the day five and a half hours after waking up compared to heavy smokers who smoke their first cigarette only 18 minutes after waking. Part of this difference may be preferences. For example, chippers report that they would have the most difficulty giving up the last cigarette of the day while regular smokers report the first cigarette of the day would be the most difficult for them to quit. Chippers also are less likely than regular smokers to smoke at night (Shiffman et al., 1994). Chippers' social environment is also different from regular smokers. Chippers report their five closest friends are more likely to be non-smokers or ex-smokers when compared to regular smokers (2.0 vs. 2.8, respectively), and only

6.3% of chippers report that most of their co-workers are smokers compared to 30.4% of regular smokers (Shiffman et al., 1994).

Chippers' smoking environments and social circles differ from regular smokers (Shiffman et al., 2009; Shiffman & Paty, 2006; Shiffman, Tindle, et al., 2012). Chippers, compared to regular smokers, are less likely to smoke at work and while driving in their car, but they are more likely than regular smokers to smoke while relaxed, eating, drinking alcohol, and are not different from regular smokers in how many cigarettes they smoke alone (Shiffman & Paty, 2006). Chippers' alcohol use also affects their craving for cigarettes (Kirchner & Sayette, 2007). Chippers and regular smokers both report positive reinforcement expectations from smoking after drinking alcohol during a period of nicotine abstinence (Kirchner & Sayette, 2007).

Alcohol use has different effects on chippers compared to regular smokers in that alcohol increases their negative reinforcement expectations while this expectation remains consistently high among regular smokers. Epstein, Sher, Young, and King (2007) found chippers' urge for smoking increases as more alcohol (e.g. 4 drinks or more) is consumed initially, but this urge decreases as the effects of alcohol attenuate. However, smoking urges remain consistent for chippers when they consume half as much alcohol even as the effects of alcohol weaken (Epstein et al., 2007).

Differences between regular smokers and social smokers

Social smokers tend to smoke with other people and while drinking, but this is not always true (Shiffman et al., 2009). Only 15% of chippers are found to be social smokers while the rest of these smokers have cigarettes mostly in the morning or in the evening (Shiffman et al., 2009). Social smokers also show much less nicotine withdrawal than regular smokers though their

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levels of nicotine dependence do vary suggesting that some social smokers experience withdrawal symptoms but at a lower intensity than regular smokers (Shiffman, Ferguson, Dunbar, & Scholl, 2012).

Similar to chippers, social smokers rarely smoke at work and many cigarettes are smoked at home (Shiffman et al., 2009). Likewise, social smokers also reported smoking soon after eating and drinking alcohol. Shiffman, Tindle, et al. (2012) confirmed the previous finding that alcohol use is an important factor in smoking for social smokers. College students also report other benefits to smoking while consuming alcohol (Nichter, Nichter, Carkoglu, & Lloyd-Richardson, 2010). College students who smoke while drinking alcohol report that it helps to calm them down, helps to interact with the opposite sex, spaces out a party, and reduces negative side effects by only smoking at parties (Nichter et al., 2010). This further supports the importance of a social factor in smoking behavior particularly while consuming alcohol.

Social relationships impact social smokers differently than regular smokers where regular smokers report that their spouse smokes while the spouse of socials likely does not smoke. Social smokers also endorse smoking more in situations where others are smoking and in social contexts which differs somewhat from chippers (Shiffman, Tindle, et al., 2012). Finally, social smokers report being more likely to smoke while in transit between two locations (Shiffman et al., 2009).

Impulsivity and smoking

There are clearly many differences among regular smokers, chippers, and social smokers (Shiffman, Dunbar, Scholl, & Tindle, 2012; Shiffman & Paty, 2006). One variable considered to be important among smokers is impulsivity (Doran et al., 2013). Impulsivity is a general term for rash action, novelty seeking, and poor planning. However, the construct can be difficult to

