

University Student Smokers' Perceptions of Risks and Barriers to Harm Reduction

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Abstract

Background: Previous studies have shown a systematic misperception about the comparative risks of cigarette smoking and other sources of nicotine. These misperceptions may inhibit smokers' adoption of safer sources of nicotine, such as smokeless tobacco.

Methods: We conducted a survey of 105 university students to investigate smokers' perceptions of the source of the health risks from smoking and barriers to tobacco harm reduction (the switching to other, much less harmful, sources of nicotine).

Results: The sample was young (median age = 22) and 50% were male. Less than one-third (31%) of the students were aware that most of the health risks from cigarettes are caused by inhaling smoke. Many attributed a larger proportion of the risk to nicotine (7%) and unburned tobacco (18%) (which cause very small risks) and non-tobacco ingredients added by manufacturers (44%) (which are largely mythical). Only about 25% of the sample was aware that smokeless tobacco is less harmful than smoking. Forty-three percent indicated that they would be willing to switch to a hypothetical product that mimicked modern smokeless tobacco products (about 99% less harmful; does not require spitting), but other questions showed misperceptions that prevented realization that this product really exists.

Conclusions: Thus, it appears that college-aged smokers are not aware that lower risk tobacco products are available. However, this study supports the notion that if smokers are informed of the availability of lower risk options, they may be interested in and willing to try these alternative less risky forms of nicotine. If this is true than providing honest information about tobacco harm reduction and the relative risks of different tobacco products could lead to a major public health improvement.

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Introduction

Most people in Western society are aware of the health risks from smoking. However, most people, including public health and medical experts, believe that other sources of nicotine, such as smokeless tobacco (ST) and pharmaceutical nicotine products, pose similar risks to smoking. This is despite overwhelming evidence that these products only cause about 1/100th the health risk of smoking and are a promising smoking cessation method (Phillips, Rabiou, & Rodu, 2006; Phillips, 2007; Rodu & Godshall, 2006). Overall, smokers are misinformed about tobacco harm reduction and the safety and efficacy of pharmaceutical nicotine products (Bansal, Cummings, Hyland, & Giovino, 2004; Cummings, Hyland, Giovino, Hastrup, Bauer, & Bansal, 2004). Few Canadians believe that chewing tobacco and snuff are less harmful than cigarettes (18% and 19%, respectively) (Health Canada, 2006). Additionally, less than 11% of participants in four studies in the United States (Broome County, 2006; ITPC, 2004; O'Connor, Hyland, Giovino, Fong, & Cummings, 2005; Smith, Curbow, & Stillman, 2007), including one of university students, and less than 3% of health care providers (Prokhorov, Wetter, Padgett, de Moor, Le, & Kitzman, 2002) believe that ST is safer than cigarettes. In a study of military recruits, most participants did not believe that switching from cigarettes to ST would reduce tobacco users' risk (Haddock, Lando, Klesges, Peterson, & Scarinci, 2004). Tobacco harm reduction (<http://www.tobaccoharmreduction.org>), the substitution of highly-reduced risk sources of nicotine for smoking, is a promising intervention for inveterate smokers. However, the widespread belief that using ST is as risky as smoking is a substantial barrier to adoption.

Previous research has shown that people are confused about the risks from 1) inhaling smoke (quite high), 2) consuming nicotine (relatively low), 3) contact with unburned tobacco (too low to be reliably measured), and 4) additives in tobacco products (largely mythical). Most people (67%) in a survey in the United States (Cummings, Hyland, Giovino, Hastrup, Bauer, & Bansal, 2004) and 60% of a sample of nurses (Borrelli, & Novak, 2007) believed that nicotine causes cancer. In addition, a survey of Canadians found that many believed that chewing tobacco and snuff contain "tar" (i.e., particulate matter combustion products) (81% and 75%, respectively) and carbon monoxide (41% and 38%, respectively) (Health Canada, 2006). "Smoking", "tobacco", and "nicotine" are often seen as synonymous by the general public and are haphazardly treated as such in the scientific literature. This misperception has substantial practical implications given the growing recognition of the need for a harm reduction strategy for the substantial proportion of the population who continue to smoke.

