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Perceived risk of developing smoking-related disease among persons living with HIV

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Abstract

Perceived risk of smoking is associated with smoking status, interest in quitting, cessation attempts, and quit success. Research is needed to explore risk perceptions of developing smoking-related disease among persons living with HIV (PLWH). Data came from 267 HIV-positive smokers who completed an online survey assessing perceived health risks associated with a) generic smoking status; b) generic non-smoking status; c) their own personal current smoking; and d) a hypothetical situation in which they were a non-smoker. PLWH perceived greater risk associated with their current smoking versus hypothetical personal non-smoking (p 's < 0.001), and greater risks associated with generic smoking status compared with their current smoking (p 's < 0.001). Being on HIV medication (β =0.65, 95% CI=0.17, 1.12), interest in quitting smoking (β =0.89, 95% CI=0.45, 1.32), and having an HIV healthcare provider who has recommended cessation (β =1.04, 95% CI=0.42, 1.67) were positively associated with perceived risk of developing smoking-related diseases. Findings have implications for developing targeted interventions to correct misperceptions regarding the health risks of smoking among PLWH, a population at particular risk for smoking and smoking-related morbidity and mortality.

Keywords

smoking; tobacco; risk perception; HIV; Amazon Mechanical Turk

Introduction

Smoking is more prevalent among persons living with HIV (PLWH) (40-75%) than the general population (15%) in the United States (U.S.) (Centers for Disease Control and Prevention, 2016; Mdodo et al., 2015; Pacek, Harrell, & Martins, 2014; Pacek, Latkin, Crum, Stuart, & Knowlton, 2014). HIV-positive smokers lose more life years to smoking

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than they do to HIV (Helleberg et al., 2013), and 24% of deaths of PLWH on ARVs are attributable to tobacco use (Lifson et al., 2010). Moreover, smoking is associated with poor antiretroviral (ARV) adherence and treatment outcomes, and all-cause mortality (Helleberg et al., 2015).

Health behavior models (e.g., Health Belief Model (Janz & Becker, 1984), Protection Motivation Theory (Rogers, 1975), protection adoption process (Weinstein, 1988), and the C-SHIP model (Miller & Diefenbach, 1998; Miller, Shoda, & Hurley, 1996)) hypothesize that perceived risk plays a key role in predicting health behaviors. Smoking risk perceptions are associated with smoking status (Berg et al., 2015; Murphy-Hoefer, Alder, & Higbee, 2004; Pacek & McClernon, 2018; Weinstein, Marcus, & Moser, 2005) and are predictive of quit motivation (Cengelli, O'Loughlin, Lauzon, & Cornuz, 2012; Costello, Logel, Fong, Zanna, & McDonald, 2012; Hyland et al., 2004; Romer & Jamieson, 2001), cessation attempts, and sustained cessation (Borrelli, Hayes, Dunsiger, & Fava, 2010; Costello et al., 2012). For example, smokers perceive less risk associated with smoking than non-smokers (Berg et al., 2015; Murphy-Hoefer, Alder, & Higbee, 2004; Pacek & McClernon, 2018; Weinstein, Marcus, & Moser, 2005), and smokers interested in quitting perceive greater smoking-related risk than those who are not (Williams, Herzog, & Simmons, 2011).

Smoking risk perceptions may be particularly important among PLWH, however limited research is available. In PLWH, current smokers perceive lower risks for continued smoking than non-smokers (Burkhalter, Springer, Chhabra, Ostroff, & Rapkin, 2005). Qualitative research shows that HIV-positive smokers justify their smoking, and discount health risks, by reasoning that they would not live long enough to be harmed by smoking due to their HIV diagnosis (Reynolds, Neidig, & Wewers, 2004). Based on the unique rationalization of smoking behavior by PLWH related to their HIV diagnosis (Reynolds et al., 2004), this information may be especially important for tailoring interventions. This work aims to: 1) characterize perceived risks of developing smoking-related disease; and 2) identify correlates of smoking risk perception among HIV-positive smokers.

