

HHS Public Access

Author manuscript Addict Behav. Author manuscript; available in PMC 2020 March 01.

Published in final edited form as:

Addict Behav. 2019 March ; 90: 236–240. doi:10.1016/j.addbeh.2018.11.001.

Differences among Cigarette-Only Smokers Compared to Dual Users of Cigarettes and Little Cigars/Cigarillos in the Criminal Justice Population

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Abstract

Introduction: The FDA has restrictions on cigarettes; however, little cigars and cigarillos (LCCs) remain largely absent from these regulations. Due to their low prices and flavoring, many engage in dual use of both LCCs and cigarettes. Dual use is particularly prevalent among low income racial/ethnic minority groups. The purpose of this study was to (1) conduct an exploratory examination among cigarette users compared to dual users on smoking characteristics; and (2) to examine racial differences (White and Black) among cigarette users compared to dual users.

Methods: Participants (N=500) were recruited from community corrections (i.e., parole/ probation) and categorized as either cigarette-only (66.4%) or dual users (33.6%) if they used little cigars or cigarillos over a one-year period during a smoking cessation clinical trial.

Results: Dual users were more likely to be younger, Black, males with lower educational attainment compared to cigarette-only smokers. Smokers with increased nicotine dependence were 17% more likely to be cigarette-only smokers compared to dual users. Racial differences revealed that White/cigarette-only smokers were more likely to report non-menthol use and higher cigarette consumption at the end of treatment compared to Black/cigarette-only or Black/dual users.

Conflicts of Interests: All authors report no conflicts of interest.

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Contributions: Samantha Schiavon, Kathleet Hodgin, and Aaron Sellers contributed to manuscript preparation. Dr. Hendricks, Dr. Gaggar, Dr. Scarinci and Dr. Cropsey contributed to study design and manuscript preparation.

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Conclusions: This study contributes to our understanding of dual use among a disenfranchised group of smokers. Overall, dual users were more likely to be younger, Black, and male with lower reported nicotine dependence compared to cigarette-only users. Racial differences revealed that non-menthol smokers as well as smokers with greater cigarettes smoked at the end of treatment were more likely White/cigarette-only smokers.

Keywords

Cigarettes; Little Cigars; Cigarillos; Dual Use; Racial Differences

1. INTRODUCTION

Tobacco use continues to be the leading cause of preventable death and disease in the United States, with smoking estimated to be the cause of every 1 out of every 5 deaths¹. In an effort to reduce the health burden caused by tobacco, the FDA implemented restrictions on tobacco sales, marketing, and advertising including banning additives or flavors to cigarettes other than menthol and prohibiting the sale of cigarettes in packages of less than 20 per pack³.

Curiously, the restriction of cigars, particularly little cigars and cigarillos (collectively referred to as LCC), remain largely absent from these regulations. Even with extended FDA regulations, most of the non-cigarette tobacco industries' marketing and manufacturing remain unaffected⁴. These products continue to be sold as single items (e.g., one cigar packaging) with flavoring options, which have been shown to be preferred by younger smokers and racial minorities^{5–7}. As cigarettes are banned from single item packaging and sold most frequently in highly-taxed 20-packs, the single-item packaging of LCCs promotes them as a cheaper alternative to cigarettes, which is particularly appealing to individuals of low socioeconomic status^{5,8–9}.

Recent studies indicate that over 30% of current cigarette smokers are also using LCCs¹⁰. Within nearly a 10-year period, annual LCC sales have increased by 250% to 300%¹¹. This trend in increased LCC use is troublesome as dual use is also associated with exacerbated risk for tobacco-related diseases as dual users are more likely to inhale cigar smoke more deeply². Cigar use is associated with a three-fold increase in lung cancer risk¹² and is associated with coronary heart disease, stroke, and other cancers¹³.

Rates of reported dual use of LCCs and cigarettes are particularly high among criminal justice populations²⁸, racial minorities¹⁴, and young smokers^{15–16}. Criminal justice populations have elevated rates of smoking (56% report daily smoking and 40% report cigar use²⁹), and a high rate of dual LCC and cigarette use has been documented among individuals under community corrections (i.e., probation, parole)²⁸. Dual users of cigarettes and LCCs are likely to be non-Hispanic Black males with lower education and income^{9–10}. Research has also shown dual use rates were similar among Black men and women¹⁷. The predominance of dual use among Blacks may be due to the association between use of LCCs and menthol cigarettes¹⁸. It is well established that there is a strong preference for menthol cigarette among Black smokers^{19–20}. However, beyond the possible racial differences among dual users, other smoking and demographic characteristics are largely unknown.