To expand upon the existing literature about perceived risks (especially those that may be barriers to tobacco harm reduction), we conducted a pilot survey of students who smoke at a western Canadian university. This study largely focused on a question designed to elicit smokers' perception of the apportionment of the total health risk to different aspects of the exposure to cigarettes.

Methods

This cross-sectional survey was conducted during April 2006, on the University of Alberta campus in Edmonton, Alberta. Trained research staff approached people who were smoking outside and appeared to possibly be students (e.g., not people wearing staff uniforms or

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hardhats) on campus between 10 am and 4 pm. People who self-identified as undergraduate students were asked to complete an anonymous self-administered survey. Of the 130 potential subjects who did not explicitly state that they were not undergraduate students, 113 participated. Seven participants indicated on the survey that they were not undergraduate students and one survey was left mostly blank, leaving 105 surveys included in this analysis.

The survey assessed participants': 1) sociodemographic characteristics; 2) history of cigarette, pharmaceutical nicotine and ST use; 3) perceptions of smoking and ST and 4) willingness to use reduced harm products. Participants who never or rarely (1-9 times) used ST were asked about their reasons for not using ST. The survey did not inform participants about the comparative risks of cigarettes and ST, so their willingness to use ST was assessed by a question about willingness to use a hypothetical oral nicotine product that costs about the same as cigarettes and has about 1% of the health risk of smoking. A major barrier to harm reduction was assessed by asking if participants would consider switching from cigarettes to this hypothetical product if it required occasional spitting (the common perception of ST) and if it did not require spitting (like many modern ST products). The questionnaire and data are available at <http://www.tobaccoharmreduction.org/technical.htm>.

Students completed a pie chart to assess their beliefs about the source of the health risks from smoking (Figure 1a). Filling in a pie chart is an unusually difficult question for a survey, but it was a uniquely effective way to assess the question and appropriate for the population. The question was within the capabilities of undergraduate students who had completed college-preparatory math. We estimated divisions of the circle by measuring the linear distance between the points where the lines dividing the pie segments intersected the circumference using calipers, and calculating the resulting portion of the circle using trigonometry. This approach assumed that the arc encompassed between two intercepts was the intended measure and ignored small deviations from straight lines between the center and circumference of the circle.

In addition to assessing the responses to the pie-chart question, we computed univariate summaries for all other questions using SAS version 9.1 (SAS Institute, Cary, NC).

[Insert Figure 1]

Results and Discussion

Table 1 summarizes the students' demographic characteristics, tobacco use history and perceptions of the risks of tobacco products. Subjects reported limited experience with non-smoked sources of nicotine. One-quarter of the sample had ever used ST: most (65%) of whom had used ST fewer than 10 times. About one-quarter (29%) of the sample had ever used pharmaceutical nicotine. Males were more likely than females to have used ST (38% and 11%, respectively). In addition, 60% had ever smoked tobacco in a form besides cigarettes, including cigars, hookahs or pipes.

Table 1: Undergraduate Student Smokers' Demographics, Tobacco Use History and Perceived Risks From Various Tobacco Products

