


Conceptual obstacles to making use of four smoking-cessation strategies: What reasons do light smokers give for rejecting strategies?

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Abstract

Some smokers have safety and cost concerns about nicotine replacement therapy which discourage its use. We recruited 56 young adult light smokers to read detailed descriptions of a hybrid nicotine replacement therapy, a prescription drug treatment, scheduled reduced smoking, and a menu of self-help tactics. Participants listed five reasons smokers might reject each strategy. An emergent-category content analysis classified each response with a high degree of inter-rater reliability. Only one-third of 32 concerns were strategy-specific; the majority focused on the general difficulty of quitting. Most prevalent were “continued cravings,” “addiction too strong,” “takes too long,” and “won’t work.” These and other concerns reflect conceptual obstacles to be surmounted in smoking-cessation interventions.

Keywords

concerns, preconceptions, smoking cessation, strategies

Introduction

In response to the continuing and widespread health threat posed by cigarette smoking (Richardson et al., 2014), a variety of smoking-cessation strategies (SCSs) are available for smokers who wish to quit smoking. Nicotine replacement therapy (NRT), for example, reduces nicotine cravings with transdermal skin patches, providing continuous, but low levels of nicotine. NRT may also include the use of nicotine gum, lozenges, or nasal sprays to help smokers cope with sudden cravings for a cigarette. NRT-based cessation strategies have proved to be 50–70 percent more effective than simply quitting “cold turkey” (Stead et al., 2012). However, smokers interested in quitting may harbor misconceptions about NRT that lead them to avoid using it as a cessation strategy. Several studies have reported that some smokers believe NRT products cause cancer, lead to heart attacks, or can themselves become addictive (Black et al., 2012; Carpenter et al., 2011; Etter and Perneger, 2001; Ferguson et al., 2012; Silla et al., 2014; Smith et al., 2015). As a report commissioned by the Robert Wood Johnson Foundation documents (Foulds et al., 2009), these

three concerns are largely unfounded. Nonetheless, smokers with concerns about NRT are less likely to adopt and adhere to an NRT protocol (Shiffman, 2007; Shiffman et al., 2008). These facts attest to the psychological reality of the three common NRT misconceptions (cancer, heart attack, and addiction risks) with regard to adopting a safe and effective cessation strategy.

Prescription drugs that block or reduce the effects of nicotine on the brain (bupropion hydrochloride, varenicline, and naltrexone hydrochloride) have also troubled smokers, but such concerns have not been so thoroughly studied as concerns about NRT products. In a semi-structured interview study, Morphett et al. (2015) report a thematic analysis in which negative views of pharmacological cessation aids were often expressed—most frequent were

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concerns about side effects from prescription medications. Foulds et al. (2009) report Black and Hispanic smokers are less likely to make use of smoking-cessation medications, often using them too infrequently or for too short a time as compared to Whites. Fucito et al. (2014) report that negative expectations about cessation medications predict lower 1-month quit rates. They conclude that addressing smokers' medication expectations can improve the effectiveness of medication-based cessation treatments.

Given the impact of some negative expectations about NRT products and prescription medications, it is vital for researchers to determine whether there are common concerns which limit smokers' willingness to adopt a broader range of SCSs. In this study, we explore the concerns young adult smokers have about using four very different kinds of cessation strategies. We include NRT and a prescription drug medication in this group, in order to confirm prior reports of negative expectancies. We also include two other cessation strategies (scheduled reduced smoking and a self-help website) that pose their own unique concerns for smokers. By examining very different SCSs, we can also determine whether there are common concerns that smokers have about the anticipated use of any SCS. Such shared concerns may reflect underlying preconceptions about smoking cessation and facilitate or hinder a smoker's choice of an appropriate cessation strategy. Knowledge of both strategy-specific ("unique") and strategy-independent ("shared" or "common") SCS concerns is necessary to develop conceptually tailored SCS communications (e.g. Williams et al., 2011).

Conceptual obstacles to the adoption of SCSs

Ferguson et al. (2012) consider the possibility that some smokers' concerns may only reflect comforting self-confirmation biases. However, these concerns may also arise from beliefs that smokers develop on their own and through their conversations with other smokers (Smith et al., 2015). In the science education literature, such naïve preconceptions have proved very resistant to change (Tippett, 2010). Therefore, researchers should be willing to treat SCS concerns seriously, recognizing that many of these concerns may reflect folk beliefs that are widely shared within a subculture of smokers (see Heurtin-Roberts and Reisin's, 1990, analysis of folk beliefs about high blood pressure). The fact that even doctors and medical students have found common NRT misconceptions to be plausible (Patel et al., 2013; Raupach et al., 2013) further attests to the enduring and pervasive nature of some misconceptions about smoking-cessation aids. The "mental models" approach to the design of risk communications (Jungermann et al., 1988; Morgan et al., 2002) assumes individuals may have a set of loosely associated or highly organized preconceptions of health risks (Chi, 2009; Kaufman et al., 2013). In using a mental models approach, researchers have conducted individual

and intensive "cognitive interviews" to elicit valid and invalid preconceptions about a variety of health risks (Bostrom et al., 1992). Health communications can then be devised to confirm valid preconceptions and correct invalid ones (Bostrom et al., 1994). In this study, we use a modified version of the cognitive interview (Morgan et al., 2002: 63–83) to elicit the conceptual concerns of young adult smokers about four very different SCSs.