Methods

Data Source

Data were collected via Amazon Mechanical Turk (MTurk). Participants were required to have a 95% approval rating from previously submitted MTurk tasks, be 18 years old, U.S. residents, and self-report lifetime HIV diagnosis, smoking 100 lifetime cigarettes, and smoking 1 cigarette within the past month. Consistent with prior research (Pacek, Rass, & Johnson, 2017a; Pacek, Rass, & Johnson, 2017b; Rass, Pacek, Johnson, & Johnson, 2015), at the survey's conclusion, participants were asked, "Do you feel that you took your time with this survey and that we should use your responses?" Individuals indicating that their data should not be used were compensated, but their data were excluded. Participation was voluntary, anonymous, and participants were paid \$1 upon completion. Study procedures were approved by the Institutional Review Board at Johns Hopkins University. The survey was active March 16-May 14, 2015.

Measures

Sociodemographic characteristics—Sociodemographic variables included sex, age, race, income, marital status, and educational attainment.

HIV characteristics—Participants reported length of time since their HIV diagnosis and their medication regimen if they were taking ARVs.

Smoking characteristics—Participants reported cigarettes per day (CPD), daily smoking, time to first cigarette (TTFC) upon waking, lifetime cessation attempt(s), and interest in cessation. The Heaviness of Smoking Index (HSI; (Heatherton, Kozlowski, Frecker, Rickert, & Robinson, 1989) was calculated based on TTFC and CPD.

Interactions with HIV care providers—Participants reported whether their HIV care provider had encouraged them to quit smoking and suggested specific cessation strategies, and how often they discussed smoking cessation with their providers.

Perceived health risks of smoking—Participants completed The Perceived Health Risks scale (Hatsukami, Vogel, Severson, Jensen, & O'Connor, 2016) based on 4 different instruction sets, which included two *generic non-smoker/smoker scenarios*: “Indicate how much you believe [*smokers/non-smokers*] are at risk for developing the following health problems on a scale from 1-10.” Participants responded to *personal smoker and non-smoker instruction sets*: “Based on smoking your *usual brand cigarette ...*” and “If you did not *smoke cigarettes*, indicate what you believe your risk is for developing the following health problems on a scale from 1-10.” Responses ranged from 1-10, with 1 anchored at “very low risk” and 10 anchored at “very high risk”. Participants reported perceived risk of: lung cancer; emphysema; bronchitis; other cancers; heart disease; and stroke.

Statistical Analysis

T-tests assessed differences in perceived risk based on instruction set type. Adjusted linear regression analyses calculated adjusted beta (β) coefficients and 95% confidence intervals (CI) to describe associations between sample characteristics and perceived health risks of smoking-related disease based on current smoking. Covariates in the adjusted model were selected based on a combination of $p < 0.05$ in bivariate models and *a priori* theory, and included: age, use of ARVs, interest in quitting, provider recommendation to quit, and frequency of cessation-related discussions. Multicollinearity between variables in adjusted models were assessed: no evidence thereof was identified. Analyses were conducted using STATA SE statistical software version 12.0 (StataCorp, 2011).

Results

Sample characteristics

Sample ($n=276$) characteristics and bivariate associations between participant characteristics and mean perceived risk of smoking-related disease are in Table 1. Bivariate associations between participant characteristics and perceived risk of developing individual smoking-related conditions are in Supplemental Table 1.

Perceived risk of smoking

Participants perceived greater risk associated with their current smoking versus if they were non-smokers (p 's<0.001) (Table 2a). Participants perceived greater risk of developing smoking-related conditions for generic smokers than generic non-smokers (p 's<0.001) (Table 2b). Participants perceived greater risk of developing smoking-related disease associated with generic smoking status versus their own current smoking (p 's<0.001) (Table 2c). Participants perceived greater risk associated with being a generic non-smoker than with themselves hypothetically being a non-smoker (p 's<0.006) (Table 2d).