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	n	%
Demographics		
Age		
Mean	104	23
Median (range)	104	22 (18, 42)
Male	53	50%
Tobacco Use History		
Cigarettes smoked per day		
0-5	42	40%
6-10	32	30%
11-15	24	23%
16+	7	7%
Ever used ST use		
Yes	26	25%
No	79	75%
Are you considering the idea of quitting smoking?		
Yes, I plan to quit soon.	38	37%
Yes, but I have no specific plans	51	49%
No, I am not interested in quitting.	13	12%
I have not thought much about it.	2	2%
Perceived Risks From Various Tobacco Products		
	n	% (95% CI)
Compared to cigarettes, ST:		
Poses a higher health risk	13	15% (7%, 22%)
Poses about the same risk	53	60% (50%, 70%)
Poses a lower health risk	22	25% (16%, 34%)
ST products cause oral cancer		
Definitely	47	48% (38%, 58%)
Probably	30	31% (21%, 40%)
Possibly	21	21% (13%, 30%)
Reasons for not using ST*		
Just never really considered using ST.	54	56% (46%, 66%)
I don't like the idea of spitting.	52	54% (44%, 64%)
I like smoking and have no desire to use ST.	46	48% (38%, 58%)
I don't believe using ST has the same social benefits as smoking.	20	21% (13%, 29%)
I am worried about the health risks from ST.	19	20% (12%, 28%)
I don't believe I will get the same nicotine fix.	5	5% (1%, 10%)
Would you consider switching from cigarettes to a product you could hold inside your mouth to provide you with nicotine, just like a cigarette, which costs about the same as cigarettes, and has only about 1% of the health risk of smoking cigarettes?		
Yes, even if it requires spitting	22	21% (13%, 29%)
Yes, but only if it does not require spitting	45	43% (33%, 52%)
No	38	36% (27%, 45%)

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Table 1: Undergraduate Student Smokers' Demographics, Tobacco Use History and Perceived Risks From Various Tobacco Products

	n	%
*Limited to the 79 students who had never used ST and the 17 students who had used ST less than 10 times.		

The students exhibited substantial misperceptions about tobacco products. The majority (75%) believed that ST is as risky as cigarettes. This proportion is somewhat better than results of previous surveys, possibly due to a more educated sample or local media coverage of our harm reduction research. Nevertheless, this illustrates the widespread misperception that there is no potential for tobacco harm reduction.

Nearly half of participants believed that ST definitely causes oral cancer. Fear of oral cancer and spitting are major barriers to tobacco harm reduction. Ironically, smoking is the major cause of oral cancer in North America (U.S. Department of Health and Human Services, 2004) and the relative risk from modern ST products is negligible. As predicted, an aversion to spitting was a commonly cited reason for not using ST. More than half (54%) cited this reason compared to 20% who did not consider ST because of the perceived health risks.

The stated aversion to spitting – a great irony in a society that forces people to experience environmental tobacco smoke and very often litters their cigarette butts – was so great that many considered it more important than almost eliminating health risk. Many (43%) respondents would consider switching to the spit-free hypothetical product (e.g., modern satchel-style ST products) but only 21% would switch if it required spitting. Spitting was more of a deterrent for females than males (15% and 27% were willing to switch to a product that required spitting, respectively).

Results from the pie chart question are summarized in Figure 1b. The pie chart is more informative than many standard types of questions, though attempts at precise numerical interpretations should be avoided since a statement like "inhaling smoke causes 26% of the total risk" might be interpreted as attributable risk based on counterfactuals, but it is not clear exactly what a subject meant by it. This question allowed for bivariate comparisons (i.e., "how does the risk from X compare to that from Y") and a quantification of intensity. Though even without an exact quantitative meaning, the comparisons are at least as useful as typical questions (e.g., 5 vs. 6 on a Likert scale or "agree" versus "strongly agree"), and the pie forces an explicit apportionment. No subjects expressed confusion about the pie chart and only eight completed most of the survey but did not complete this question.

As expected, few (31%) subjects correctly identified smoke inhalation as the major cause of the health effects of smoking. The average attribution of the total risk to smoke was similarly low (median=24%; mean=26%). If subjects had randomly divided the pie, 25% would have correctly identified the largest source of risk. While the exact portion of the total risk attributable to inhaling smoke is unknown, the correct answer is clearly more than 90%. Failure

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to realize this represents a substantial misperception of the potential health benefits of switching to non-combustion nicotine sources.

