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Short-term fluctuations in motivation to quit smoking in a sample of smokers in Hawaii

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Abstract

Background—Despite its potential for usefulness in informing the development of smoking cessation interventions, short-term fluctuations in motivation to quit is a relatively understudied topic.

Objectives—To assess the prevalence of smokers' day-to-day fluctuations in motivation to quit, and to assess associations of day-to-day fluctuations in motivation to quit with several established cessation-related variables.

Methods—A cross-sectional survey was administered to smokers in Hawaii ($N=1,567$). To assess short-term fluctuations in motivation to quit smoking, participants were asked to respond "True" or "False" to the statement: "My motivation to quit smoking changes from one day to the next." Other items measured desire to quit smoking, intention to quit, confidence in quitting, cigarette dependence, and other cessation-related variables.

Results—"My motivation to quit smoking changes from one day to the next" was endorsed as true by 64.7% of smokers, and false by 35.3%. Analyses revealed that smokers who indicated fluctuating motivation were significantly more interested in quitting as compared to smokers without fluctuations. Fluctuations in motivation to quit also were associated with greater confidence in quitting, lesser cigarette dependence, and more recent quitting activity (all $ps<0.01$).

Conclusions—Day-to-day fluctuations in motivation to quit are common. Day-to-day fluctuations in motivation to quit are strongly associated with higher motivation to quit, greater confidence in future quitting, and other positive cessation-relevant trends.

Keywords

Smoking cessation; motivation to quit; fluctuations; changes; intention to quit

1. Introduction

Motivation to quit smoking has been a featured topic in tobacco research over the past 25 years. The appeal of motivation to quit as a potentially important construct is clear: If some smokers are more motivated to quit than others, then it makes sense to take this into account

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Declaration of Interest

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when designing smoking cessation interventions. The model best known for employing motivation to quit smoking as an organizing construct is the Transtheoretical Model (TTM) and its core component, the Stages of Change (SOC) (Prochaska, DiClemente, & Norcross, 1992). Although the TTM initially brought needed attention to the topic of motivation to quit smoking, critics of the TTM have questioned various aspects of the model's validity (e.g., Herzog, 2008; Sutton, 2001; West, 2005). The TTM and other models of behavior change typically conceive of motivation to quit as varying over time. However, changes in motivation are theorized to change over long periods such as six months or 30 days. Short-term fluctuations in motivation to quit smoking remains a relatively understudied topic.

1.1. Fluctuations in motivation to quit smoking

Six studies have assessed fluctuations in motivation to quit over short time periods. Donovan et al. (1998), in an Australian sample, found that intention to quit changed for 16–17% of participants between baseline and a 2-week follow-up. Etter & Sutton (2002) found that between 15% and 24% of smokers differed in motivation to quit from baseline to a follow-up eight days later (results varied according to which measure of motivation to quit was employed). Hughes, Keely, Fagerstrom, & Callas (2005) assessed motivation to quit either twice or four times over a 30-day period. The results indicated that between 12% and 34% of smokers changed in motivation to quit over the 30-day period, depending on measurement schedule (two or four measurements) and which measure of motivation to quit was employed. Peters & Hughes (2009) assessed smokers daily for a month regarding their plans to quit or reduce smoking the next day. The results indicated that intentions to quit or reduce smoking changed a median of two times over a month's time and that 59% reported multiple changes in motivation to quit. Hughes, Solomon, Finger, Helzer, & Callas (2005) replicated the Peters & Hughes (2009) study with a sample of smokers who wanted to quit within the next three months. The results of Hughes et al. (2013) revealed that most participants fluctuated in their motivation to quit. Further, many daily intentions to quit did not result in a quit attempt the next day, whereas many actual quit attempts were not preceded by a reported intention to quit on the previous night. The authors of Peters & Hughes (2009) and Hughes et al. (2013) both concluded that fluctuations in cessation and reduction plans are more common than most models of smoking cessation would suggest. Finally, Werner, Lovering, & Herzog (2004) reported that 42% of a small sample of treatment-attending smokers ($N=72$) endorsed the statement: "My motivation to quit smoking changes from one day to the next."