Young adult "light" smokers

We focused in this study on sample of "light" smokers— young adults who smoke 10 or fewer cigarettes a day. Research has shown that long-term, low-rate (as few as 1–4 cigarettes a day) or intermittent smoking (as few as 5 days out of the month) can lead to serious health consequences (Ferguson et al., 2012; Gilpin et al., 1997; Okyemi et al., 2004; Schane et al., 2010). The subpopulation of light or occasional smokers may comprise as much as one-fifth of the current smoking population (Hassmiller et al., 2003). Since they do not usually self-identify themselves as being addicted to nicotine (Schane et al., 2010), these "light" smokers seldom seek cessation advice nor make use of SCSs. As such, they may be relatively unschooled about different SCSs and especially likely to offer a rich source of preconceptions to explore. Because of their failure to identify themselves as smokers, they also represent an underserved population at risk for becoming moderate or heavy smokers (Smith et al., 2007). In addition, light-smoking college students are of particular interest because they often report that they plan to quit before graduation (Thompson et al., 2007). Therefore, efforts to assist these smokers in quitting during their college years may prove quite effective in preventing the development of a more dangerous lifelong habit.

Our choice of SCSs

Given the variety of SCSs available to smokers (see Raupach et al., 2009), we chose to limit the scope of our exploratory study to preconceptions light smokers have about four very different SCSs. Although Chapman and McKenzie (2010) argue for the prevalence of successful unassisted smoking-cessation efforts, such efforts may depend upon idiosyncratic beliefs and tactics not readily employed by other smokers. We have focused on cessation strategies that health professionals would endorse and recommend. We provided our participants with detailed protocols for the effective use of each SCS, rather than providing only the name of the SCS and a brief description. This procedure served to standardize what participants knew about each SCS and minimized the impact of potentially large differences among our participants in their pre-existing understanding of each SCS. Since our aim is to establish what aspects of these known SCSs smokers find objectionable

rather than to determine what strategies they might devise on their own (see Smith et al., 2015, for an examination of such strategies), providing detailed protocol descriptions only furthers our objectives in this study. We describe the four cessation strategies briefly here and include in Appendices 1–4 the more detailed protocol descriptions our participants read in order to acquaint themselves with each strategy.

The first strategy is a hybrid NRT, calling for the daily application of nicotine skin patches and “as-needed” use of nicotine gum (see Foulds et al.’s, 2009, recommendations). The second strategy is a prescription drug therapy (PDT), calling for the daily use of Zyban® tablets (bupropion hydrochloride). Bupropion’s nicotine-antagonistic effects prevent cigarette smoking from stimulating nicotine receptor sites. Bupropion was chosen as a prescription drug treatment rather than Chantix® (varenicline): its partial-agonistic effects on nicotine receptor sites make it akin to NRT in its cessation effect. The third strategy is scheduled reduced smoking (SRS), originally developed by Shapiro et al. (1971) and later refined by Cinciripini et al. (1997). SRS diminishes the power of internal and external smoking triggers by requiring a fixed number of cigarettes to be smoked at randomly or equally spaced intervals throughout the day. Cigarettes not smoked as scheduled are discarded. After a smoker adjusts to the initial schedule, the number of daily cigarettes is reduced and the time between smoking appointments is increased. This process continues in gradual steps until the smoker is able to cease smoking completely. The fourth strategy is a self-help guide (SHG) available at the SmokeFree.Gov. The website <http://smoke-free.gov> was developed by the Tobacco Control Research Branch of the National Cancer Institute and is more a menu of tactics for use in a self-directed quit attempt than a formal cessation strategy. In this SHG, smokers are informed of the dangers of smoking, enjoined to set a public “quit date,” to avoid internal and external smoking “triggers,” to find substitute behaviors to cope with withdrawal symptoms, and to seek support services as needed.

Methods

Participants

In order to fulfill a course research requirement at a major state university in the southwestern United States, 29 females (8 Non-Hispanic Whites, 15 Hispanic Whites, 5 Non-Hispanic Blacks, and 1 Asian) and 29 males (12 Non-Hispanic Whites, 14 Hispanic Whites, and 3 Non-Hispanic Blacks) volunteered to participate in a 50-minute, small-group session on “Smoking-Cessation Techniques.” The computerized research participation system restricted enrollments to current smokers between 18 and 24 years of age. Of the 58 participants, 56 described themselves as light smokers (“10 or fewer cigarettes per day”); the

remaining two participants reported smoking more than 10 cigarettes a day and were eliminated from all subsequent analyses. Of the final pool of 56 light smokers, 50 had already made efforts to quit smoking, with 42 attempting to quit “cold turkey.” Three participants had made use of nicotine patches, gum, or lozenges, and one of the three had also used a prescription medication. According to their Fagerstrom Test for Nicotine Dependence (FTND) scores (Heatherton et al., 1991), 33 of the light smokers in this sample had “no dependence,” 15 had “low dependence,” and 7 had “moderate dependence.” On the basis of these self-reports, the majority of our participants were young adult light smokers who had made an attempt to quit smoking on their own but had no previous experience with the four cessation protocols examined in this study.

Experimental materials

Smoking Behavior Questionnaire. The 24-item Smoking Behavior Questionnaire (SBQ) form asked participants to answer close-ended questions about smoking behavior, cigarette preferences, craving levels, and the use of SCSs. Heatherton et al.’s (1991) six FTND items were embedded in this questionnaire. The primary purpose of the SBQ was to verify that participants were light smokers who were interested in quitting but had made any serious effort to do so.