Participants' apportionment of the remaining risk offers further insight. If smoke is not sufficiently implicated then nicotine, additives and/or tobacco itself are misperceived as causing more harm than they do. Overall, participants believed that nicotine (median=12%; mean=16%), and other chemicals in the tobacco plant (median=20%; mean=24%) caused less than 40% of the risk. Presumably the sum of these two would represent the perceived risk from using ST, though 75% of respondents believed that ST was at least as harmful as smoking. This contradiction provides further evidence that the intentional equation of smoking, tobacco, and nicotine by anti-ST advocates (Phillips, Wang, Guenzel, 2005) has effectively misled smokers.

A surprisingly large portion of the sample attributed major risks to ingredients (other than tobacco) that manufacturers add to cigarettes. This was considered the greatest source of harm, with 44% ranking it highest and attributing one-third of the risk to these additives (median=32%; mean=33%). However, most manufactured cigarettes contain no ingredients that substantially change the risk from inhaling burning organic matter. The leading Canadian manufacturer adds only water and menthol to the tobacco (What is in cigarettes, 2003; Imperial, 1998). This belief explains the common misperception that other smoked tobacco products (e.g., hookahs/shisha, natural/organic cigarettes and hand rolled cigarettes) are safer than manufactured cigarettes (Labib, Radwan, Mikhail, Mohamed, Setouhy, Loffredo, Israel, 2007). It is particularly troubling since these alternative products may actually pose greater health risks (World Health Organization, 2005). This misperception is likely attributable to the tendency to demonize corporations rather than to honestly educate consumers about the risks from smoke.

Conclusion

Our results suggest that among a population that is interested in smoking cessation, but have not quit, there is little awareness of the potential for harm reduction. Moreover, this population shows a strong willingness to switch to hypothetical reduced-risk oral products, but few realize that these exist in the form of modern ST. While it might be too optimistic to think that 43% of this population would switch to ST if they had accurate information, this estimate is lower than the percent of young males in Sweden who switched from cigarettes to ST (Stegmayr, Eliasson, Rodu, 2005).

The effective anti-ST propaganda will make it challenging to inform smokers of the truth. However, overcoming the misplaced worry about spitting (particularly among women) is just as important as, and perhaps easier than, overcoming the propaganda about health effects (Phillips, Bergen, Guenzel, 2006; Phillips, Bergen, Rodu, pre-publication).

Our research further suggests that the ends-justify-the-means attitude among anti-tobacco advocates has interfered with harm reduction and convinced smokers that their options are to quit nicotine entirely, which many will not do, or to die from it. Additionally, it seems possible that misunderstanding the immense risks of inhaling smoke might lead people to believe that smoking is less risky than it actually is.

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The answers to the pie question, like responses to any question, involve some predictable bias. In this case, there is probably a tendency to homogenize the four probabilities, though this alone is unlikely to account for the huge misperceptions found in this study. Although the generalizability of our specific numbers is limited due to the use of a small sample of one socio-demographic, the results support existing evidence about misperceptions about ST, and show that such misperceptions may even extend to fairly educated university populations. The major findings of this study emphasize the importance of educating the public on the health benefits of switching from smoking to the use of ST.

List of abbreviations

ST – Smokeless tobacco

Competing interests

Dr. Phillips and his students and colleagues focus much of their work on assessing and promoting the potential of tobacco harm reduction, and so have an interest in the results of this research. In particular, we have previously presented assessments and predictions that could be either supported or called into doubt by the results of this survey, and thus had reasons to hope the survey generated particular results. Less importantly, Dr. Phillips and his research group are partially supported by unrestricted (completely hands-off) grants from the Institute for Health Economics and U.S. Smokeless Tobacco Company. Neither funder has control over the research topic or study design, analysis or interpretation and they will not view this manuscript prior to publication. Dr. Phillips has consulted for U.S. Smokeless Tobacco Company in the context of product liability litigation.

Authors' contributions

KG designed the survey, under the direction of Dr. Phillips and other University of Alberta faculty, and collected the data with the assistance of other members of Dr. Phillips research group. CVP supervised data collection and analysis. KH conducted the data analysis. All authors contributed to writing the manuscript and have read and approved the final manuscript.

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