measure, and no one theory of impulsivity has gained acceptance (Whiteside & Lynam, 2001). Whiteside and Lynam (2001) created a new measure that attempts to use facets of impulsivity that are common among other models to create a better measure. Factor analysis divided impulsivity into four categories: urgency, lack of premeditation, lack of perseverance, and sensation seeking (Whiteside & Lynam, 2001). This measure is known as the Urgency, Premeditation (lack of), Perseverance (lack of), and Sensation seeking Impulsive Behavior Scale (UPPS). Urgency represents a tendency to commit rash or regrettable actions as a result of negative affect. Lack of premeditation represents an inability to plan and, in parallel, carefully think about an action before performing it. Lack of perseverance represents an inability to continue a task through completion and avoid distraction and, finally, sensation seeking represents the tendency to seek excitement and adventure. Cyders et al. (2007) found positive urgency to be distinct from urgency and added this category to the UPPS to create the UPPS-P. Positive urgency is the same as urgency except these rash actions occur during positive affective states. The UPPS has been used often in smoking research to better understand how impulsivity contributes to cigarette use (Billieux, Van der Linden, & Ceschi, 2007; Doran, Cook, McChargue, Myers, & Spring, 2008; Doran, Cook, McChargue, & Spring, 2009; Doran et al., 2013; Doran, McChargue, & Cohen, 2007; Spillane, Smith, & Kahler, 2010).

Doran et al. (2013) hypothesize that increased impulsivity, specifically sensation seeking and negative urgency, would predict initiation of smoking among college students. Sensation seeking directly predicted initiation of smoking, but negative urgency did not. Negative urgency does predict initiation when this relationship is mediated by negative reinforcement expectancies, and the relationship between sensation seeking and initiation is mediated by positive reinforcement expectancies. When smokers are exposed to smoking cues, sensation seeking

predicts positive affect craving, meaning that these smokers expect positive feelings from smoking. Increased urgency and a lack of perseverance predicts negative affect craving where smokers expect relief from negative affect when smoking (Doran et al., 2009). Similarly, another experiment found that urgency is related to stronger negative affect after being exposed to a cigarette cue than negative affect before the cigarette exposure. A similar but weaker relationship also exists for sensation seeking (Doran et al., 2008).

Billieux et al. (2007) examined the role of impulsivity in cigarette craving among college students and found that negative urgency only predicts an increase in relief from withdrawal or negative affect. Finally, Spillane et al. (2010) examined which of these impulsivity categories predicts being a current smoker. Smoking status is only predicted by sensation seeking while positive urgency is the only trait to predict significantly higher nicotine dependence. The result that positive urgency predicts higher nicotine dependence is surprising considering that chippers report increased smoking during positive mood states compared to negative mood states (Shiffman et al., 1994). Positive urgency is expected to be inversely related to nicotine dependence or have no relation at all. Sensation seeking predicting smoking status may have been found because Spillane et al. (2010) also included smokers who smoked at least once a month which includes social smokers and chippers who report higher sensation seeking (Kassel, Shiffman, Gnys, & Paty, 1994).

The research on impulsivity among chippers, regular smokers, and non-smokers is limited to only a single study (Kassel et al., 1994). This study found that regular smokers and chippers report significantly higher sensation seeking than non-smokers but have comparable sensation seeking to each other. Including social smokers with chippers as one group may explain this difference. Chippers and regular smokers also differ on self-control and a broad

measure of impulsivity where regular smokers report less self-control and more impulsivity than chippers but do not differ on stress, social support, or coping.

Purpose

Chippers and social smokers are unique among smokers because little or no nicotine dependence drives their smoking (Shiffman et al., 1995). Smoking continues to be a significant public health concern but delineating what separates chippers and social smokers from regular smokers can help to address factors that promote nicotine dependence. These smokers are also not progressing to nicotine dependence as previously thought and a minority used to be heavier smokers (Shiffman et al., 1994). Some factors appear to differentiate regular smokers from chippers and social smokers. Chippers report that smoking is associated with positive moods and less with negative mood (Shiffman et al., 1994), but this result has not always been observed (Shiffman & Paty, 2006). Social smokers and chippers report higher urges to smoke while drinking alcohol (Kirchner & Sayette, 2007; Shiffman, Ferguson, et al., 2012). These findings still do not fully explain the smoking behavior of social smokers and chippers. These smokers may differ on facets of impulsivity which may help to explain their use and help to create new smoking cessation treatments. Alcohol use may also help to distinguish these smoking groups. Based on the literature, it is hypothesized:

1. Regular smokers will have significantly higher negative urgency than chippers, social smokers, and non-smokers.

2. Chippers will have significantly higher positive urgency than regular smokers and non-smokers.

3. Social smokers will have significantly higher positive urgency than regular smokers and non-smokers.

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4. Social smokers will report higher rates of alcohol consumption than regular smokers.