Correlates of perceived health risk of smoking

Currently being on ARVs (β =0.65, 95% CI=0.17, 1.12), interest in cessation (β =0.89, 95% CI=0.45, 1.32), and having an HIV healthcare provider recommend cessation (β =1.04, 95% CI=0.42, 1.67) were associated with mean perceived risk of developing smoking related-conditions (Table 3).

Discussion

To our knowledge, this manuscript represents one of the first to characterize HIV-positive smokers' smoking-related risk perceptions. Risk perceptions were evaluated under various instruction sets: based on participants' current smoking status and under hypothetical scenarios, allowing for evaluation of personal versus general risk perceptions. Findings also provide information regarding correlates of smoking-related risk perceptions among PLWH.

Participants perceived the risk of developing smoking-related disease as being greater for a generic smoker than for a generic non-smoker. Additionally, participants perceived their own risk to be greater based on their current smoking versus a situation in which they were a non-smoker. However, participants perceived the health risks of being a generic smoker to be greater than they would be based on their current smoking. Interestingly, participants also perceived generic non-smokers to be at greater health risk than themselves as a non-smoker. Differences between personal smoker/non-smoker and generic smoker/non-smoker risk perceptions were small but were statistically significant. Similar to findings from the general population (Weinstein, 1989; Weinstein et al., 2005), the latter two findings may indicate that HIV-positive smokers have an optimistic bias regarding their risk for developing smoking-related diseases, both when considering their current smoking status (versus smokers generally), and when imagining their risks as a non-smoker (versus generic non-smokers). Findings indicate the need for educational interventions to correct misperceptions and underscore the need for interventions that are personalized, and not based on generic "other" smokers.

Being interested in cessation, taking ARVs, and having a healthcare provider recommend cessation were associated with increased smoking-related risk perceptions. These findings suggest that greater health literacy (i.e., the degree to which individuals are capable of obtaining, processing, and understanding health information and services needed to make health decisions)—which is associated with health-related knowledge among PLWH (Kalichman et al., 2000; Kalichman & Rompa, 2000)—may lead to increased smoking-

related risk perceptions. Associations between healthcare providers' cessation recommendations and perceived risk indicates the importance of PLWH's healthcare provider-patient relationship. HIV treatment initiation is associated with increases in intention to quit smoking; this time period may serve as a unique teachable moment for smoking cessation (Vidrine et al., 2014, 2017). HIV-positive patients whose healthcare providers encouraged them to quit were more likely to be interested in cessation (Berg et al., 2014; Pacek et al., 2017a) and the frequency of these discussions was associated with interest in quitting (Pacek et al., 2017a). Likewise, a physician-delivered smoking status assessment increases readiness to quit (Amiya et al., 2011). It is possible that healthcare providers—through counseling and/or education—may increase HIV-positive smokers' perceived risks of smoking, resulting in increased interest in cessation.

This study has several limitations. Data were collected via self-report—which confers the potential for recall and social desirability biases and precludes verification of participants' HIV and smoking statuses. The Perceived Health Risks scale did not include health problems that are clearly unrelated to smoking (e.g., chicken pox) to serve as a manipulation check and ensure that participants were giving thought to harms associated with each possible condition. Given that the sample was comprised of relatively young, low nicotine dependence smokers, findings may not generalize to older, heavier smoking PLWH; generalizability may be limited due to the online nature of the sample. These limitations notwithstanding, this paper represents one of the first to explore health risk perceptions of smoking among PLWH.