The purpose of the present study was to conduct an exploratory examination of cigaretteonly users compared to dual users on smoking characteristics. Although dual use represents a particularly harmful smoking practice due to increased inhalation of smoke^{2, 12–13}, there has been limited research that directly compares these two groups of smokers especially among individuals within the criminal justice system. Smokers in community corrections are a particularly vulnerable smoking group due to elevated smoking rates (~70%) and limited access to healthcare or smoking cessation treatments²¹. A secondary aim of this study was to examine racial differences (White vs. Black) among cigarette users compared to dual users. Given the strong association between race and socioeconomic status (SES)²², it is possible that among the community correction population, where there is a more restricted range of SES, alternate racial differences among dual users would emerge. Given the exploratory nature of this study, no direct hypotheses were assumed.

2. METHODS

2.1 Participants

Data were sourced from a clinical trial examining the effects of bupropion on smoking outcomes among individuals in the criminal justice system²³. Participants (N=500) were recruited from community corrections in Birmingham, Alabama. Participants were 67% male (M age = 37.41 years), never married (54.3%), being primarily Black (66.1%) or White (31.9%), and cigarette-only smokers (66.4%). There were 40.6% Black/cigarette-only, 25.8% White/cigarette-only, 27.4% Black/dual use, and 6.2% White/dual use smokers. Education level was evenly reported with 31.7% reporting less than high school, 37.1% achieving a high school diploma or GED and 31.1% achieving trade or other higher education. The average monthly income was \$563.73 (ranging from \$0 to \$5,200). The majority of participants were under criminal justice supervision for substance (85.5%), court (66.8%), and property (65.2%) related offenses with numerous individuals receiving multiple offenses.

Study criteria included being adult age and currently under community corrections supervision (e.g., parole, probation, etc.), smoking at least five cigarettes per day (CPD), a cotinine level above 200 mg/mL at baseline, living in an environment that allows smoking, and willing to take bupropion as well as receive four sessions of behavioral counseling to quit smoking. Participants were excluded from the study if they had a history of mania or eating disorder, a seizure disorder, current suicidal ideation or a suicide attempt in the past six months, were pregnant or nursing a child, were non-English speaking, had cognitive impairment, or were medically unstable.

2.2 Measures

Demographic information including age, gender, race, highest educational attainment, marital status, monthly income, history of mental illness, and substance use were obtained. Smoking status was characterized as either cigarette use only or dual use (LCC and cigarettes), which was determined by report of using LCCs over a one-year period. All smoking characteristics were assessed through self-report at baseline or end of treatment. Nicotine dependence was assessed through the Fagerström Test for Nicotine Dependence

(FTND). Level of carbon monoxide (CO) was assessed using a CO monitoring device. Abstinence self-efficacy and availability of social support were assessed through self-report items rated on a 7-point scale from 1 (*not at all*) to 7 (*very much*). The Center for Epidemiological Studies Depression Scale (CES-D) assessed current depressive symptoms at the baseline appointment. CES-D was dichotomized using the clinical cutoff of 16 indicating the presence or absence of depressive symptoms.

2.3 Procedure

Self-referred eligible participants completed baseline assessments and provided urine for pregnancy, cotinine, and drug screening, had blood drawn to assess for general health, and had their smoke exposure measured through a CO monitoring device. All participants received 12 weeks of bupropion and were randomized to either four weekly 30-minute smoking cessation counseling sessions or brief physician advice to quit smoking. All assessments for this study were completed during the baseline assessment and end of treatment. This study was registered with ClinicalTrials.gov (NCT01257490).

2.4 Data Analytic Approach

Chi-square analyses were conducted to examine differences on demographic variables between cigarette-only and dual users. A hierarchical logistic regression analysis was conducted to determine predictors of cigarette use (coded as 1) or dual use (coded as 0). A hierarchical multinomial logistic regression analysis was conducted to determine predictors of race (White v. Black) and smoking status (cigarette us v. dual use) with White cigaretteonly smokers as the reference group for all comparisons. Demographic variables (gender and education) were controlled for in all analyses. Prior to analysis all relevant assumptions were examined. For only the hierarchical multinomial regression analysis, continuous variables were dichotomized based on median splits to satisfy the assumption of sufficient expected cell frequencies.