5. Social smokers will report significantly higher sensation seeking than regular smokers and chippers.

METHODS

Participants and recruitment

Participants (N = 2578) were recruited via email and Sona Systems from a large Midwestern university. They ranged in age from 18-57 (M = 19.98, SD = 2.86). Participants were 92.0% Caucasian, 3.2% Asian, 1.5% African American, and 2.7% others. Females comprised 60.5% (n = 1558). The subsample (n = 535) included 120 randomly selected non-smokers from the all of the non-smokers to create a comparison group approximately equal in size to the smoking groups. This subsample was similar in age (M = 20.76, SD = 3.96). Females comprise 52.6% (n = 305) of the subsample, and participants were 92.1% Caucasian, 2.6% Asian, 1.2% African American, and 3.3% other. This study was approved for human subjects by the Institutional Review Board and consent was given by all participants before the start of the study.

Measures

Alcohol Use Disorders Identification Test (AUDIT: Saunders, Aasland, Babor, & de la Fuente, 1993) is a 10-item measure used to assess alcohol consumption (Items 1-3; α =.83) and alcohol-related consequences (Items 4-10; α =.83). The alcohol use subscale of the AUDIT assesses typical alcohol use frequency (item 1) and quantity (item 2), and binge frequency (item 3). Example items from this section include "How often do you have a drink containing alcohol?" and "How many units of alcohol do you drink on a typical day when you are drinking?" Items 4 through 10 assess for dependence and alcohol-related consequences. Example items include "How often during the last year have you found that you were not able to stop drinking once you had started?" and "Have you or someone else been injured as a result of your drinking?" Previous research supports convergent validity with the Michigan Alcohol Screening

Test and the MacAndrew alcoholism screening test, and the AUDIT was superior to the Michigan Alcohol Screening Test in identifying hazardous drinking (Bohn, Babor, & Kranzler, 1995). The AUDIT also has excellent one month test-retest reliability (α =.84; de Meneses-Gaya, Zuardi, Loureiro, & Crippa, 2009). Previous research supports the validity and reliability of the AUDIT with college student samples (DeMartini & Carey, 2012). For example, the AUDIT showed convergent validity with the Brief Young Adults Alcohol Consequences Questionnaire, and the AUDIT identified at-risk drinking significantly better than chance (DeMartini & Carey, 2012).

Smoking Status and Use was determined by asking participants "Do you smoke cigarettes?" If they responded "yes," they were asked how much they smoke with options ranging from "Once a month or less" to "30+ a day." There was also an option "I only smoke when I drink" to identify social smokers. Regular smokers reported smoking 6 or more cigarettes daily, and chippers reported smoking 5 or fewer cigarettes a day. Non-smokers identified as non-smokers.

UPPS-P Impulsive Behavior Scale is a 59-item measure assessing a 5-factor model of impulsivity. This scale incorporates the original 45-item four factor UPPS model (Whiteside & Lynam, 2001) with a 14-item measure of positive urgency (Cyders & Smith, 2007; Cyders et al., 2007). Participants respond to statements on a 4-point Likert scale ranging from *strongly agree* to *strongly disagree*. Example items for negative urgency include "I have trouble controlling my impulses", and "I have trouble resisting my cravings." Example items for Premeditation include "I have a reserved and cautious attitude toward life" and "My thinking is usually careful and purposeful." An example item for sensation seeking is "I generally seek new and exciting experiences and sensations," while an example item for Perseverance is "I generally like to see

things through to the end." An example item for positive urgency is "When I am in great mood, I tend to get into situations that could cause me problems." The five factors include negative urgency (12 items, α = .88), positive urgency (14 items, α = .93), premeditation (11 items, α = .82), perseverance (10 items, α = .82), and sensation seeking (12 items, α = .83). The UPPS-P has shown excellent test-retest reliability (α = .81 - .93; Weafer, Baggott, & de Wit, 2013) as well as convergent (Duckworth & Kern, 2011; Smith et al., 2007) and predictive validity (Cyders, Flory, Rainer, & Smith, 2009; Cyders & Smith, 2007; Cyders et al., 2007). For example, the UPPS has shown convergent validity with independent measures that assessed self-reported urgency (r = .46), lack of perseverance (r = .48), lack of premeditation (r = .40), and sensation seeking (r = .48).

Procedure

Participants, recruited via campus-wide email, completed an online survey assessing demographic variables, aspects of behavioral and emotional functioning, smoking behavior, and alcohol use/consequences. Participants completed several other measures that are not included in this study. All participants were treated in accordance with APA ethical guidelines.