SCS protocol descriptions. The first author (M.P.R.) prepared a detailed description of each smoking-cessation protocol written at comparable Flesch–Kincaid Grade Levels (FKGL). The NRT description (485 words; FKGL=9.8) relied on product label information for nicotine skin patches and nicotine gum; in addition, information was also obtained from the products’ websites, www.NicoDermCQ.com and www.Nicorette.com. The hybrid gum-and-patch strategy we describe in our protocol is based on Foulds et al.’s (2009) recommendations. The PDT protocol for bupropion (429 words; FKGL=9.8) relied on product information for physicians at the manufacturer’s website—www.drugs.com/pro/zyban. That website cautions potential users about the potential risks and side effects of the drug, portraying it as more harmful than might be appropriate given the risk of smoking itself (see Foulds et al., 2009: 16). The SRS protocol (490 words; FKGL=8.8) described an equal-interval scheduling of smoking appointments (Cinciripini et al., 1997) rather than the original random-interval scheduling (Shapiro et al., 1971). The SHG protocol description (603 words; FKGL=8.9) relied on information found at the National Cancer Institute’s SmokeFree.gov website. The complete descriptions are included in Appendices 1–4. Each legal-sized sheet included five numbered lines at the bottom prefaced by the question, “What five reasons might a smoker give for thinking the <SCS protocol name> is not a good one?”

Assignment of booklets to participants. Because each participant was asked to report concerns about all four protocols, it was necessary to control for protocol order and response fatigue effects using different orderings of the descriptions across participants. Rather than using all 24 permutations of the protocol orders, we prepared four sets of materials booklets to satisfy two constraints: (a) each description appeared as often in one booklet position as in any other, and (b) each description was preceded and followed by each of the other three descriptions (or no description) equally often. Participants were randomly assigned to the four booklet conditions, with each block of four participants receiving different booklets.

Procedure

After signing the consent form, the experimenter handed out copies of the SBQ, asking participants to answer each question as honestly as they could. Participants were then provided with materials booklets as described above. The experimenter explained “relatively little is known about the specific concerns that prevent smokers who are ready to stop smoking from making greater use of formal smoking-cessation strategies.” Participants were given 5 minutes to read each SCS protocol and obtain a clear understanding of the details of each protocol. Immediately after reading a protocol description, participants took another 5 minutes to write down five different reasons a smoker might give for not using that SCS. We did not request our participants to write down their own reasons because we wanted them to report both their own reasons and those they might have heard or could imagine. Our goal was to obtain the largest possible pool of SCS concerns. The experimenter concluded the session by giving all participants the debriefing form, answering any questions, and thanking them for their help. The University’s Institutional Review Board reviewed and approved the procedure and all materials.

Analysis

In order to obtain information about the relative frequency of different preconceptions for a given SCS, our emergent content analysis focused on keywords or phrases that signaled an identifiable and distinctive underlying preconception that might preclude the adoption of and adherence to a given cessation protocol.

Classifying individual concerns into distinct categories of preconceptions. Participants typically reported four concerns for each SCS, with some reporting as few as three and others as many as six. Occasionally, a participant used slightly different words for the same SCS concern (e.g. “has too many risky side effects” and “the side effects sound scary”): only one concern was coded in such cases. The second author (J.J.H.) independently classified concerns into as many

distinct SCS preconception categories as possible. The classification task was made easier by the fact that similar wording was often used by participants to identify a particular preconception. For example, the preconception label “CravingsContinue” was coded in response to SHG concerns such as “urge would never fade,” “you will still have cravings,” or “the urge might still be there.” Similarly, the preconception label “OralRitual” was coded in response to NRT concerns such as “For me, I like the act of smoking to receive nicotine,” “Won’t have the sensation of having a cigarette in your mouth,” or “it’s not just the nicotine, it’s the act of smoking itself that is relaxing and nice.” J.J.H. was able to classify all but 7 of the pool of nearly 900 concerns into 32 distinguishable categories of preconceptions.

Reliability of the coding procedure. Using the 32 preconception categories identified by J.J.H., M.P.R. independently classified all concerns from half of our participants to obtain a measure of inter-rater reliability. The overall agreement rate across the four SCSs for this subsample was 93 percent. The NRT agreement rate was 91 percent for 114 concerns, the PDT rate was 96 percent for 117 concerns, the SRS rate was 96 percent for 110 concerns, and the SHG rate was 92 percent for 121 concerns. We resolved the 29 coding disagreements by discussion, and J.J.H. then re-scored the concerns expressed by all of our participants to accord with the final set of classification criteria.

Results

Categories of SCS preconceptions

The total response pool consisted of 219 NRT concerns, 229 PDT concerns, 218 SRS concerns, and 233 SHG concerns. We introduce in this study a distinction between preconceptions “unique” to a given strategy and preconceptions “shared” by two or more strategies. We believe the distinction is useful because shared preconceptions may offer insights into participants’ mental models of nicotine addiction rather than insights into their mental models of a specific cessation strategy. Of the 32 distinguishable preconceptions we found, 19 were “unique” to a single strategy, and 13 were “shared” by more than one strategy. In Table 1, we show in descending order for each SCS protocol the proportion of participants reporting a particular category of preconception. The identifying label for each concern reflects the typical descriptive phrase provided by participants for that category of preconception. All reporting rates for categories of concern are expressed as proportions based on the sample size of 56. Concern labels and proportions shown in bold font are “unique,” reflecting a concern specific to a given cessation protocol. Concern labels and proportions shown in regular font are “shared” and reflect a concern reported for two or more cessation protocols. The label superscript for shared-concern proportions

Table 1. Concerns that light smokers have about four kinds of smoking-cessation strategies.