Health risk perceptions regarding smoking may influence who initiates and continues to smoke cigarettes as well as interest in smoking cessation and quit behaviors (Borrelli et al., 2010; Costello et al., 2012; Williams et al., 2011). Addressing misperceptions about smoking is critically important among PLWH, who face significant smoking-related harm. HIV-positive participants' optimistic bias regarding their risk for smoking-related disease, compared to generic smokers, indicates the need for personalized educational interventions to correct misperceptions. Findings also highlight the importance of health literacy and the patient-provider relationship, regarding accurate smoking-related risk perceptions. Furthermore, identified correlates of perceived risk have implications for developing targeted interventions to correct misperceptions regarding the health risks of smoking.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

- Amiya RM, Poudel KC, Poudel-Tandukar K, Kobayashi J, Pandey BD, Jimba M. Physicians are a key to encouraging cessation of smoking among people living with HIV/AIDS: a cross-sectional study in the Kathmandu valley, Nepal. *BMC Public Health*. 2011; 11

- Berg CJ, Nehl EJ, Wang X, Ding Y, He N, Johnson BA, Wong FY. Healthcare provider intervention on smoking and quit attempts among HIV-positive versus HIV-negative MSM smokers in Chengdu, China. *AIDS Care*. 2014; 26(9):1201–1207. [PubMed: 24601710]
- Berg CJ, Stratton E, Schauer GL, Lewis M, Wang Y, Windle M, Kegler M. Perceived harm, addictiveness, and social acceptability of tobacco products and marijuana among young adults: marijuana, hookah, and electronic cigarettes win. *Substance Use & Misuse*. 2015; 50:79–89. [PubMed: 25268294]
- Biener L, Abrams DB. The Contemplation Ladder: validation of a measure of readiness to consider smoking cessation. *Health Psychology*. 1991; 10(5):360–365. [PubMed: 1935872]
- Borrelli B, Hayes RB, Dunsiger S, Fava JL. Risk perception and smoking behavior in medically ill smokers: a prospective study. *Addiction*. 2010; 105(6):1100–1108. DOI: 10.1111/j.1360-0443.2010.02900.x [PubMed: 20331572]
- Burkhalter JE, Springer CM, Chhabra R, Ostroff JS, Rapkin BD. Tobacco use and readiness to quit smoking in low-income HIV-infected persons. *Nicotine Tob Res*. 2005; 7(4):511–522. DOI: 10.1080/14622200500186064 [PubMed: 16085522]
- Carter RR, DiFeo A, Bogie K, Zhang GQ, Sun J. Crowdsourcing awareness: exploration of the ovarian cancer knowledge gap through Amazon Mechanical Turk. *PLoS One*. 2014; 9
- Cengelli S, O'Loughlin J, Lauzon B, Cornuz J. A systematic review of longitudinal population-based studies on the predictors of smoking cessation in adolescent and young adult smokers. *Tob Control*. 2012; 21(3):355–362. DOI: 10.1136/tc.2011.044149 [PubMed: 21846777]
- Centers for Disease Control and Prevention. Current cigarette smoking among adults in the United States. 2016a. Retrieved from https://www.cdc.gov/tobacco/data_statistics/fact_sheets/adult_data/cig_smoking/index.htm
- Centers for Disease Control and Prevention. Trends in current cigarette smoking among high school and adults, United States, 1965–2014. 2016b. Retrieved from https://www.cdc.gov/tobacco/data_statistics/tables/trends/cig_smoking/index.htm
- Costello MJ, Logel C, Fong GT, Zanna MP, McDonald PW. Perceived risk and quitting behaviors: results from the ITC 4-country survey. *Am J Health Behav*. 2012; 36(5):681–692. DOI: 10.5993/AJHB.36.5.10 [PubMed: 22584095]
- Hatsukami DK, Vogel RI, Severson HH, Jensen JA, O'Connor RJ. Perceived Health Risks of Snus and Medicinal Nicotine Products. *Nicotine Tob Res*. 2016; 18(5):794–800. DOI: 10.1093/ntr/ntv200 [PubMed: 26386473]
- Heatherton TF, Kozlowski LT, Frecker RC, Rickert W, Robinson J. Measuring the heaviness of smoking: using self-reported time to first cigarette of the day and number of cigarettes smoked per day. *British Journal of Addiction*. 1989; 84:791–800. [PubMed: 2758152]
- Helleberg M, Afzal S, Kronborg G, Larsen CS, Pedersen G, Pedersen C, Obel N. Mortality attributable to smoking among HIV-1-infected individuals: a nationwide, population-based cohort study. *Clin Infect Dis*. 2013; 56(5):727–734. DOI: 10.1093/cid/cis933 [PubMed: 23254417]
- Helleberg M, May MT, Ingle SM, Dabis F, Reiss P, Fatkenheuer G, Obel N. Smoking and life expectancy among HIV-infected individuals on antiretroviral therapy in Europe and North America. *AIDS*. 2015; 29(2):221–229. DOI: 10.1097/QAD.0000000000000540 [PubMed: 25426809]
- Hyland A, Li Q, Bauer J, Giovino G, Steger C, Cummings KM. Predictors of cessation in a cohort of current and former smokers followed over 13 years. *Nicotine & Tobacco Research*. 2004; 6(6):363–369. DOI: 10.1080/14622200412331320761
- Janz NK, Becker MH. The health belief model: a decade later. *Health Education Quarterly*. 1984; 11(1):1–47. [PubMed: 6392204]
- Johnson PS, Herrmann ES, Johnson MW. Opportunity costs of reward delays and the discounting of hypothetical money and cigarettes. *Journal of the Experimental Analysis of Behavior*. 2015; 103(1):87–107. [PubMed: 25388973]
- Kalichman SC, Benotsch E, Suarez T, Catz S, Miller J, Rompa D. Health literacy and health-related knowledge among persons living with HIV/AIDS. *American Journal of Preventive Medicine*. 2000; 18(4):325–331. [PubMed: 10788736]