Data analysis plan

Bivariate correlations were conducted for all independent variables. A multinomial logistic regression was used to analyze with independent variables derived from the UPPS-P: positive urgency, negative urgency, lack of premeditation, lack of perseverance, and sensation seeking to predict smoking class. The AUDIT was also included as a predictor with items 1-3 being combined to produce an alcohol use independent variable, and items 4-10 being combined to produce an alcohol-related problems variable. This analysis also controlled for age and gender. There were four smoking classes: regular smoker, chipper, social smoker, and non-

smoker. One hundred twenty non-smokers were randomly selected to be compared against the other classes as homogeneity of variance is a concern with such a large disparity in class sizes. Using 120 randomly selected non-smokers created a class that is similar in size to the other groups because there are approximately 2163 non-smokers that comprised 83.9% of the sample compared to the smoking classes that range in sample size from 97 regular smokers, 124 chippers, and 194 social smokers.

RESULTS

Descriptive and bivariate statistics

Table 1 displays the descriptive and bivariate statistics for the study variables. Some respondents (14.36%) reported some form of cigarette consumption. Men and women were not equally distributed across smoking group with women being over represented in the regular smoking and chippers groups, $\chi^2(3) = 20.03$, $p = .013$. Women had lower AUDIT use scores ($r = -.24$, $p < .001$), AUDIT problem scores ($r = -.13$, $p = .016$), and sensation seeking ($r = -.22$, $p < .001$), but higher negative urgency ($r = .09$, $p = .036$). Alcohol use was positively correlated with alcohol-related problems ($r = .56$, $p < 0.001$), negative urgency ($r = .18$, $p < .001$), positive urgency ($r = .21$, $p < 0.001$), lack of perseverance ($r = .17$, $p < 0.001$), lack of premeditation ($r = .20$, $p < .001$), and sensation seeking ($r = .26$, $p < .001$). Alcohol-related problems were positively correlated with negative urgency ($r = .38$ $p < 0.001$), positive urgency ($r = .34$, $p < .001$), lack of perseverance ($r = .19$, $p < .001$), lack of premeditation ($r = .22$, $p < .001$), and sensation seeking ($r = .16$, $p < .001$). Negative urgency was positively correlated with positive urgency ($r = .65$, $p < .001$), lack of perseverance ($r = .41$, $p < .001$), lack of premeditation ($r = .28$, $p = .002$), and sensation seeking ($r = .14$, $p < .001$). Positive urgency was positive correlated with lack of perseverance ($r = .36$, $p < .001$), lack of premeditation ($r = .34$, $p < .001$), and sensation seeking ($r = .27$, $p < .001$). Lack of perseverance was positively correlated with lack of premeditation ($r = .41$, $p < .001$), and inversely correlated with sensation seeking ($r = -.11$, $p = .017$). Lack of premeditation was positively correlated with sensation seeking ($r = .22$, $p < .001$).

Table 1

Descriptive statistics and bivariate correlations among all study variables

Analysis Variables	1	2	3	4	5	6	7	8	Mean	SD
1. AUDIT Use	.83								1.67	1.00
2. AUDIT Problems	**.59**	.83							0.52	0.66
3. Negative Urgency	**.17**	**.37**	.88						27.38	7.09
4. Positive Urgency	**.21**	**.33**	**.64**	.93					26.71	8.51
5. Sensation Seeking	**.26**	**.14**	**.11**	**.21**	.83				34.89	6.74
6. Perseverance	**.17**	**.19**	**.41**	**.38**	-.07	.82			19.74	4.86
7. Premeditation	**.22**	**.22**	**.32**	**.35**	**.19**	**.43**	.82		19.90	4.82
8. Gender	**-.23**	**-.15**	.08	**-.10**	**-.24**	-.07	-.07	---	0.51	0.50
9. Age	.00	.03	-.01	**-.08**	**-.15**	.04	-.04	**-.13**	20.76	3.96

Note. Significant correlations ($p < .05$) are bolded for emphasis. Gender was dummy-coded (1 = Women, 0 = Men)

Multivariate analyses

Multinomial logistic regression analysis examined differences in the behavioral self-regulation and drinking behavior across three smoking classes and non-smokers via the mlogit function in Stata 12 (StataCorp, 2011), see Table 2. At Step 1, smoking class was regressed onto gender and age; LR $\chi^2(6) = 76.24$, $p < .001$, Cragg-Uhler $R^2 = .052$. At Step 2, the higher order self-regulation indicators were added to the model LR $\chi^2(21) = 132.39$, $p < .001$, Cragg-Uhler $R^2 = .091$. This was a significant improvement over the Step 1 model, $\Delta\chi^2(15) = 56.15$, $p < 0.001$, ΔCragg-Uhler $R^2 = .039$. At step 3, drinking behaviors were added to the model, LR $\chi^2(27) = 211.35$, $p < .001$, Cragg-Uhler $R^2 = .15$. This was a significant improvement over the Step 2 model, $\Delta\chi^2(6) = 78.96$, $p < 0.001$, ΔCragg-Uhler $R^2 = .059$.