NRT concerns	p_{NRT}	PDT concerns	p_{PDP}	SRS concerns	p_{SRS}	SHG concerns	p_{SHG}
		SideEffectsWorries ²	.98				
TooMuchEffort ³	.48			TooMuchEffort ³	.63	SuddenQuittingHard ³	.50
				CantSmokeAtWill	.50	LifeStyleChangeHard	.48
NoOralRitual ²	.36	PrescriptionHassle	.34	LikelihoodOfSlips ²	.34	HaveSmokingFriends	.38
				HardTo“UseOrLose”	.32	LackSelfDiscipline ³	.38
						AddictionTooStrong ⁴	.34
CravingsContinue ⁴	.30	PossibleDosingError ²	.30	StillSmoking	.30	PublicContractWorry	.29
TakesTooLong ⁴	.29			CantWaitUntilAppt	.29		
SuddenQuittingHard ³	.29			CravingsIncrease	.29		
				LackSelfDiscipline ³	.29		
SideEffectsWorries ²	.20	NoOralRitual ²	.27	KeepingTrackHard	.23	CravingsContinue ⁴	.27
JustWontWork ⁴	.20	TakingPillsDaily	.25	TakesTooLong ⁴	.20	NoGoodSubstitute	.23
		CravingsContinue ⁴	.23			LittleMoralSupport	.21
		CostOfProduct ²	.23				
AddictionTooStrong ⁴	.18	TakesTooLong ⁴	.16	CravingsContinue ⁴	.14	JustWontWork ⁴	.11
PossibleDosingError ²	.14	JustWontWork ⁴	.16	JustWontWork ⁴	.14		
LikelihoodOfSlips ²	.11	SuddenQuittingHard ³	.14				
CostOfProduct ²	.09	AddictionTooStrong ⁴	.07	CantStopAtLimit	.09	TakesTooLong ⁴	.07
DontLikeProduct ²	.07	DontLikeProduct ²	.07	AddictionTooStrong ⁴	.07	CantAvoidTriggers	.05
LackSelfDiscipline ³	.05	SmokeMoreForHit	.05				
CouldCauseCancer	.04	TooMuchEffort ³	.04				
StillUsingNicotine	.02						
GumPatchAddictive	.02						

SCSs: smoking-cessation strategies.

N=56. Concerns shown in bold font were unique to a given SCS. Concerns in regular font were reported for more than one SCS; the superscript indicates how many of the four SCSs elicited that concern.

indicates how many other protocols elicited that same concern.

NRT preconceptions. As can be seen in the first column of Table 1, only three preconceptions were specific to the hybrid patch/gum nicotine replacement protocol, and none were reported by more than 5 percent of our respondents. Two of these were the preconceptions that NRT products could cause cancer or prove addictive; both concerns have been reported in prior studies with much greater frequency. The third concern was that the NRT protocol required a smoker to keep using nicotine when the goal is to eliminate nicotine dependence. In contrast, the three primary concerns of our light smokers were as follows: following the NRT protocol would require too much effort, .48; the patches and gum would fail to provide the oral satisfaction of cigarette smoking, .36; and these products would fail to alleviate nicotine cravings, .30. Two other major concerns were that the protocol required them to stop smoking completely on a target date, .29; and that it would take too long to work, .29. A fifth of our respondents did worry about potential side effects of pharmaceutical nicotine, confirming Foulds et al.’s (2009) argument that the warnings on

these products may focus smokers on rare or negligible side effects. Although some cessation interventions have produced increases in adoption rates by providing free nicotine replacement products (see Krupski et al., 2013), less than 10 percent of our participants expressed concerns about the cost of those products.

It is notable that at least 11 of the 16 categories of concern about the nicotine replacement protocol were not unique to that protocol. The most common of these non-specific concerns were as follows: too much effort would be required, .48; missing the oral satisfaction of their smoking ritual, .36; continuing cravings that would be difficult to control, .30; the 12-week length of the procedure, .29; and suddenly quitting smoking in order to begin the NRT, .29.

PDT preconceptions. As shown in the second column of Table 1, only three concerns were unique to the prescription drug protocol: that it would be difficult to obtain the necessary prescription, .34; that pills would have to be taken daily, .25, and that an individual might smoke more cigarettes in order to overcome the nicotine-antagonist effects of bupropion, .05. Smokers’ concerns about medication regimens have previously been reported, but increased

compensatory smoking has not been. The overwhelming concern of our light smokers was the possibility of relatively serious side effects from the use of bupropion. Our prescription drug protocol makes use of information for doctors found at the Zyban website and may reflect an overly cautious stance of the manufacturer and the Federal Drug Administration (see Foulds et al., 2009). However, a prescribing physician is expected to function as an “informed intermediary” and would be obligated to explain potential side effects to a smoker whose dependence level warranted a pharmacological intervention.

It is notable that 7 of the 14 expressed concerns were not specific to the use of a prescription drug, but instead reflected general concerns about the challenges of any SCS. Chief among non-specific concerns were the following: they would miss the oral satisfaction of their smoking ritual, .27; and the fear that cigarette cravings would continue to be difficult to control, .25.

SRS preconceptions. As can be seen in the third column of Table 1, our respondents had seven protocol-specific concerns about SRS. Their main concern was not being allowed to smoke whenever they had the urge, .50. Four other major concerns were also expressed: the “use it or lose it” rule requiring them to throw away any cigarette not smoked when scheduled, .32; they would still be smoking throughout the cessation effort, .30; they would not be able to postpone smoking until the appointed time, .29; and their cravings for cigarettes would actually increase whether they were obligated to smoke when they had no urge to do so, .29. They were also concerned that keeping track of the appointed smoking times and the number of cigarettes allowed at each “appointment” would be difficult, .23. Less than 10 percent anticipated a problem with limiting themselves to the allocated number of cigarettes at the appointed times.

Seven preconceptions about SRS were common to other SCSs. The major non-specific concern was again that too much effort was involved in adhering to the protocol, .63. Three other concerns were also expressed: slipping up by smoking at the wrong time, .34; lacking the self-discipline to stick with the cessation protocol, .29; and thinking that the process would take too long, .20.

SHG preconceptions. The concerns about the SmokeFree.Gov protocol are shown in the fourth column of Table 1. Six preconceptions were unique to this self-help menu. The major protocol-specific concern was that a complete change in lifestyle would be necessary, .48. Other strong concerns were as follows: their smoking friends would obstruct their efforts directly or indirectly, .38; and the potential embarrassment of making a public commitment on the chosen “quit date,” .29. Respondents also had concerns they had no good substitute activity for smoking, .23; and there would be little moral support for them in their efforts, .21. Only

5 percent expected to have any problem avoiding the smoking triggers in their daily routines.

