

Smokers' interest in using nicotine replacement to aid smoking reduction

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In recent years the public health community has considered the risks and benefits of encouraging smokers to reduce their smoking, perhaps with the aid of nicotine replacement therapy (NRT). Little is known, however, about whether smokers themselves are interested in smoking reduction; whether they see reduction as an endpoint, or primarily as a route to cessation; or whether they are receptive to the notion of using NRT to achieve reduction. We conducted a population-based national telephone survey of 1,000 current daily cigarette smokers (499 male, 501 female). Most smokers (57%) reported previously trying to reduce their smoking, and many (26%) said that they plan to reduce within the next year. Almost half of those planning to quit in the next 12 months (44%) preferred to quit via gradual cessation and most (68%) indicated that they would consider using a reduction product or medication. Respondents reported that they would prefer a product with a cessation endpoint rather than a reduction endpoint (63% vs. 21%). Interest in reduction was highest among smokers who were less interested in quitting and among heavier smokers. We conclude that many smokers are interested in gradually reducing prior to quitting and that promoting reduction is unlikely to undermine motivation to quit smoking.

Introduction

In response to the epidemic of tobacco-related death and disease, considerable effort has focused on encouraging smokers to quit and helping them to do so successfully (U.S. Department of Health and Human Services, 1990). Nevertheless, the percentage of smokers who attempt to stop and the percentage of attempters who are successful have not improved in the past decade (National Cancer Institute, 2000). In total, less than 3% of U.S. smokers quit annually (Mendez, Warner, & Courant, 1998; National Cancer Institute, 2000).

Given the large proportion of smokers who are either unwilling or unable to quit, a growing focus is the potential for reducing the harm caused by

smoking by encouraging smokers to reduce the number of cigarettes they smoke, and thus their exposure to tobacco toxins (Shiffman et al., 2002; Stratton, Shetty, Wallace, & Bondurant, 2001). Considerable debate has explored the benefits and risks of strategies to encourage smokers to reduce their cigarette consumption (Hughes & Carpenter, 2005, in press; Stratton et al., 2001; Warner, 2002). A major concern with encouraging smoking reduction has been the fear that this would undermine motivation to make a quit attempt (Stratton et al., 2001), though a recent review concluded that reduction increases—rather than decreases—smoking cessation (Hughes & Carpenter, in press). Existing studies of whether reducing the number of cigarettes smoked results in tangible improvements in long-term health outcomes have produced mixed results with no clear benefit established (Godtfredsen, Osler, Vestbo, Andersen, & Prescott, 2003; Godtfredsen, Prescott, & Osler, 2005; Godtfredsen, Vestbo, Osler, & Prescott, 2002; Hughes & Carpenter, in press). Current research is exploring reduction both as a harm reduction strategy (e.g., Kunze, 2000) and as a route to quitting

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(Cinciripini et al., 1995; Cooper & Clayton, 1988), but neither function is currently endorsed by guidelines (Fiore et al., 2000).

As policy and clinical issues regarding smoking reduction are addressed, it is important to consider smokers' attitudes and wants regarding reduction and cessation. A 2001 survey of smokers in the United Kingdom (where tobacco control activity is common) reported that 51% had tried to cut down in the past year (West, McEwen, Bolling, & Owen, 2001). A study of smokers in Germany (where little tobacco control activity exists; Gilmore & McKee, 2002) suggested that most smokers who had recently tried to quit also had tried to reduce their smoking, and that substantial numbers had tried to reduce without quitting (Meyer, Rumpf, Schumann, Hapke, & John, 2003). In the present study, we assessed U.S. smokers' interest in reduction either as an endpoint yielding health benefits or as part of a trajectory to quitting completely.