Table 2

Means and standard deviations of predictors by smoking class

	Non-smokers $n = 120$ Mean (SD)	Regular Smokers $n = 97$ Mean (SD)	Chippers $n = 124$ Mean (SD)	Social Smokers $n = 194$ Mean (SD)
Negative Urgency	24.65(6.30)	29.21(7.73)	27.99(6.75)	27.76(7.02)
Positive Urgency	24.53(7.87)	26.66(0.82)	27.77(8.65)	27.42(7.94)
Premeditation	18.46(4.34)	20.31(4.85)	20.38(4.92)	20.29(4.87)
Perseverance	17.81(4.13)	20.42(4.91)	20.40(4.95)	20.18(4.92)
Sensation Seeking	33.50(6.58)	34.04(7.67)	35.72(6.10)	35.64(6.59)
AUDIT Use	1.02 (0.90)	1.58(0.89)	1.72(1.04)	2.10(0.86)
AUDIT Problems	0.21(0.46)	0.62(0.82)	0.50(0.60)	0.67(0.64)
Sex	0.61(0.49)	0.41(0.49)	0.44(0.50)	0.53(0.50)
Age	19.39(1.64)	23.62(6.46)	20.76(3.28)	20.20(2.92)

Note: Gender was dummy-coded (1 = Women, 0 = Men).

Before controlling for alcohol use and alcohol-related problems, chippers endorsed significantly higher sensation seeking (RRR = 1.05, p = .018) and lack of perseverance (RRR = 1.09, p = .013) than non-smokers. Social smokers also endorsed significantly more sensation seeking (RRR = 1.06, p = .007) and lack of perseverance (RRR = 1.09, p = .008) than non-smokers in Step 2. After controlling for alcohol use and alcohol-related problems, these relationships did not meet conventional levels of significance, though the difference in lack of perseverance for both chippers (RRR = 1.07, p = .057) and social smokers (RRR = 1.06, p = .076), when compared to non-smokers, was still meaningful.

Relative to non-smokers in the final model, social smokers were older (RRR = 1.20, p = .006) and exhibited higher alcohol use (RRR = 3.20, p < .001). Social smokers were not significantly different from non-smokers on sensation seeking, lack of premeditation, lack of perseverance, negative urgency, positive urgency, and alcohol-related problems. Relative to non-smokers, chippers were more likely to be older (RRR = 1.27, p < .001). Chippers endorsed

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higher alcohol use (RRR = 1.87, *p* = .001) and higher negative urgency (RRR = 1.06, *p* = .041).

Positive urgency, negative urgency, sensation seeking, lack of premeditation, lack of

perseverance, and alcohol-related problems were not significantly different between chippers and

non-smokers. Relative to non-smokers, regular smokers were more likely to be older (RRR =

1.42, *p* < .001) and exhibited higher negative urgency (RRR = 1.13, *p* < .001), but regular

smokers exhibited lower positive urgency (RRR = 0.95; p = .039). However, regular smokers did

not differ significantly from non-smokers on any other variables.

When compared to the regular smokers in the final model, chippers were younger (RRR

= 0.89, *p* = .001), and exhibited lower negative urgency (RRR = 0.94, *p* = .035). When social

smokers were compared to regular smokers, social smokers were younger (RRR = 0.84, *p* <

.001), more likely to be male (RRR = 2.48, *p* = .003), consumed more alcohol (RRR = 2.37, *p* <

.001), and exhibited lower negative urgency (RRR = 0.93, *p* = .004). Compared to chippers,

social smokers were more likely to be male (RRR = 1.85, *p* = .019), and consumed more alcohol

(RRR = 1.71, *p* = .001). See Table 3 for complete results.