There were also shared preconceptions about the self-help suggestions at SmokeFree.gov. The major one was that sudden quitting would be very difficult, .50. Our participants were also concerned that they lacked the necessary self-discipline to quit smoking, .38; that they had an addiction that was too strong to control, .34; and that they would have to tolerate unabated cigarette cravings .27. There was little concern that the variety of self-help strategies would prove ineffective, .11; or that the process would take too long, .07.

Discussion

Summary and interpretation of findings

In this study, we asked a convenience sample of light smokers to report reasons smokers might have for not using a given SCS. Three important methodological features of our study were as follows: (a) the use of four very different cessation strategies, (b) the use of open-ended prompts to elicit an unconstrained range of concerns about each strategy, and (c) a standardized coding scheme to permit quantitative estimates of the prevalence and relative frequency of cessation preconceptions within and across the four strategies. The need for open-ended prompts in the study of counterproductive preconceptions about smoking cessation is all too evident: misconceptions commonly reported about NRT (the possibility of cancer, heart attacks, or addiction as well as cost and availability) in closed-ended studies were rarely reported by our participations. Instead, perceived inconvenience (“too much effort,” “takes too long”) was a central focus for our participants. In addition, we found that similar reasons for not using a cessation strategy were often reported for multiple strategies. Chief among these shared preconceptions was the perceived inconvenience of the strategy (“too much work,” “takes too long”). It is notable as well that 40 percent of the preconceptions we identified were reported for multiple strategies, suggesting that preconceptions about the cessation process itself may contribute importantly to the acceptability of specific cessation strategies. Finally, it should be noted that nearly two-thirds of the concerns our participants reported reflected low perceived task efficacy (“lack self-discipline,” “can’t avoid triggers”) rather than negative outcome expectations (“possible side effects,” “cravings may continue”).

Eliciting productive and unproductive preconceptions about smoking cessation. The value of using open-ended questions rather than closed-ended rating scales (see, e.g. Gross et al., 2008) is particularly evident in the concerns of our light smokers about nicotine replacement products. Previous studies have shown cost, availability, and the risk of negative outcomes (cancer, heart attack, or addiction) to be very

important concerns. However, our data show the chief concern to be the perceived effort in adhering to the required protocol rather than the cost or availability of nicotine replacement products. Participants were also concerned that the recommended 12-week program would take too long or would be unlikely to work. The risks of cancer or pharmaceutical nicotine addiction were mentioned less than 5 percent of the time, while the risk of a heart attack was never mentioned. Anticipated negative outcomes focused on the loss of the oral rituals associated with cigarette smoking and the prospect that smoking cravings would not be adequately controlled by nicotine skin patches and the as-needed use of nicotine gum or lozenges. The prescription drug protocol also produced concerns about the perceived inconvenience of the program. Although it is not surprising that most would be worried about potential bupropion side effects and that many would be concerned about the effort involved in getting a prescription, it is quite surprising that a quarter of the sample were concerned about the perceived inconvenience of having to take pills daily during the course of the treatment. These findings indicate that formal, in-depth cognitive interviews of small groups of smokers (see Morgan et al., 2002) may make it possible to develop more valid closed-ended questionnaires for use in large-scale studies.

Identifying the folk beliefs and mental models that frustrate smoking-cessation efforts. The importance of comparing the nature and prevalence of concerns about smoking cessation across multiple strategies is underscored when the majority of reported concerns do not focus on specific features of the cessation protocols. Overall, one-third of the concerns were protocol-focused (e.g. “gum/patch addictive”), but the remaining concerns focused on the general challenge of smoking cessation (e.g. “lack self-discipline”). Four non-specific (i.e. strategy-independent or shared) concerns were reported with differing frequencies for all four strategies: smoking cravings would continue at high levels; the addiction was simply too strong; the quitting process would take too long; and the strategy would simply not work. Three more shared concerns were reported for all but one strategy: that there was too much effort involved in adhering to a protocol; that suddenly quitting was very difficult; and that too much willpower was required. In the absence of this comparative information about SCS concerns, efforts to modify preconceptions hindering the use of a strategy might focus inappropriately on strategy-specific concerns. The relative frequency of shared cessation concerns suggests cessation communications should focus more on preconceptions about nicotine addiction in promoting the use of any cessation strategy. Concerns about continued cravings, the strength of a nicotine addiction, lack of self-discipline, and the likely failure of any strategy all point to folk models of nicotine addiction that are counterproductive in motivating cessation efforts. For that reason, in-depth

cognitive interviews of smokers are needed to identify and classify the mental models that smokers have of nicotine addiction as well as the mental models that smokers have of different treatment protocols. For smokers who are interested in quitting, optimal results may be obtainable only if cessation interventions correct both their mental models of the available treatment options and their mental models of nicotine addiction (see Morgan et al., 2002, and Vosniadou, 2013, for wide-ranging examples of conceptual change interventions).