In sum, the six studies of short-term fluctuations in motivation to quit revealed that approximately 20%–60% of adult smokers indicated some change in motivation to quit over time periods ranging from one day to 30 days. These studies varied in terms of sample characteristics, instruments used to measure motivation to quit, and study design. Thus, it can be concluded that some short-term fluctuations in motivation to quit do occur.

The current study employs the same approach as Werner et al. (2004) for assessing short-term fluctuations in motivation to quit smoking. Specifically, smokers were asked to indicate whether or not their motivation to quit "changes from one day to the next." Unlike Werner et al. (2004), the current study employs a large sample of multiethnic adult smokers

who represent the full spectrum of motivation to quit. In addition, the current study is the first to assess associations between fluctuations of motivation to quit and several established cessation-relevant variables. Available theories do not provide a clear basis for predictions regarding associations between short-term fluctuations in motivation to quit smoking and other cessation-related variables. Thus, these analyses are considered exploratory.

2. Methods

2.1. Participants and procedures

Participants were recruited from the community through local newspaper advertisements in Hawaii as part of a low-intensity intervention (i.e., printed materials) study comparing different stage models of smoking cessation. Smokers across the full spectrum of motivation to quit smoking were eligible to participate, and smokers were not required to try to quit smoking. Eligible participants: (a) were 18 years or older, (b) read English, (c) had mailing addresses, (d) were self-identified as smokers of at least three cigarettes per day, (e) smoked at least 100 cigarettes in their lifetime, and (f) were residents of the state of Hawaii. All measurements were obtained at the baseline assessment prior to the provision of any intervention.

2.2. Measures

2.2.1. Stability of motivation to quit—The item assessing stability of motivation to quit asked participants to rate the following statement as true or false: “My motivation to quit smoking changes from one day to the next.”

2.2.2. Interest and intention to quit smoking or cut down—Three items were employed: (a) “Do you want to quit smoking?” (b) “Do you intend to quit smoking?” (c) “Do you intend to cut down on the number of cigarettes you smoke?” Response options for these three items were: “(1) No, definitely not,” “(2) No, probably not,” “(3) Don’t know/undecided,” “(4) Yes, probably,” and “(5) Yes, definitely.” These items have been employed to assess motivation to quit smoking in several previous studies (e.g., Herzog & Blagg, 2007). Measures of motivation and intention to quit consistently have been found to predict future cessation (e.g., Abrams, Herzog, Emmons, & Linnan, 2000).

2.2.3. Contemplation Ladder—The contemplation ladder (Biener & Abrams, 1991) is an 11-point Likert scale depicted as a ladder. Contemplation ladder scores range from 0 (“No thought of quitting”) to 10 (“Taking action to quit, such as cutting down on smoking, enrolling in a program”), with a midpoint of 5 (“Think I should quit, but not quite ready”). This instrument has been employed to assess motivation to quit smoking in several previous studies (e.g., Herzog & Blagg, 2007) and is a predictor of smoking cessation (Abrams et al., 2000).

2.2.4. Confidence in quitting—Two items were employed to assess confidence in quitting smoking: “How confident are you that you will quit smoking some day?” and “How confident are you that you will quit smoking in the next six months?” Responses ranged

from “(1) Not at all confident” to “(5) Extremely confident.” Confidence in quitting is an established predictor of smoking cessation (e.g., Abrams et al., 2000).

2.2.5. Number of past 24-hour quit attempts—Participants were asked to indicate the number of times they had quit smoking cigarettes for 24 hours or longer in the past year. Response options ranged from 0 to “9 or more.” Responses of “9 or more” were coded as “9.” This variable also has been shown to predict cessation (Abrams et al., 2000; Farkas et al., 1996). However, we also note that several studies have found assessments of past quit attempts based on retrospective recall to be unreliable (e.g., Gilpin & Pierce, 1994).

2.2.6. The Fagerstrom Test for Cigarette Dependence (FTCD)—The Fagerstrom Test for Cigarette Dependence (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991) was employed as a measure of cigarette dependence. This test was formerly known as the Fagerstrom Test for Nicotine Dependence until its name was changed in 2012 (Fagerstrom, 2012).