Smokers who attempt to reduce smoking encounter some of the same difficulties that smokers encounter when they try to quit smoking (e.g., craving and withdrawal may emerge as nicotine levels drop). Smokers who reduce the number of cigarettes they smoke also may smoke the remaining cigarettes more intensely (Scherer, 1999), which perhaps accounts for the lack of positive health impact of reduction (Hughes & Carpenter, in press). Accordingly, it's been suggested that nicotine replacement therapy (NRT) could be used to assist smokers in reduction. Indeed, a review of 19 studies concluded that although behavioral treatments for reduction appear promising, only NRT was clinically proven to help smokers reduce, increasing the odds of reduction by a factor of 1.3–4.6 (Hughes & Carpenter, 2005). However, the question is whether smokers would be interested in using NRT to support smoking reduction. An Internet survey of Swiss smokers reported that 23% had used NRT to reduce smoking (Etter, le Houezec, & Landfeldt, 2003). In contrast, in a volunteer sample of American users of nicotine gum, smokers reported very little use of nicotine gum for reduction (Hughes, Pillitteri, Callas, Callahan, & Kenny, 2004). In the present study, we used a national U.S. survey to assess smokers' interest in using an NRT product for reducing their smoking, either as a vehicle for moving toward cessation or as a means of reducing harm.

Method

Procedure

A total of 1,000 adult daily smokers were recruited by random digit dialing. Households in the continental United States were phoned using lists of

randomly generated telephone numbers provided by Survey Sampling International (Fairfield, Connecticut) during March and April 1998. A population-based sample was estimated by using regional quotas assigned based on the state-by-state prevalence of cigarette smoking. When a household was contacted, the interviewer stated, "Hello, my name is [blank] and I'm from HBR, a national public opinion research firm. We're conducting a survey, and this number was selected at random. We are not selling anything, but only want to know people's opinions on important issues." Smoking was not mentioned in the introduction. The interviewer then asked at random for the youngest or oldest male or female adult (>18 years old) in the household. If the randomly selected adult was not a smoker, the interviewer then asked to speak with an adult smoker in the household. This secondary respondent also was selected at random based on age-sex combinations. Smokers were excluded only if they reported working for an advertising agency, market research firm, pharmaceutical manufacturer, doctor's office, hospital, clinic, or the tobacco industry. The response rate was not recorded.

Except where noted, the interview questions were designed for this survey and were not tested previously. The interviewer first asked participants about their plans for smoking and quitting in the next year, that is, whether they intended to (a) quit smoking completely, (b) cut back significantly the amount they smoked without giving up cigarettes completely, or (c) continue to smoke at their current amount. Smokers who expressed an interest in quitting were then asked if, when they attempt to quit, they prefer to quit by cutting back gradually or quitting abruptly. All respondents were asked about past attempts to stop smoking and to reduce smoking (other than for smoking cessation). Those who reported that they had tried to cut back at some stage in the past were asked to estimate the duration of time that smoking reduction was maintained.

To gauge interest in use of medications to aid reduction, participants were asked if they would consider using nicotine patches or nicotine gum (the NRT products available over the counter in the United States at the time) and also asked general questions about an (unspecified) "product containing nicotine" using the question "Would you or would you not consider using [nicotine gum/nicotine patches/a product containing nicotine] to help you cut down your smoking?" All respondents were asked whether they would prefer a product either (a) to help them reduce their smoking and quit completely or (b) to help them to reduce their smoking and then to maintain it at a lower level.

To estimate the expected impact of reduction strategies on cessation attempts, we asked all participants (both those who planned to quit and those who planned to reduce) whether, if they were able to successfully reduce the number of cigarettes that they smoked, they would be more or less likely to attempt to quit completely (or no difference). To measure smokers' perceptions of the health benefits of smoking reduction, all participants were asked to choose between two statements: "Cutting back the number of cigarettes you smoke helps improve your health because you are smoking fewer cigarettes" and "The only way to improve your health is to quit smoking completely and cutting back won't help at all."

Interest in quitting was assessed using a modified contemplation ladder (Biener & Abrams, 1991) in which one of six categories was chosen: "No thoughts of stopping smoking," "Think I need to consider quitting some day," "Think I should quit but not quite ready," "Starting to think about how to change my smoking patterns," "Moving towards doing something to quit smoking," or "Taking action to quit, for example, cutting down or enrolling in a program." The scale was modified from its original form so as to remove any reference to reduction as a step toward quitting, which might have biased and confounded the responses. The order in which the six categories were presented was rotated randomly across respondents. The interview typically took 30 min to complete.