The role of self-efficacy beliefs. Our findings also have implications for improving the success rates for unaided cessation efforts (see Chapman and McKenzie, 2010). Most of the reasons our participants cite for not using a cessation strategy are the very reasons that self-directed efforts would often fail. Bandura (1997, 2004, 2011) has convincingly demonstrated the centrality of efficacy beliefs as a determinant of behavior. Among the 32 concerns summarized in Table 1, nearly two-thirds reflect maladaptive efficacy beliefs that would undermine unaided smoking cessation. To some degree, the success of formal SCSs (see especially Cinciripini et al.’s, 1997, SRS procedure) may derive from their success in developing relevant efficacy beliefs and cognitive competencies in a systematic way. The potential risk inherent in self-directed cessation efforts is that individuals may not set for themselves the moderately challenging, but attainable proximal subgoals that would build cessation competencies and coping-efficacy beliefs (see Bandura and Schunk, 1981, for an example of the proximal-subgoal method). Even more unfortunately, there is the prospect that any resulting cessation failures would only further strengthen low self-efficacy beliefs. Although efficacy beliefs underlie the majority of the concerns our participants expressed, some concerns cited in Table 1 reflect other psychosocial determinants of health-protective behavior identified by Bandura (2004). These include outcome expectations (“side effects worries,” “cravings continue,” “public contract”), perceived social and environmental barriers (“can’t avoid triggers,” “cost of product,” “have smoking friends”), and goal-setting orientations (“too much effort,” “takes too long,” “just won’t work”). Because efficacy beliefs have indirect effects on all of these determinants, fostering and developing efficacy beliefs through smoking-cessation communications and interventions is likely to increase success rates for any cessation effort.

Implications and next steps

Although some of the concerns noted in Table 1 may reflect the self-serving confirmatory biases that Ferguson et al. (2012) describe, many appear to reflect naïve beliefs about smoking behavior (PDT: “addiction too strong”) or about the strategy dictating the SCS protocol (SRS: “why smoke

when I'm not in the mood"). The specificity of the expressed concerns we report in Table 1 suggests that general admonitions to use SCSs will often fail.

Although we identify misconceptions that hinder the adoption of and adherence to four cessation strategies, a crucial next step is to determine whether and to what degree specific concerns prejudice the use of each SCS. Once we confirm in behavioral studies which concerns are most counterproductive, we will then need to determine whether those concerns are isolated beliefs that can be easily modified with persuasive health communications or whether they are more deeply entrenched preconceptions rooted in an underlying mental model of smoking cessation. In the former case, relatively simple interventions such as the decisional-balance worksheet used in motivational interviewing (Rollnick et al., 2008) may prove sufficient. In the latter case, more intensive conceptual-change interventions (Vosniadou, 2013) may be needed. One of these is the refutational-text method (Tippett, 2010) in which a misconception is first articulated ("Many smokers believe that using a 12-week nicotine replacement program to quit smoking requires too much effort"), then clearly labeled a misconception ("But this belief is mistaken because it does not take account of the actual reports of smokers using the program"), and finally reconciled with the actual facts ("The 12-week program is twice as effective as a 'cold turkey' strategy that may fail several times and discourage a smoker from making any additional efforts. The actual effort requires only the daily application of a skin patch and the chewing of nicotine gum when cravings are too strong—a daily investment of no more than ten minutes").

However, the critical question is whether the correction of mistaken beliefs or the refutation of conceptual misconceptions is sufficient to persuade a smoker to adopt and adhere to a cessation regimen he or she would otherwise have rejected. Despite the obvious theoretical and practical importance of the question, little relevant research is to be found in the literature. One notable exception is an effort by Ferguson et al. (2011) to correct specific misconceptions about NRT by informing smokers that research findings had demonstrated those beliefs to be incorrect. A second exception is an effort by Borland et al. (2012) to disabuse smokers of misconceptions about NRT by providing a fact sheet demonstrating the incorrectness of those beliefs. Ferguson et al. (2011) reported an increase in the intention of their respondents to use NRT in the future, but Borland et al. (2012) reported only mixed results. Clearly, additional research is required to determine how best to correct misconceptions about cessation strategies.

Limitations of the study

Sample limitations. Our findings are based on a convenience sample of college freshmen who were light smokers interested in quitting, but had largely relied on going "cold

turkey" as a cessation strategy. As noted previously, young adult light and intermittent smokers are a large subpopulation of smokers of intrinsic interest. Our findings will not necessarily generalize to other subpopulations of smokers. In particular, the preconceptions that long-term smokers, moderate and heavy smokers, and ethnically diverse smokers harbor may be very different from those reported by our participants. Studies of moderate and heavy smokers will be of particular importance because light and intermittent smokers often do not make serious efforts to cease smoking nor are they typically encouraged to do so (Schane et al., 2010). A virtue of further replications with varied subpopulations of smokers and different sets of cessation strategies is that it may be possible to identify a comprehensive set of smoking-cessation preconceptions and to determine their relative importance for different subpopulations of smokers.

Stimulus materials limitations. Another limitation of our procedure is the fact that we provided our participants with detailed cessation protocols in order to elicit preconceptions. In doing so, we necessarily precluded the possibility of obtaining detailed information concerning our participants' naïve beliefs about the specific procedures involved in using each cessation strategy. As Carpenter et al. (2011) have demonstrated, smokers do not necessarily have an accurate or detailed understanding of the means by which NRT facilitates smoking cessation. Had we provided our participants only with labels for our four cessation strategies (e.g. "NRT" or "PDT") along with sentence-long descriptions, variations in their understanding of those strategies would have been confounded with the nature of the concerns they reported about each strategy. We therefore provided detailed protocol descriptions using brand-name products in order to standardize as much as possible our participants' understanding of what each cessation strategy would require of them.

Limitations of the interview procedure. A final limitation of our study is that participants were asked to provide spontaneous reports of concerns after spending only a few minutes reading and thinking about each of the four protocols. The use of a single, open-ended probe question is no substitute for an in-depth mental models interview (Morgan et al., 2002: 63–83). However, in our exploratory study, some form of open-ended questioning was needed to discover the range of preconceptions individuals hold about different cessation strategies. Furthermore, asking smokers to rate the truth of various claims about cessation strategies is potentially problematic. It is quite possible that responding to true-false statements (e.g. "The nicotine gums and lozenges are just as addictive as cigarettes") may make explicit a belief previously only held implicitly or engender an entirely new belief that is plausibly consonant with a respondent's existing beliefs. For that reason, our

open-ended procedure is a less reactive one than that used in previous studies. Although our open-ended procedure does not provide as much detail as a cognitive interview might, it does provide us with enough information to portray the prevalence and relative frequency of participants' concerns about different protocols.