Table 3

Multinomial logit table comparing all smoking groups

	RRR	B	S.E.B	*p* > |z|	95 % CL	
Regular vs. Non-smoker						
Age	1.42	0.35	0.07	.001	0.225	0.480
Sex	0.56	-0.57	0.34	.093	-1.244	0.095
Negative Urgency	1.13	0.12	0.03	.001	0.057	0.184
Positive Urgency	0.95	-0.05	0.03	.039	-0.105	-0.003
Premeditation	1.03	0.03	0.04	.473	-0.048	0.103
Perseverance	1.05	0.05	0.04	.201	-0.027	0.130
Sensation Seeking	1.01	0.01	0.03	.652	-0.039	0.062
AUDIT use	1.36	0.30	0.22	.158	-0.118	0.728
AUDIT problems	1.68	0.52	0.38	.166	-0.217	1.263

Table 3. *Multinomial logit table comparing all smoking groups (continued)*

	RRR	B	S.E.B	*p* > |z|	95 % CL	
Chipper vs. Non-smoker						
Age	1.27	0.24	0.07	.001	0.108	0.363
Sex	0.75	-0.28	0.30	.349	-0.878	0.311
Negative Urgency	1.06	0.06	0.19	.041	0.002	0.119
Positive Urgency	0.99	-0.01	0.02	.563	-0.061	0.033
Premeditation	1.01	0.01	0.03	.722	-0.056	0.081
Perseverance	1.07	0.07	0.04	.057	-0.002	0.141
Sensation Seeking	1.03	0.03	0.02	.158	-0.013	0.078
AUDIT use	1.88	0.63	0.19	.001	0.253	1.009
AUDIT problems	1.01	0.01	0.37	.972	-0.705	0.731
Social smoker vs. Non-smoker						
Age	1.20	0.18	0.07	.006	0.052	0.308
Sex	1.40	0.33	0.29	.255	-0.241	0.909
Negative Urgency	1.04	0.04	0.03	.121	-0.011	0.099
Positive Urgency	0.98	-0.02	0.02	.379	-0.065	0.024
Premeditation	1.00	0.00	0.03	.937	-0.063	0.068
Perseverance	1.06	0.06	0.04	.076	-0.006	0.131
Sensation Seeking	1.02	0.02	0.02	.282	-0.019	0.067
AUDIT use	3.21	1.16	0.19	.001	0.792	1.539
AUDIT Problems	1.21	0.19	0.34	.585	-0.487	0.863
Chippers vs. Regular Smokers						
Age	0.89	-0.12	0.04	.001	-0.188	-0.047
Sex	1.34	0.29	0.32	.357	-0.328	0.910
Negative Urgency	0.94	-0.06	0.03	.035	-0.116	-0.004
Positive Urgency	1.04	0.04	0.02	.074	-0.004	0.084
Premeditation	0.98	-0.02	0.03	.645	-0.081	0.050
Perseverance	1.02	0.02	0.04	.598	-0.050	0.087
Sensation Seeking	1.02	0.02	0.02	.377	-0.026	0.068
AUDIT Use	1.39	0.33	0.19	.090	-0.051	0.702
AUDIT Problems	0.60	-0.51	0.28	.065	-1.053	0.033
Social Smokers vs. Regular						
Age	0.84	-0.17	0.04	.001	-0.251	-0.096
Sex	2.48	0.91	0.31	.003	0.308	1.510
Negative Urgency	0.93	-0.08	0.03	.004	-0.130	-0.024
Positive Urgency	1.03	0.03	0.02	.113	-0.008	0.075
Premeditation	0.97	-0.03	0.03	.437	-0.088	0.038
Perseverance	1.01	.01	0.03	.742	-0.055	0.077
Sensation Seeking	1.01	.01	0.02	.603	-0.033	0.057
AUDIT Use	2.37	0.86	0.19	.001	0.486	1.235
AUDIT Problems	0.72	-0.34	0.25	.181	-0.826	0.155

Table 3. *Multinomial logit table comparing all smoking groups (continued)*

	RRR	B	S.E.B	*p* > |z|	95 % CL	
Social Smokers vs. Chippers						
Age	0.95	-0.06	0.04	.179	-0.137	0.026
Sex	1.86	0.62	0.26	.019	0.102	1.133
Negative Urgency	0.99	-0.02	0.02	.480	-0.065	0.030
Positive Urgency	0.98	-0.01	0.02	.741	-0.044	0.031
Premeditation	0.99	-0.01	0.03	.732	-0.065	0.046
Perseverance	0.99	-0.01	0.03	.804	-0.065	0.050
Sensation Seeking	0.99	-0.01	0.02	.651	-0.049	0.031
AUDIT Use	1.71	0.54	0.16	.001	0.213	0.858
AUDIT Problems	1.19	0.17	0.24	.460	-0.289	0.638

Note: Base group is listed last in all comparisons

In summary, regular smokers did have significantly higher negative urgency than chippers, social smokers, and non-smokers supporting hypothesis 1. Chippers did not have significantly higher positive urgency than non-smokers, but chippers did have higher positive urgency than regular smokers though this difference did not meet conventional levels of significance, partially supporting hypothesis 2. Social smokers did not have significantly higher positive urgency than regular smokers and non-smokers which did not support hypothesis 3. Social smokers did report higher rates of alcohol consumption than regular smokers, supporting hypothesis 4. Social smokers did not report significantly higher sensation seeking than regular smokers and chippers which did not support hypothesis 5.