- Kalichman SC, Rompa D. Functional health literacy is associated with health status and health-related knowledge in people living with HIV-AIDS. *Journal of Acquired Immune Deficiency Syndromes*. 2000; 25:337–344. [PubMed: 11114834]
- Lifson AR, Neuhaus J, Arribas JR, van den Berg-Wolf M, Labriola AM, Read TRH. Smoking-related health risks among persons living with HIV in the strategies for management of antiretroviral therapy clinical trial. *American Journal of Public Health*. 2010; 100(10):1896–1903. [PubMed: 20724677]
- Mdodo R, Frazier EL, Dube SR, Mattson CL, Sutton MY, Brooks JT, Skarbinski J. Cigarette smoking prevalence among adults with HIV compared with the general adult population in the United States: cross-sectional surveys. *Ann Intern Med*. 2015; 162(5):335–344. DOI: 10.7326/M14-0954 [PubMed: 25732274]
- Miller SM, Diefenbach MA. A cognitive-social health information processing approach to cancer. In: Krantz D, editor *Perspectives in Behavioral Medicine*. New Jersey: Lawrence Erlbaum; 1998. 219–244.
- Miller SM, Shoda Y, Hurley K. Applying cognitive-social theory to health protective behavior: breast self-examination in cancer screening. *Psychological Bulletin*. 1996; 119:70–94. [PubMed: 8559860]
- Murphy-Hoefer R, Alder S, Higbee C. Perceptions about cigarette smoking and risks among college students. *Nicotine Tob Res*. 2004; 6(Suppl 3):S371–S374. [PubMed: 15799600]
- Pacek LR, Harrell PT, Martins SS. Cigarette smoking and drug use among a nationally representative sample of HIV-positive individuals. *Am J Addict*. 2014; 23(6):582–590. DOI: 10.1111/j.1521-0391.2014.12145.x [PubMed: 25065609]
- Pacek LR, Latkin C, Crum RM, Stuart EA, Knowlton AR. Current cigarette smoking among HIV-positive current and former drug users: associations with individual and social characteristics. *AIDS and Behavior*. 2014; 18:1368–1377. [PubMed: 24287787]
- Pacek LR, Rass O, Johnson MW. Knowledge about nicotine among HIV-positive smokers: implications for tobacco regulatory science policy. *Addict Behav*. 2017a; 65:81–86. [PubMed: 27792909]
- Pacek LR, Rass O, Johnson MW. Positive smoking cessation-related interactions with HIV care providers increase the likelihood of interest in cessation among HIV-positive cigarette smokers. *AIDS Care*. 2017b
- Rass O, Pacek LR, Johnson PS, Johnson MW. Characterizing use patterns and perceptions of relative harm in dual users of electronic and tobacco cigarettes. *Exp Clin Psychopharmacol*. 2015; 23(6):494–503. [PubMed: 26389638]
- Reynolds NR, Neidig JL, Wewers ME. Illness representation and smoking behavior: a focus group study of HIV-positive men. *Journal of the Association of Nurses in AIDS Care*. 2004; 15(4):37–47.
- Rogers RW. A protection motivation theory of fear appeals and attitude change. *The Journal of Psychology*. 1975; 91:93–114. [PubMed: 28136248]
- Romer D, Jamieson P. The role of perceived risk in starting and stopping smoking. In: Slovic P, editor *Risk, perception, & policy*. Thousand Oaks, CA: Sage Publications Inc; 2001. 64–80.
- StataCorp. *Stata Statistical Software: Release 12*. College Station, TX: StataCorp, LP; 2011.
- Vidrine DJ, Frank SG, Savin MJ, Waters AJ, Li Y, Chen S, Gritz ER. HIV care initiation: a teachable moment for smoking cessation? *Nicotine & Tobacco Research*. 2017
- Weinstein ND. The precaution adoption process. *Health Psychology*. 1988; 7:355–386. [PubMed: 3049068]
- Weinstein ND. Optimistic biases about personal risks. *Science*. 1989; 246:1232–1233. [PubMed: 2686031]
- Weinstein ND, Marcus SE, Moser RP. Smokers' unrealistic optimism about their risk. *Tob Control*. 2005; 14:55–59. [PubMed: 15735301]
- Williams RJ, Herzog TA, Simmons VN. Risk perception and motivation to quit smoking: a partial test of the health action process approach. *Addictive Behaviors*. 2011; 36:789–791. [PubMed: 21463920]