Conclusion

We argue that a smoker's concerns about making use of a particular SCS may offer crucial insights into the smoker's naive preconceptions about the strategy or of the nature of nicotine addiction. Either set of preconceptions may be flawed, causing the smoker to reject a feasible and effective cessation strategy. Our open-ended questions and our emergent-category content analysis allowed us to develop a less biased estimate of the nature and prevalence of cessation preconceptions than previously possible. By providing our young adult light smokers with detailed descriptions of each cessation protocol, we have controlled for pre-existing differences in our smokers' understanding of those protocols. The preconception-based concerns that we found unique to each protocol offer insights into the mental models that light smokers have of the four cessation strategies we examined. NRT, for example, proved wanting because it failed to provide smokers with the oral satisfaction that cigarette smoking afforded them. Previously reported concerns about cancer, heart attack, and addiction risks were infrequent in our participants' mental models of NRT. In contrast, the preconception-based concerns that we found common to two or more protocols offered insights into the mental models that our smokers have of nicotine addiction and smoking cessation. Most common were preconceptions about the challenge of fighting an addiction, and the perceived inconvenience of using formal cessation strategies.

Whether the counterproductive preconceptions we have identified arise from easily corrected misconceptions or from deeply rooted conceptual misunderstandings, the health-communication challenge is a daunting one. Not only must persuasive interventions argue for the health benefits and effectiveness of a cessation strategy, they must also confirm and correct naïve preconceptions that smokers hold about the logic of the strategy and the nature of nicotine addiction. What we hope to accomplish with our study is to make it evident that smokers' expressed concerns about a cessation strategy are to be taken seriously—as valid concerns to be alleviated or invalid concerns to be corrected. Persuasive efforts to promote smoking cessation must be regarded as highly focused interventions to foster strategy-specific conceptual change as well as the development of strategy-specific efficacy beliefs. The importance of further inquiry in this area is reflected in the scarcity of intervention studies that attempt to mitigate the conceptual obstacles that hinder the adoption of effective SCSs.

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Appendix 1

Hybrid nicotine replacement therapy protocol

Nicotine replacement therapy (NRT) helps you quit smoking by gradually reducing the amount of nicotine they take in each day. Smokers can wear NicoDerm CQ skin patches to ensure that they receive a continuous level of nicotine throughout the day. The pure nicotine in these patches passes through the skin into the blood stream and eventually reaches the brain to produce some, but not all, of the satisfaction that cigarette smoking normally provides. Before you can begin using the skin patches, you need to stop smoking completely. The steady supply of nicotine from the skin patches will help you cope with the urge to smoke.

Smokers begin the first step of the three-step NicoDerm CQ program by placing a new Step 1 patch on a different part of the body each day. The skin area has to be clean, dry, and hairless. The Step 1 skin patches deliver the equivalent of 21 mg of nicotine throughout the day (an average cigarette delivers an absorbed level of nicotine that is about 1 mg). This patch can be worn for 24 hours or for 16 hours. Smokers who experience nicotine cravings when they wake up may want to keep the patch on for 24 hours. Those who have trouble sleeping or have vivid dreams may wish to take the patch off at bedtime and replace it with a new patch the next morning.

During the course of the 10-week NicoDerm CQ program, smokers may occasionally experience sudden and strong urges to smoke—although the patches are supplying nicotine continuously. If that happens, you can chew a piece of Nicorette gum to get a small additional dose of nicotine (2 or 4 mg) to reduce that urge. During Step 1 of the program, you can chew one piece of gum every 90 minutes as needed to cope with a strong urge to smoke.

Smokers should use the Step 1 patch for 6 weeks and then switch to the Step 2 patch for Weeks 7 and 8. The NicoDerm CQ Step 2 patch delivers 14 mg of nicotine throughout the day. During Step 2 of the program, a smoker should only chew one piece of Nicorette gum every 3 hours as needed to cope with a strong urge to smoke. For Weeks 9 and 10, smokers should switch to Step 3 patch. The NicoDerm CQ Step 3 patch delivers 7 mg of nicotine throughout the day. This gradual reduction in the daily nicotine dose over a 10-week period helps you get used to lower and lower nicotine levels. By Week 11, you should stop using the skin patches and feel little need to start smoking again. During Weeks 11 and 12, a smoker should only chew one piece of Nicorette gum every 6 hours as needed to cope with a strong urge to smoke. After 12 weeks, one should have no further need to use Nicorette gum.

Appendix 2

Prescription drug therapy protocol

Zyban (bupropion hydrochloride) helps individuals to quit smoking by preventing nicotine from producing the pleasurable feelings that smokers enjoy. Zyban molecules occupy nicotine receptor sites in the brain without activating them. With those nicotine receptor sites blocked by Zyban, nicotine molecules cannot reach the receptor sites to activate them. For that reason, nicotine cannot produce its usual effects. At first, you should take one Zyban tablet each day for a week while you continue to smoke. During that week, Zyban builds up in your system and gradually reduces the amount of pleasure that nicotine produces.

Zyban is a prescription drug that should only be used by individuals who are 18 years and older. It should only be taken as directed by a physician because the drug can have harmful effects on some individuals. A doctor will be able to decide whether you are likely to have those side effects and will not prescribe the drug for you. You will normally take one Zyban tablet each day for the first 3 days and then begin taking one tablet and a second tablet 8 hours later each day for 7–12 weeks. Sometimes, a doctor will decide that you should take it for a longer period of time in order get the full benefit of the drug. You can obtain the maximum benefit from using Zyban if you avoid smoking after taking Zyban for that first week. However, it is not harmful to your health if you “slip” and smoke a cigarette while taking Zyban.

