Knowledge about nicotine among HIV-positive smokers: Implications for tobacco regulatory science policy

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HIGHLIGHTS

- Most participants identified smoking as a cause of smoking-related morbidity.
- Most participants misattributed nicotine as causing smoking-related morbidity.
- Misperceptions about nicotine have implications for potential tobacco regulations.

ARTICLE INFO

ABSTRACT

The present paper describes the general knowledge of smoking and nicotine among a sample of current smokers living with HIV ($n = 271$) who were recruited via Amazon Mechanical Turk. Descriptive statistics were used to report sociodemographic and smoking characteristics, as well as knowledge about smoking and nicotine. The sample was comprised of relatively light smokers, both in terms of cigarettes per day ($M = 8.1$, $SD = 9.7$) and dependence (67.5% had low dependence according to the Heaviness of Smoking Index). The majority of participants correctly identified smoking as being a potential cause of various smoking-related conditions and correctly identified constituents in cigarette smoke. However, a majority of participants also misattributed nicotine as being a potential cause of smoking-related illness. Accurate knowledge about nicotine was low. These misperceptions are of particular concern for vulnerable populations, such as persons living with HIV, who are disproportionately burdened by the prevalence of smoking and associated morbidities and mortality. These misperceptions could have unintended consequences in the wake of a potential nicotine reduction policy, such that reduced nicotine content products are perceived as safer than normal nicotine content products currently available for sale. Additionally, incorrect knowledge about nicotine has implications for the uptake and continued use of nicotine replacement therapy.

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1. Introduction

The Family Smoking Prevention Tobacco Control Act (FSPTCA) gives the Food and Drug Administration (FDA) the authority to reduce, but not eliminate, the levels of nicotine in cigarettes (Congress, 2009). The reduction of nicotine to nonaddictive levels could have a significant, positive impact on public health (Benowitz & Henningfield, 1994); the feasibility of this approach is supported by prior research using reduced nicotine content cigarettes (Benowitz et al., 2007; Donny et al., 2015; Hatsukami et al., 2010). Findings suggest that nicotine reduction has

the potential to decrease dependence and subsequent tobacco use, which would likely translate into reduced smoking-related morbidity and mortality and thus reduce the economic burden of cigarette smoking.

One concern about implementing a nicotine reduction policy is that smokers may misunderstand the role of nicotine in smoking and smoking-related morbidity and mortality. Though nicotine is the primary addictive component in cigarettes, it is the tar and chemicals in cigarette smoke that are responsible for the majority of smoking-related adverse health outcomes, rather than nicotine itself (DHHS, 2010). However, in survey research, most smokers incorrectly identified nicotine as a cause of strokes, heart attacks/disease, asthma (Bobak, Shiffman, Gitchell, Bery, & Ferguson, 2010), and lung cancer (Bansal-Travers, Cummings, Hyland, Brown, & Celestino, 2010; Cummings et al., 2004; Mooney, Leventhal, & Hatsukami, 2006). Similar findings were observed among faculty at a major United States (U.S.) university: the majority correctly perceived cigarettes as a moderate

or high risk for all health domains (i.e., general health, heart attack/stroke, all cancers, oral cancer), however, 78%–91% also perceived nicotine intake to be a moderate to high risk for the same domains (Patel, Peiper, & Rodu, 2012). Knowledge and beliefs about smoking and nicotine are related to socioeconomic status (SES). In an analysis of the International Tobacco Control Four Country Survey (ITC-4)—a cohort survey of 9000 adult smokers from the United States, Canada, United Kingdom, and Australia—individuals of lower SES were more likely to have lower awareness of the harms of smoking and the harmful constituents of tobacco smoke. Additionally, lower SES was associated with the inaccurate belief that nicotine causes most of the cancer associated with smoking (Siahpush, McNeill, Hammond, & Fong, 2006).

Inaccurate beliefs that nicotine is the harmful constituent in cigarettes and that low nicotine products are safer are potentially dangerous for smokers. Should the FDA mandate a reduction in nicotine content in cigarettes nationwide, lack of knowledge and misunderstanding regarding the role of nicotine in smoking-related morbidity and mortality could result in: 1) decreased urgency to reduce or quit smoking; and 2) the perceived opportunity to resume smoking among former smokers. Moreover, inaccurate beliefs about nicotine in the presence of a nicotine reduction policy have the potential to be especially detrimental among vulnerable populations, like persons living with HIV, among whom smoking is highly prevalent (40–75%) (Helleberg et al., 2013; Mdodo et al., 2015; Pacek, Harrell, & Martins, 2014; Pacek, Latkin, Crum, Stuart, & Knowlton, 2014). This group exhibits greater risk of cardiovascular disease, non-AIDS-malignancies, and all-cause mortality compared to non-smokers with HIV (Helleberg et al., 2015). Helleberg and colleagues (Helleberg et al., 2014) found that smokers living with HIV currently lose a greater number (15 versus 3) of life-years to smoking than to HIV itself.