Table 1

Sample characteristics and associations with perceived risk of developing smoking-related illnesses based on current smoking of smoking usual brand cigarettes (n=267)

Characteristic	Total sample n (%) or M (SD)	Perceived risk of smoking-related health conditions ^a Mean (SD)
<i>Sociodemographic characteristics</i>		
Sex		
Male	176 (65.92)	7.19 (2.24)
Female	91 (34.08)	7.64 (2.23)
Age – Beta (95% CI)	29.46 (7.31)	0.05 (0.01, 0.09)
Race		
Caucasian	199 (74.53)	7.27 (2.32)
Non-Caucasian	68 (25.47)	7.54 (2.00)
Annual income		
<\$25,000	66 (25.29)	7.14 (2.38)
\$25,000	195 (74.71)	7.45 (2.15)
Marital status		
Married	57 (21.35)	7.24 (2.26)
Not married	210 (78.65)	7.37 (2.24)
Education		
<4-year college degree	170 (63.67)	7.26 (2.41)
4-year college degree	97 (36.33)	7.50 (1.91)
<i>HIV characteristics</i>		
On HIV medication		
No	74 (27.72)	6.81 (2.63)
Yes	193 (72.28)	7.55 (2.05)
Length of HIV diagnosis – Beta (95% CI)	5.98 (4.61)	–0.02 (–0.08, 0.04)
<i>Smoking characteristics</i>		
CPD ^b – Beta (95% CI)	8.09 (9.71)	–0.03 (–0.06, 0.01)
Daily smoking		
No	164 (61.42)	7.29 (2.11)
Yes	103 (38.58)	7.43 (2.44)
HSI ^c		
Low	180 (67.42)	7.31 (2.10)
Moderate-high	87 (32.58)	7.41 (2.51)
Menthol status		
Menthol	140 (52.43)	7.36 (2.30)
Non-menthol	127 (47.57)	7.33 (2.20)
Other tobacco use		
No	77 (28.84)	7.47 (2.24)