Zyban tablets must be swallowed whole. Crushing, chewing, or cutting Zyban tablets should not be done because it would release the medication into your system too fast and may result in seizures or other harmful side effects. It is also important that you should not take an extra dose of Zyban to make up for a missed dose. An extra dose may also increase the possibility of seizures or other side effects.

Zyban can be used while wearing nicotine patches, but only as directed by your doctor. Smoking while taking Zyban and using nicotine patches is not recommended because the combination can have unpleasant side effects. Two of these side effects are dry mouth and trouble sleeping. If it becomes difficult to fall asleep and stay asleep, your doctor may suggest that you take the tablet in the morning rather than in the evening. There are other side effects that can occur if you have certain medical conditions or are taking certain drugs. A doctor or pharmacist can tell you whether you are likely to have those side effects.

Appendix 3

Scheduled reduced smoking protocol

The first step in the scheduled-smoking procedure is to set smoking “appointments” each day. The number of appointments you set should equal the number of times you smoke

each day. If you normally smoke eight cigarettes a day, then you should set eight, evenly spaced smoking appointments a day. Spacing your appointments at equal intervals across the day is the most effective approach. However, what is most important is that your appointments should *never* take place where, when, and with whom you usually smoke.

It is also very important that you smoke each cigarette at its appointed time. If you do not, then you “lose” that smoke for the day and have to wait for your next appointment. You cannot “save” a cigarette until you are in the mood. Scheduled smoking is most effective if you only smoke when you have no real craving for a cigarette. That way you break down the link between the urge to smoke and whatever internal or external cues automatically trigger that urge. If you keep every appointment each day, the amount of nicotine in your system will be at a constant level for the day. As a result, you should experience very few withdrawal symptoms.

It may take you a week or more before you are comfortable smoking your usual number of cigarettes at evenly spaced appointment times throughout the day. Once you can easily do so, you can start reducing your smoking in small steps. You might begin by scheduling only seven evenly spaced smoking appointments a day instead of your usual eight (in general, just reduce whatever number of cigarettes you smoke each day by one). The important thing is to make the reduction small enough so that you will have no problem maintaining the reduced level of smoking. You do not want to make the mistake of reducing your smoking so much that you develop cravings you cannot control.

You keep up this process of slowly reducing the number of cigarettes you smoke each day and always smoking by appointment. Remember that you lose a cigarette for the day if you do not smoke it on schedule. Force yourself to throw it away and wait for your next appointment. Make sure that you are never carrying more cigarettes than you are allowed to smoke each day. There is no need to rush the process; you just want to keep making gradual reductions without having to work too hard to control your cravings. Withdrawal symptoms will be minimal because you are getting a steady supply of nicotine each day. You may not even experience any withdrawal symptoms if you always keep your appointments and always make small reductions only when you can do so easily and comfortably. That is the reason this technique is called “scheduled reduced smoking.” No matter how long it takes, you are still reducing the level of the cancer-causing chemicals you take in each day.

Appendix 4

Self-help guide protocol (www.SmokeFree.gov)

Your Quit Date is the day you become SmokeFree—taking not a single puff on a cigarette from that day forward. Prior to your Quit Date, you can prepare yourself for the change

by reducing the number of cigarettes you smoke each day or the number of puffs you take on each cigarette. You also need to make a public commitment to stop completely on your Quit Day. You should sign a no-smoking contract in front of a family member, a friend, or an acquaintance. This contract serves as a public statement of your goal to stop smoking. Your witness should be someone who is willing to provide you with help and support when you need it. A friend who has already stopped smoking and has not had a single puff for a year or more is a good choice.

The second step in becoming SmokeFree is to develop a quit plan and arrange for whatever support you will need to stick with that plan. You should identify what triggers your urge to smoke, decide how you will cope with your smoking cravings, and how you will reward yourself for the progress you make. You can call 1-800-QUIT-NOW to get advice about the different types of quit methods you can use.

The third step in becoming SmokeFree is to keep yourself busy with challenging activities that keep you from focusing on the fact that you are not smoking. If you smoke when you are bored, need to relax and unwind, or are under stress, make a list of other activities that are interesting, relaxing, and stress-free enough to keep you from thinking about how much you would enjoy a cigarette. The urge to smoke usually lasts no more than 5–10 minutes if you can avoid focusing on it. You only need an absorbing and easily done activity that you can focus on for about 15 minutes. A short walk or a set of stretching exercises can do that for you. Remember to ask a close friend or relative for help at those times when you are feeling you cannot control your urge to smoke. You can also ask family members, friends, and acquaintances not to smoke around you in order to help you stay SmokeFree.

The fourth step in becoming SmokeFree is to recognize and avoid anything that triggers a smoking urge for you. Get rid of all cigarettes, lighters, matches, cigarette butts, and ashtrays in your house, car, or any place you spend time. Stay away from your favorite smoking spots. Avoid going places where you know others will be smoking. Identify the thoughts that lead you to think about smoking and do not let yourself focus on them. Be aware of the fact that any of these smoking triggers will still produce a craving for a cigarette even if you are no longer experiencing nicotine-withdrawal symptoms.

The final step in becoming SmokeFree is to maintain your momentum once you are past the withdrawal symptoms of the first few days or weeks. Make sure that you have fruits, vegetables, and candy and gum handy to substitute for that cigarette you would like to smoke. Keep track of the progress you make and do not blame yourself for occasional “slips.” Being able to defeat smoking cravings is something that you teach yourself in time and with patience. Reward yourself in some way at the end of every SmokeFree day. Keep your guard up and be willing to lean on someone else for support. And never take even a single puff to see whether cigarettes still have a hold on you!