Data analyses

We weighted the sample to be representative of the U.S. population of smokers aged 18 years or older based on age, gender, race, and education, using estimates from the 1998 National Health Interview Survey (www.cdc.gov/nchs/nhis.htm). We present descriptive statistics with confidence intervals. Pearson chi-square statistics were used to compare groups. A one-sample test of proportions was conducted to determine if smokers thought cessation differed from reduction in terms of improving their health; and to test for differences in preference for quitting versus reduction. Bowker's test of symmetry (an extension of McNemar's test for change in proportions; Bowker, 1948) was conducted to determine if smokers differed on their interest in products to aid smoking cessation.

Results

Sample characteristics

Sample demographics are shown in Table 1. Approximately half of the sample was female, and

almost all were White. The typical participant was 25–34 years old, had been smoking for over a decade, smoked 11–25 cigarettes/day, and had made several attempts to quit smoking.

History of, general interest in, and perceptions of smoking reduction

More than half of the sample (57%, 95% CI $\pm 3.1\%$) said they had previously attempted to reduce their smoking (other than as part of a quit attempt). In comparison, 73% ($\pm 2.8\%$) said they had previously attempted to stop smoking. About 19% ($\pm 3.2\%$) reported that their most recent reduction attempt lasted less than a week. Approximately 23% ($\pm 3.4\%$) of attempts lasted at least 3 months.

About one-third of the sample (29% $\pm 2.8\%$) reported that they had no plans to change their smoking in the next year. Approximately one-quarter (26% $\pm 2.7\%$) reported that they planned to cut back their smoking without quitting completely, and 42% ($\pm 3.1\%$) said they wanted to quit smoking completely (the remaining smokers gave no preference). Those smokers who preferred reduction over cessation smoked more cigarettes per day, were less likely to smoke low-tar cigarettes, and were less ethnically diverse (Table 1). The two groups did not differ on measures of motivation nor other variables.

We also assessed smokers' interest in quitting gradually versus abruptly. Among those planning to quit in the next 12 months, 44% ($\pm 4.8\%$; 19% of the entire sample) reported that they preferred to achieve cessation by gradually reducing smoking (vs. abrupt cessation, 53% $\pm 4.8\%$; 22% of the entire sample). Women were more likely than men to prefer to quit using gradual reduction (52% vs. 39%; $\chi^2=6.3$, $p=.012$), as were smokers who had been smoking for a shorter time ($\chi^2=11.8$, $p=.019$). No other demographic, motivational, or smoking history variables distinguished these groups.

Half of smokers (50% $\pm 3.1\%$) felt that only complete cessation would improve their health, whereas a substantial minority (41% $\pm 3.1\%$) expected that smoking reduction would improve their health ($Z=2.9$, $p=.004$). The remaining smokers were undecided.

In terms of reduction endpoints, we compared the demographic, motivational, and smoking history variables presented in Table 1 between smokers who said that they planned to reduce as a means of quitting smoking ($n=190$) and those who reported that they planned to reduce their smoking without quitting ($n=261$). Smokers who preferred reducing and maintaining smoked a greater number of cigarettes per day ($\chi^2=11.9$, $p=.003$), were less likely to smoke low-tar cigarettes ($\chi^2=12.3$, $p<.001$), and were less ethnically diverse ($\chi^2=8.4$, $p=.038$).

Table 1. Characteristics and smoking history of entire sample, and by smoking plans for the next 12 months (all values in percentages).