3. RESULTS

3.1 Demographics of Cigarette-Only Smokers vs. Dual Users

Table 1 presents demographic characteristics of cigarette-only and dual users. Dual users were younger and male compared to cigarette-only users. Dual users were more likely to be Black (40.3% v. 19.4%; p<.001) as compared to White. Additionally, dual users were less likely to have more than a high school degree (31.6% v. 68.4%; p = .015) and were less likely to have a history of substance abuse treatment (40.7% v. 59.3%; p = .020) compared to cigarette-only smokers.

3.2 Smoking Characteristics of Cigarette-Only Smokers and Dual Users

A hierarchical logistic regression analysis was conducted to predict dual use compared to cigarette-only use while controlling for demographic variables. The results revealed that for every 1-unit increase in nicotine dependence smokers were 17% more likely to be a cigarette-only smoker compared to a dual user (OR: 1.17; 95% CI: 1.00 - 1.37; *p*<0.05). No other smoking characteristic was significantly predictive of the outcomes.

3.3 Racial Differences among Cigarette-Only Smokers and Dual Users

As shown in Table 2, a hierarchical multinomial logistic regression analysis controlling for demographic variables (gender and education) was used to examine differences among smoking characteristics of cigarette-only and dual users by racial ethnicity (White v. Black). White cigarette-only smokers were used for the reference group for all multinomial comparisons. Overall, the results revealed that non-menthol smokers were more likely to be White/cigarette-only users compared to Black/cigarette-only users or Black/dual users. At the end of treatment, higher reported CPD was associated with a 5.22- and 5.66-times greater odds of being a White/cigarette-only smoker compared to Black/cigarette-only or Black/dual user, respectively. No significant differences were found comparing White/dual users compared to White/cigarette-only smokers.

4. **DISCUSSION**

The primary purpose of the present study was to conduct an exploratory investigation comparing cigarette-only users to dual users of LCCs and cigarettes on smoking characteristics, specifically among low-income individuals within the criminal justice system. This study revealed that individuals who were dual users were more likely to be less educated, younger, Black, male, and with no history of substance abuse treatment as compared to cigarette-only smokers. These findings support previous literature demonstrating a high rate of dual use among young, Black smokers^{9–10,14,16}. However, unlike one study showing similar dual use rates among Black men and women¹⁷, this study revealed a higher prevalence of dual use among Black male smokers. Although there was an overrepresentation of males in this sample consistent with the criminal justice system²⁵, these findings closely parallel research regarding dual use of cigarettes and small or large cigars⁹, suggesting that a true gender difference exists.

Interestingly, dual users reported lower nicotine dependence compared to cigarette-only users. Although dual use is associated with increased nicotine exposure provided by LCCs, this suggest there may be a discrepancy in reported dependence symptoms. This difference is likely attributable to variations in perception as previous research has shown that dual users tend to perceive themselves as not addicted to LCCs⁶. Additionally, the FTND primarily references to cigarette use as a measure of nicotine dependence²⁴ which may further explain this finding. Overall, non-menthol smokers as well as smokers with higher reported CPD at the end of treatment were more likely White/cigarette-only smokers compared to Black/cigarette-only smokers and Black/dual users. These findings are in agreement with previous research demonstrating that Whites tend to smoke more cigarettes and are more likely to smoke nonmenthol cigarettes compared to Black smokers^{19–20;26; 31–32}.

This study is not without limitations. The cross-sectional nature of this study impedes causal interpretations and confounding factors associated with race and preference between dual use and cigarette-only use cannot fully be controlled. Given the racial representation within Alabama, no other minorities were represented in this study which would have enabled broader comparison among racial groups on these smoking characteristics. Further, the use of self-report measures may not provide accurate representations of smoking characteristics.

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This study only measured tobacco addiction in terms of tobacco consumption, cravings, and dependence, but did not assess how other determinants of cravings (i.e., loss of autonomy over use) influence addiction behaviors. Additionally, this study had only 31 white/dual users which limits the study's statistical inference between this and other groups. However, given the low frequency of LCCs among Caucasians within the general population^{6;30}, this may be an accurate reflection of the racial demographics of dual users within the general population. Lastly, the inclusion of individuals under criminal justice supervision may limit the generalizability of this study.