DISCUSSION

The purpose of the present study was to examine differences in self-regulation, and drinking behavior across groups of smokers. Three groups of smokers were defined based on when and how much participants smoked, with regular smokers smoking more than five cigarettes a day, chippers smoking five or less cigarettes a day, and social smokers reporting that they only smoke when they drink. These groups were compared to each other, as well as against non-smokers, to see how they differed in terms of self-regulation and drinking behavior.

Smokers endorsed higher negative urgency; in particular, chippers and regular smokers, though not social smokers, reported significantly higher negative urgency than non-smokers. Non-smokers reported lower alcohol use compared to chippers and socials smokers. Regular smokers reported lower positive urgency than non-smokers. Social smokers and chippers reported increased alcohol use compared to non-smokers. Comparing regular smokers to social smokers and chippers, regular smokers consumed less alcohol and endorsed higher negative urgency. The only notable difference between chippers and social smokers, after controlling for alcohol-related variables, is that social smokers consumed more alcohol than chippers. Finally, we found that smokers tended to be older in general.

Regular smokers endorsing higher negative urgency supported hypothesis 1, and higher negative urgency has been related to increased smoking frequency by Doran and Trim (2013). As expected, regular smokers reported the highest negative urgency, but social smokers and chippers also had significantly higher negative urgency than non-smokers. Negative urgency increased among smokers who smoked more cigarettes, even after controlling for alcohol use. This result supports Doran et al. (2013) who found that alcohol use did not mediate the relationship between negative urgency and smoking initiation. This means that higher negative

urgency is a strong predictor of smoking status for all three smoking groups, and this result further extends previous research suggesting that negative urgency is an important factor in continued cigarette use even among who those smoke less.

Surprisingly, positive urgency was significantly lower among regular smokers compared to non-smokers when controlling for drinking and other forms of self-regulation which contradicts the finding by Spillane et al. (2010) that positive urgency was related to higher nicotine dependence. Regular smokers typically have the highest nicotine dependence when compared to social smokers and chippers (Shiffman, Ferguson, et al., 2012), so it, at first, is surprising that chippers showed higher positive urgency that did not reach conventional levels of significance when compared to regular smokers. This result, however, supports the finding by Shiffman et al. (1994) that increased smoking among chippers during positive mood states was a better predictor of smoking behavior compared to negative mood states though this result did not hold against non-smokers. This result partially supported hypothesis 2. Social smokers did not have significantly higher positive urgency than regular smokers thus not supporting hypothesis 3. However, it is unclear why regular smokers would have significantly lower positive urgency than both of the other smoking classes as well as non-smokers. One possibility may be multicollinearity with the other predictor variables, particularly negative urgency. Evidence for this possibility is that regular smoker's raw scores on positive urgency are higher than non-smokers. This would support recent analyses that have lumped positive and negative urgency together as a single "mood-based rash action" construct because these constructs are highly correlated ($r = .64$). Negative and positive urgency may be measuring emotionally driven rash actions which are difficult to distinguish for participants, or these emotionally driven rash actions may be important because emotion drives people toward impulsive actions and the nature of the

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emotional state is not so important. It is also possible that regular smokers do exhibit lower positive urgency after accounting for other factors such as negative urgency, alcohol use, and other impulsivity factors which would also explain these results.