	Entire sample (N=1,000)	Plans for the next 12 months	
		Quit completely (n=428)	Cut back (n=261)
Age (years)			
18–24	15.2	11.9	15.0
25–34	27.4	29.3	26.3
35–44	23.4	23.5	25.6
45–54	16.4	18.4	16.8
55+	17.7	17.0	16.2
Female	47.5	48.0	52.0
Race			
White	78.2	75.1	84.3*
Black	10.8	12.3	7.1
Hispanic	7.9	9.6	6.6
Other	3.1	3.1	2.0
Cigarettes/day			
1–10	15.8	22.7	12.6**
11–25	55.4	55.8	59.6
26+	28.9	21.6	27.8
Years smoking			
≤5	20.5	18.9	19.1
6–10	20.7	20.0	26.0
11–15	14.8	16.1	12.5
16–20	13.7	12.0	16.3
21+	30.3	33.0	26.0
Previous quit attempts			
Never	26.5	15.7	16.1
1–4	61.0	67.3	71.4
5–10	9.2	13.5	9.1
11+	3.3	3.5	3.4
Smoke low-tar cigarettes	40.2	50.8	36.4***

Note. The cut-back and quit-completely groups were compared using chi-square tests for a general association between the demographic characteristic (e.g., race) and the interest in quitting or reducing. Asterisks indicate significant differences between the two groups: * $p < .05$; ** $p < .01$; *** $p < .001$.

Interest in products to aid smoking reduction

Approximately two-thirds of the sample ($62\% \pm 3.0\%$) stated that they would definitely or probably consider using some type of product as an aid in smoking reduction. The majority of smokers ($56\% \pm 3.1\%$) reported that they would consider using an undefined “product containing nicotine” to aid smoking reduction; half ($50\% \pm 3.1\%$) would be interested in the nicotine patch and about one-third ($39\% \pm 3.0\%$) in the nicotine gum. Smokers were more likely to consider using an undefined “product containing nicotine” than either patch ($S=40.6$, $p < .001$) or gum ($S=137.6$, $p < .001$). Participants also were more likely to consider a patch product than a gum product ($S=45.8$, $p < .001$).

When asked their preferred outcome when using a product for reduction, more participants ($63\% \pm 3.0\%$) preferred a product that would help them to quit completely than a product to help them reduce their smoking and then maintain it at a lower level ($21\% \pm 2.6\%$; $Z=14.3$, $p < .001$). The remaining 16% of the sample gave no preference. Smokers who, on the contemplation ladder, were closer to

quitting were more likely to prefer a product that would help them quit completely ($\chi^2=55.6$, $p < .001$; Figure 1).

Discussion

The present study indicates that smokers have considerable interest in reducing their smoking.

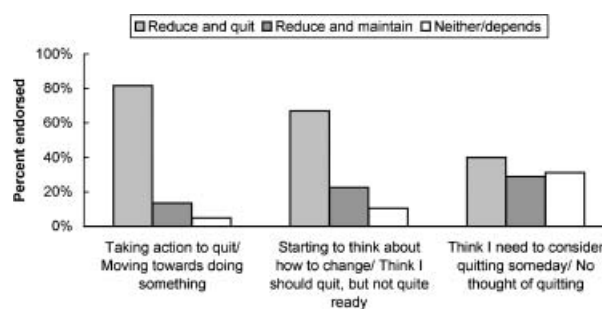


Figure 1. Proportion of smokers interested in a product aimed at reducing to quit versus reducing to maintain, by smoker rung on the contemplation ladder.

Strikingly, most smokers interested in reduction prefer to view it as a stepping-stone toward complete cessation rather than a means of continuing smoking at a reduced level. Much of the debate in the literature regarding smoking reduction has focused on whether smoking reduction will undermine overall cessation (e.g., Carpenter, Hughes, & Keely, 2003; Hughes, 2000; Shiffman et al., 2002; Stratton et al., 2001). The data presented in this paper suggest that smokers' interest in reduction is not an attempt to evade cessation (i.e., most smokers *want* reduction to lead to cessation). Consistent with this, a recent review concluded that reduction did not undermine cessation and, indeed, promoted cessation (Hughes & Carpenter, in press).