Characteristic	Total sample n (%) or M (SD)	Perceived risk of smoking-related health conditions ^a Mean (SD)
Yes	190 (71.16)	7.29 (2.25)
Lifetime quit attempt		
No	84 (31.46)	6.83 (2.53)
Yes	183 (68.54)	7.58 (2.06)
Interest in quitting		
No	132 (49.44)	6.70 (2.46)
Yes	135 (50.56)	7.97 (1.80)
Provider recommend quitting		
No	41 (15.36)	5.91 (2.16)
Yes	226 (84.64)	7.60 (2.16)
Provider suggested specific modalities		
No	87 (32.58)	7.01 (2.10)
Yes	180 (67.42)	7.50 (2.29)
Frequency of cessation discussions with provider		
Never-rarely	115 (43.07)	6.97 (2.26)
Sometimes	86 (32.21)	7.59 (2.26)
Often-always	66 (24.72)	7.67 (2.13)

Note: Bold text indicates statistically significant results

^a Averaged across all health conditions assessed (i.e., lung cancer; emphysema; bronchitis; other cancers; heart disease; and stroke)

^b CPD = cigarettes smoked per day

^c HSI = Heaviness of Smoking Index, a measure of nicotine dependence

Table 2

Perceived of smoking-related health conditions, under various instruction sets

a. Perceived risk under personal non-smoking versus personal smoking instruction sets				
	Personal – Current smoking	Personal – Non-smoking	Difference	p-value
Average of all conditions	7.3 (2.2)	4.1 (2.4)	3.2 (2.9)	<0.001
Lung cancer	7.4 (2.3)	4.0 (2.5)	3.4 (3.2)	<0.001
Emphysema	7.4 (2.3)	4.0 (2.6)	3.4 (3.2)	<0.001
Bronchitis	7.4 (2.4)	4.2 (2.6)	3.2 (3.1)	<0.001
Other cancers	7.1 (2.4)	4.3 (2.5)	2.8 (3.0)	<0.001
Heart disease	7.3 (2.3)	4.2 (2.5)	3.1 (3.0)	<0.001
Stroke	7.3 (2.4)	4.2 (2.6)	3.1 (3.0)	<0.001
b. Perceived risk under generic non-smoking versus generic smoking instruction sets				
	Generic – Smoker	Generic – Non-smoker	Difference	p-value
Average of all conditions	8.1 (2.0)	5.0 (2.5)	3.1 (2.9)	<0.001
Lung cancer	8.1 (2.2)	4.7 (2.8)	3.4 (3.3)	<0.001
Emphysema	8.1 (2.1)	4.5 (2.8)	3.6 (3.4)	<0.001
Bronchitis	8.2 (2.1)	4.9 (2.7)	3.3 (3.1)	<0.001
Other cancers	7.8 (2.3)	5.3 (2.6)	2.5 (2.9)	<0.001
Heart disease	8.0 (2.2)	5.2 (2.7)	2.8 (3.1)	<0.001
Stroke	8.1 (2.1)	5.1 (2.7)	3.0 (3.1)	<0.001
c. Perceived risk under personal smoking versus generic smoking instruction sets				
	Generic – Smoker	Personal – Current smoking	Difference	p-value
Average of all conditions	8.1 (2.0)	7.3 (2.2)	0.7 (1.7)	<0.001
Lung cancer	8.1 (2.2)	7.4 (2.3)	0.7 (1.8)	<0.001
Emphysema	8.1 (2.1)	7.4 (2.3)	0.7 (1.9)	<0.001
Bronchitis	8.2 (2.1)	7.4 (2.4)	0.8 (1.8)	<0.001
Other cancers	7.8 (2.3)	7.1 (2.4)	0.7 (1.9)	<0.001
Heart disease	8.0 (2.2)	7.3 (2.3)	0.7 (1.9)	<0.001
Stroke	8.1 (2.1)	7.3 (2.4)	0.8 (2.0)	<0.001
d. Perceived risk under personal non-smoking versus generic non-smoking instruction sets				
	Generic – Non-smoker	Personal – Non-smoking	Difference	p-value
Average of all conditions	5.0 (2.5)	4.2 (2.5)	0.8 (2.6)	<0.001
Lung cancer	4.7 (2.8)	4.0 (2.5)	0.7 (2.8)	<0.001
Emphysema	4.5 (2.8)	4.0 (2.6)	0.5 (3.0)	0.006
Bronchitis	4.9 (2.7)	4.2 (2.6)	0.7 (3.0)	<0.001
Other cancers	5.3 (2.6)	4.3 (2.5)	1.0 (2.7)	<0.001
Heart disease	5.2 (2.7)	4.2 (2.5)	1.0 (2.9)	<0.001
Stroke	5.1 (2.7)	4.2 (2.6)	0.9 (2.7)	<0.001