Social smokers consumed significantly more alcohol than all other smoking groups including chippers. This was the only significant difference for social smokers compared to chippers, which supports hypothesis 4. Social smokers were defined by reporting "I only smoke when I drink," but this classification alone does not explain why they would drink more than chippers. For chippers, drinking alcohol increases positive and negative reinforcement expectancies (Kirchner & Sayette, 2007). The amount of alcohol consumed affects the strengths of smoking urges and the length of those urges for chippers (Epstein et al., 2007).When chippers drank approximately four alcoholic drinks in a lab setting, they had a strong urge to smoke that waned over time as the effects of alcohol wore off, but, when chippers consumed half as much alcohol, they experienced intermediate urges to smoke that were not reduced over time (Epstein et al., 2007). Likewise, there are social benefits to smoking such as increasing social ability, calming effects, and spacing out a party (Nichter et al., 2010). For social smokers, drinking more may be due to their social nature, but it could also be that their urge to smoke does not wane over time when they consume more alcohol as it does for chippers does. So, drinking more alcohol than chippers may make them more likely to smoke whereas chippers urge to smoke decreases over time if they consume too much alcohol. Smoking cigarettes may result in a conjoint reinforcement with alcohol for social smokers where increased alcohol use becomes strongly associated with smoking expectations. In this case, a positive relationship occurs where the more alcohol consumed results in a higher likelihood of smoking. Future research should focus on the

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smoking and drinking habits of social smokers compared to chippers to explore this difference between these two groups.

Sensation seeking was not significantly different among the smoking groups, failing to support hypothesis 5. Sensation seeking was significantly higher among social smokers and chippers compared to non-smokers until alcohol use was added to the model. Sensation seeking may play an important role in alcohol use, which may eventually lead to smoking in social situations. Sensation seeking has been an important factor in predicting smoking status (Billieux et al., 2007), and it has been found to differentiate chippers and regular smokers from non-smokers (Kassel et al., 1994). However, neither of these studies accounted for alcohol use. Doran and Trim (2013) found sensation seeking was an important factor in smoking initiation among previous non-smokers, but that this relationship was mediated by alcohol consumption, and this might explain why sensation seeking was no longer significant when alcohol use was added to our model. It is also possible that sensation seeking independently influences someone's urge to smoke cigarettes and to drink alcohol, and the combination of these two behaviors acts a further way to increase the pleasure of a positive experience. Future research relating sensation seeking to smoking would benefit from controlling for alcohol use to exclude it as a confounding variable but also to further explore this relationship, for example, using ecological momentary assessment and longitudinal studies to determine if drinking alcohol is a mediator between sensation seeking and smoking behavior.

Finally, lack of perseverance was higher for social smokers and chippers compared to non-smokers. Previous research by Doran et al. (2009) found lack of perseverance (as well as negative urgency) predicted negative affect craving for smokers. Lack of perseverance was the only behavioral regulation predictor that separated social smokers from non-smokers. This

difference might help to explain why non-smokers remain non-smokers even if they are exposed to smoking cues over time because they can persevere through factors that lead to smoking for chippers and social smokers such as emotion-related craving. Alternatively, the direction of this relationship is unknown. Given that the current data are cross-sectional, it is unclear if smoking results in lower perseverance, if smokers tend to have lower perseverance prior to initiation, or if something else entirely is occurring (e.g., a synergistic interaction where lower initial rates produce more rapid decline post-initiation). Future research should use longitudinal data and ecological momentary assessment to further delineate this relationship and help to establish temporal precedence.

Limitations

These findings should be considered within the context of the study's limitations. First, the non-experimental design prevents causality determination and establishing temporal precedence. For example, negative urgency may lead to increased smoking or increased smoking may result in higher negative urgency. Second, based on how smoking groups were defined, there may be overlap in these groups where some chippers may similar to social smokers, regular smokers may be similar to chippers, and social smokers may be similar to chippers. This overlap limits the differences between them. Third, an additional limitation is the homogenous college student sample that is predominately Caucasian. Thus, it is not clear that the results from this sample would generalize to the broader population. Finally, the self-report nature of the data may result in biased reporting.

Conclusions

Relative to other smokers and non-smokers, regular smokers endorsed higher negative urgency, but, compared to non-smokers, regular smokers also exhibited lower positive urgency.

Chippers differed from non-smokers with higher negative urgency, increased alcohol use, and marginally higher lack of perseverance. Social smokers differed from non-smokers with higher alcohol use and marginally higher lack of perseverance. Chippers and social smokers only differed on alcohol use with social smokers reporting consuming more alcohol than chippers.

These results highlight the importance of comparing different types of smokers as they seem to differ in important ways that can influence how to help them quit smoking by addressing these group differences. For example, chippers and social smokers may benefit from efforts to improve their perseverance and drink less alcohol as these appear to be important factors affecting their smoking. Prevention and treatment efforts should focus on ways to help people avoid negative mood states that lead to increased urgency. Possible techniques could include mindfulness training that helps people to be more aware of their present mood state and environment. It is also possible that simply informing people they are at increased risk may help them to avoid exposure to smoking cues.

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