Despite these limitations, the current study contributes to our understanding of dual users compared to cigarette-only users among a disenfranchised group of smokers. Individuals under criminal justice supervision have elevated smoking rates with limited access to health care and smoking cessation interventions^{23,27}. Overall, there is a high prevalence of dual use among young, Black males with a tendency to report lower nicotine dependence compared to cigarette-only users. Racial differences revealed that non-menthol smokers as well as smokers with higher CPD at the end of treatment were more likely White/cigarette-only smokers compared to Black dual or cigarette-only users.

Acknowledgements:

We acknowledge the contributions of Sonya Hardy and Nandan Katiyar for data collection.

Funding: This research was supported by the National Cancer Institute and the National Institutes of Health (R01CA141663) to K.L.C. Funding source had no such involvement in study designs, collection, analysis, interpretation, writing the article or decision to submit the article for publication.

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- **1.** Examined cigarette only users compared to dual users on smoking characteristics.
- 2. Examined racial differences among cigarette users compared to dual users.
- 3. Dual users were more likely to be young, Black, males with lower education.
- 4. Dual users were more likely to reported lower nicotine dependence.
- 5. Contributes to our understanding of dual use among disenfranchised smokers.

Table 1:

Chi-Square Analysis Examining Demographic Characteristics on Cigarette Use v. Dual LCC/Cigarette Use (N = 500)

Variable		Cigarette Smoker Only (n=332)	Dual LCC/Cigarette Smoker (n= 168)	P-value
Age	Mean	39.16	33.92	< 0.001
	SD	10.84	11.42	
Race	White	80.6%	19.4%	< 0.001
	Black	59.7%	40.3%	
Sex	Male	62.7%	37.3%	0.015
	Female	73.9%	26.1%	
Marital Status	Never Married	61.9%	38.1%	0.107
	Married	68.5%	31.5%	
	Divorced/Separated	73.2%	26.8%	
	Widow	64.7%	35.3%	
Education Level	<hs< td=""><td>57.6%</td><td>42.4%</td><td>0.012</td></hs<>	57.6%	42.4%	0.012
	HS/GED	72.0%	28.0%	
	>HS	68.4%	31.6%	
History of Mental Health Treatment	Yes	71.8%	28.2%	0.187
	No	64.9%	35.1%	
History of Substance Abuse Treatment	Yes	69.7%	30.3%	0.027
	No	59.3%	40.7%	
Criminal Offenses	Person	63.3%	36.7%	0.294
	Property	68.5%	31.5%	0.310
	Substance	66.0%	34.0%	0.705
	Court	68.3%	31.7%	0.337

Note: GED = General Educational Development; HS = High School. Age was examined with a one-way ANOVA.

Table 2:

Hierarchical Multinomial Logistic Regression Analysis to Examine Baseline Smoking Characteristics between Black and White Smokers (White/Cigarette-Only as Reference Group).

Variable	Black/Cigarette-Only	Black/Dual Use	White/Dual Use
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Gender	0.44 (0.20-0.96)*	0.20 (0.08–0.47)***	0.56 (0.18–1.73)
Education	0.64 (0.40-1.03)	0.63 (0.38-1.04)	0.57 (0.29–1.12)
Menthol Use	0.07 (0.03–11.52)***	0.06 (0.03-0.16)***	1.00 (0.34–2.97)
Average CPD	1.18 (0.37–3.75)	0.64 (0.19–2.14)	1.17 (0.25–5.42)
End of Treatment CPD	5.22 (2.37–11.52)***	5.66 (2.45–13.07)***	1.03 (0.31–3.43)
FTND	1.58 (0.73–3.40)	2.21 (0.96-5.06)	1.37 (0.45–4.15)
QSU	1.25 (0.59–2.69)	1.12 (0.50–2.53)	0.82 (0.28–2.46)
Depression	1.24 (0.58–2.61)	0.69 (0.31-1.53)	0.94 (0.33–2.70)
Abstinence Self-Efficacy	0.69 (0.30-1.56)	0.51 (0.21-1.26)	2.73 (0.94–7.91)
Social Support for Quitting	1.04 (0.37–2.88)	1.57 (0.56–4.44)	0.71 (0.16–3.12)

Note: Continuous variables are dichotomized based on median splits. FTND=Fagerstrom Test for Nicotine Dependence; QSU=Questionnaire of Smoking Urges; CPD = cigarettes smoked per day; Dual Use = Combined LCC/Cigarette Use.