Not surprisingly, smokers' interest in reduction without quitting depended on their stage of interest in quitting. Among smokers who were most advanced in their interest in and progress toward quitting, interest in reduction was focused overwhelmingly on using reduction as a means of achieving cessation. Even smokers who were not close to quitting preferred to use reduction as a means to quit, but the preference was narrowed, with almost equal proportions interested in reduction for its own sake. The lack of interest in reduction *per se* suggests that reduction options are unlikely to divert these smokers. Consistent with this, one study randomly assigned smokers who wanted to quit to be offered reduction as an outcome versus offering only abstinence as an outcome (Glasgow, Morray, & Lichtenstein, 1989). Offering reduction did not reduce abstinence rates. Interest in reduction peaked among smokers who were not very interested in quitting. Given the evidence that reduction can lead to quitting (Hughes & Carpenter, in press), offering reduction could be a method to motivate these smokers to move toward quitting. In any case, the fact that only a small proportion of U.S. smokers are interested in continuing reduction, and that most prefer to see reduction proceed to cessation, is reassuring for programs that might offer smokers the option of reducing.

Almost half of the smokers (44%) who planned to quit in the coming year expressed a preference for doing so by gradual reduction. Gradual reduction methods are not recommended in national smoking cessation guidelines (Fiore et al., 2000). Although some meta-analyses concluded the evidence for the efficacy of gradual cessation was not sufficient (Fiore et al., 2000; Silagy, Lancaster, Stead, Mant, & Fowler, 2004), others have concluded that gradual cessation is effective (Law & Tang, 1995). In fact, except for one small early study (Flaxman, 1978), the four more recent studies have found gradual cessation to be as effective as, if not more effective than, abrupt cessation (Gunther, Gritsch, & Meise, 1992;

Cinciripini et al., 1995; Cinciripini et al., 1994; Shiffman, Dresler, Norton, & Strahs, 2006). Coupled with smokers' interest in gradual reduction, this finding suggests that gradual reduction should be considered as a viable alternative way to quit.

Current indications for NRT products represent one barrier to gradual cessation. Directions for the use of NRT in most countries explicitly prohibit the use of NRT while smoking, precluding their use as an aid in gradual cessation (An exception is the very recent approval of nicotine gum for prolonged reduction leading to cessation in the United Kingdom and France (Committee on Safety of Medicines and Healthcare Products Regulatory Agency, 2006). Our finding that 44% of smokers want to stop gradually suggests that a substantial proportion of smokers are implicitly precluded from using NRT medications with their preferred cessation method. Furthermore, it suggests that developing, validating, and offering approaches to cessation through gradual reduction, including use of NRT, would likely significantly expand the appeal of treatment for smokers.

Our study, based on survey responses from a large, nationwide survey of U.S. smokers, likely reflects the attitudes and beliefs of current smokers. However, we did not assess actual behavior. For example, among those who say they plan to stop smoking in the next month, only half actually attempt to quit (Hughes, Keely, Fagerström, & Callas, 2005). Some smokers say they are interested in quitting because this is the socially acceptable response, but when facing the actual difficulties of cessation, they may decide not to attempt to quit or shift and settle for reductions in smoking. Another limitation of the results presented here is that they are based on data collected some years ago. Smokers' attitudes toward using NRT for smoking reduction could have changed over the ensuing years, and other cessation products have been introduced (notably bupropion) but were not included in our survey. Another limitation of the study is that we lack data on the response rate, making it hard to assess the potential for nonresponse bias. However, we did weight the study data to match a nationally representative sample of U.S. smokers.

In any case, our findings indicate that many smokers are interested in smoking reduction, primarily as a route to quitting rather than as an ongoing practice for harm reduction. Also, a large percentage of those who want to quit prefer to do so by gradual reduction. Offering gradual approaches to quitting may expand the appeal and reach of smoking cessation treatment. Given that NRT reduces craving and withdrawal (Shiffman, Ferguson, Gwaltney, Balabanis, & Shadel, 2006) and the number of cigarettes smoked per day

(Hughes & Carpenter, 2005), its use as an aid to smoking reduction should expand the appeal of treatment to those who prefer quitting gradually.

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