Table 3

Adjusted linear regression analyses for associations between participant characteristics and perceived risk of developing smoking-related disease based on current smoking of usual brand cigarettes

	Average of all health conditions	Lung cancer	Emphysema	Bronchitis	Other cancers	Heart disease	Stroke
	β^* (95% CI)	β^* (95% CI)	β^* (95% CI)	β^* (95% CI)	β^* (95% CI)	β^* (95% CI)	β^* (95% CI)
Age	0.02 (−0.01, 0.05)	0.02 (−0.01, 0.06)	0.03 (−0.01, 0.07)	0.02 (−0.02, 0.06)	0.02 (−0.02, 0.06)	0.03 (−0.01, 0.07)	0.04 (−0.01, 0.08)
On HIV meds							
No	REF	REF	REF	REF	REF	REF	REF
Yes	0.65 (0.17, 1.12)	0.82 (0.24, 1.40)	0.67 (0.07, 1.27)	0.69 (0.09, 1.29)	0.63 (−0.01, 1.26)	0.77 (0.19, 1.34)	0.92 (0.31, 1.54)
Interested in quitting							
No	REF	REF	REF	REF	REF	REF	REF
Yes	0.89 (0.45, 1.32)	1.17 (0.64, 1.71)	1.05 (0.49, 1.60)	1.09 (0.54, 1.65)	1.07 (0.48, 1.65)	1.06 (0.53, 1.59)	1.05 (0.48, 1.62)
Provider recommended quitting							
No	1 REF	REF	REF	REF	REF	REF	REF
Yes	1.04 (0.42, 1.67)	1.14 (0.36, 1.91)	1.33 (0.52, 2.13)	1.45 (0.64, 2.26)	1.24 (0.40, 2.09)	1.27 (0.50, 2.04)	1.26 (0.43, 2.08)
Frequency of cessation discussions with provider							
Never-rarely	REF	REF	REF	REF	REF	REF	REF
Sometimes	0.03 (−0.49, 0.55)	0.29 (−0.35, 0.93)	0.05 (−0.61, 0.71)	0.12 (−0.54, 0.79)	−0.22 (−0.92, 0.47)	0.01 (−0.63, 0.64)	0.01 (−0.67, 0.68)
Often-always	0.01 (−0.55, 0.56)	0.24 (−0.44, 0.93)	−0.02 (−0.73, 0.68)	0.06 (−0.65, 0.77)	−0.36 (−1.10, 0.38)	0.12 (−0.55, 0.79)	0.04 (−0.68, 0.77)

Note: Bolded text indicates statistically significant findings

* Adjusted for age, use of medications to treat HIV, interest in quitting, past provider recommendation to quit smoking, and frequency of cessation-related discussions with providers