Little is known about knowledge of smoking and nicotine among smokers living with HIV, a group with a higher prevalence of smoking as well as associated morbidity and mortality than the general population. Data regarding beliefs and misinformation regarding smoking and nicotine are critical for developing appropriate educational and labeling information for nicotine and tobacco products. The present study addresses this gap in the literature by assessing general knowledge regarding smoking and nicotine, as well as characteristics associated with knowledge, among a sample of current smokers living with HIV.

2. Methods

2.1. Data source

Data were from an online survey targeting current cigarette smokers living with HIV. Participants were recruited from Amazon Mechanical Turk (MTurk). MTurk provides a cost-effective and rapid method for conducting studies that span multiple disciplines, including public health (Carter, DiFeo, Bogie, Zhang, & Sun, 2014; Rass, Pacek, Johnson, & Johnson, 2015). In order to view and participate in the survey, individuals registered on MTurk were required to: 1) have a 95% or higher approval rating from previously submitted surveys; 2) be ≥18 years of age; and 3) reside in the U.S. (confirmed during initial MTurk registration).

The survey was advertised as a "Survey about HIV and health behaviors." Interested individuals read a description of the survey (e.g., purpose, confidentiality/anonymity, compensation) and completed a brief screening questionnaire to determine study eligibility. Inclusion criteria consisted of: 1) lifetime diagnosis of HIV; 2) having smoked at least 100 cigarettes in their lifetime; and 3) having smoked at least one cigarette within the past month. Participants were also asked about lifetime use of alcohol and cannabis in an attempt to mask the true nature of the survey. If a participant met inclusion criteria, he/she was given a code to access the password-protected survey, hosted by Qualtrics. A total of 5257 participants completed the screener questionnaire, and 304 (5.8%) met eligibility criteria. Participants were instructed to complete the survey in one sitting and were paid $1. The survey was active from March

16–May 14, 2015. The average time to complete the survey was 19 min, 39 s (SD = 12 min, 37 s). Participation was voluntary and anonymous (no name or IP address was recorded). The Institutional Review Board at Johns Hopkins University approved this study.

2.2. Measures

2.2.1. Sociodemographic characteristics

Sociodemographic variables included: sex, age (continuous), race (Caucasian, African American, other), income (<$25,000; $25,000–$34,999; $35,000–$49,999; $50,000–$74,999; $75,000 +), marital status (married, not married), and education (less than high school, high school graduate/GED, more than high school).

2.2.2. HIV-related characteristics

Participants reported the age at which they received their first diagnosis. Subtracting age-at-diagnosis from their current age resulted in a "length of time since initial diagnosis" variable. Participants reported currently taking any medications for the treatment of HIV (yes/no).

2.2.3. Smoking characteristics

Participants reported how many cigarettes per day (CPD) and on how many days in the past month they smoked as continuous measures. A dichotomous "daily smoking" variable was created (i.e., smoking on 30/31 days in the past month (yes/no)). Participants also reported the age at which they began smoking; subtracting that age from their current age resulted in a "years smoking" variable.

Time to first cigarette (TTFC) upon waking (<5 min, 5–30 min, 31–60 min, >60 min) was assessed. Summing TTFC and CPD (categorized as: 10 or less, 11–20, 21–30, 31 or more) produced the Heaviness of Smoking Index (HSI), a measure of nicotine dependence (Heatherton, Kozlowski, Frecker, Rickert, & Robinson, 1989). Scores on the HSI range from 0 to 6, with higher scores indicating greater dependence; the HSI was used as a continuous variable.

Participants reported the characteristics of their usual cigarette brand: preference for menthol cigarettes (menthol, non-menthol), type of cigarette typically smoked (machine-manufactured, roll-your-own), whether their cigarette was filtered (filtered, non-filtered), and length of their typical cigarette was ("regular", "King size (80–85 mm)", "100 mm", "other", "don't know").

2.2.4. Knowledge about smoking and nicotine

Drawing upon items from previous evaluations of smoking knowledge (Bansal-Travers et al., 2010; Bobak et al., 2010; Cummings et al., 2004; Mooney et al., 2006; Patel et al., 2012; Siahpush et al., 2006), participants were presented with a series of statements intended to assess their general knowledge regarding smoking and nicotine, and asked to indicate whether they believed each of the statements to be true or false. For instance, "Smoking may be a cause of: 1) Heart disease; 2) Heart attack; 3) Stroke; 4) Impotence; 5) Asthma; 6) Lung cancer." Additionally, participants responded to the statement "Tobacco smoke contains: 1) Cyanide; 2) Mercury; 3) Arsenic; 4) Formaldehyde; 5) Carbon monoxide", and were asked to evaluate each statement (true/false). Similar statements pertaining to general knowledge of nicotine were also presented. For instance, "Nicotine may be a cause of: 1) Heart disease; 2) Heart attack; 3) Stroke; 4) Impotence; 5) Asthma; 6) Lung cancer." Participants answered two additional true/false questions about nicotine: "Nicotine is the addictive component of tobacco products" and "Nicotine causes most of the cancer that people get from smoking."

2.3. Quality check(s)

Several questions served as quality checks throughout the survey, and were used to exclude questionable data. For instance, within the main survey, participants were again asked about their HIV diagnosis and current cigarette smoking status; participants not reporting a