2.2.7. Mean daily smoking rate—Participants were asked to report the mean number of cigarettes smoked per day. This was an open-ended question assessed during the initial telephone screening process. Cigarettes smoked per day is an established predictor of smoking cessation (e.g., Abrams et al., 2000; Farkas et al., 1996).

3. Results

3.1. Participant characteristics

The sample ($N=1,567$) was 50.0% female. The ethnic distribution was: 34.3% Caucasian, 31.1% Native Hawaiian, 21.0% Asian (e.g., Japanese, Filipino, Chinese, Korean), 6.7% African American, and 6.9% other (e.g., Hispanic, Native American, Micronesian). Household incomes exceeded \$30,000 for 25.6% of participants, whereas 41.8% reported annual household incomes of \$10,000 or less. Forty percent of the sample had a high school diploma, GED, or less education. Participants had a mean age of 45.2 years ($SD = 13.2$), smoked a mean of 18.7 cigarettes per day ($SD = 11.2$), and had smoked for a mean of 26.1 years ($SD = 13.4$). The mean FTCD score was 5.09 ($SD=2.36$). The mean Contemplation Ladder score for the sample was 4.98 ($SD=2.92$), whereas the midpoint of the Contemplation Ladder is 5. Thus, the sample was distributed about the mid-point on this validated measure of motivation to quit smoking. In summary, the sample was broadly representative of American adult smokers in terms of age, gender, smoking rate, motivation to quit, and cigarette dependence. However, the sample was much more ethnically diverse than most samples, and the participants were disproportionately low-income.

3.2. Day-to-day fluctuations in motivation to quit smoking

The analysis revealed that 64.7% of smokers endorsed the statement, “My motivation to quit smoking changes from one day to the next,” whereas 35.3% of smokers disagreed with the statement.

3.3. Associations with cessation-related variables

Associations with day-to-day fluctuations in motivation to quit smoking were calculated for each of the cessation-related variables. Specifically, independent samples *t*-tests were used to assess differences in means between those who did, and those who did not, indicate day-to-day fluctuations in motivation to quit. Significant effects were observed for each of these variables. Smokers with day-to-day fluctuations in motivation to quit were more likely to want to quit, intend to quit, and intend to cut down on cigarettes per day (all p s<.001). In addition, smokers reporting day-to-day fluctuations in motivation to quit smoked fewer cigarettes per day (p <.001), were less cigarette dependent (p <.01), and reported a greater number of recent quit attempts (p <.001), as compared to smokers with more stable day-to-day motivation to quit. In summary, day-to-day fluctuations in motivation to quit were significantly associated with positive trends in an array of established cessation-relevant variables, and six of seven tests were significant at p <.001 (see Table 1).

4. Discussion

Few studies have assessed the stability of motivation to quit smoking over short periods of time, and most of these studies employed a repeated measures design. The current study assessed the stability of motivation to quit by asking participants directly about day-to-day fluctuations in motivation to quit. Most smokers (64.7%) agreed with the statement: “My motivation to quit smoking changes from one day to the next.” These results are generally consistent with prior studies that employed repeated measures approaches to studying short-term fluctuations in motivation to quit. The results differed from Werner et al. (2004), who found that 42% of the sample endorsed the statement: “My motivation to quit smoking changes from one day to the next.” However, Werner et al. (2004) employed a small sample of treatment-attending smokers who likely had a more steadfast commitment to quitting smoking as compared to the current sample.

There is likely no ideal approach to assess short-term fluctuations in motivation to quit. Although there are advantages to a repeated measures approach, there are shortcomings as well. For example, the repeated measures approach generally relies on binary yes-no responses to questions that may or may not be well suited to yes-no responses (“Do you think you will smoke cigarettes tomorrow?”). Some smokers on some days may prefer to respond “Probably” or “I hope not,” etc., to such questions. Further, if one is interested in a subjective internal experience such generalized short-term fluctuations in motivation to quit, it makes sense to ask people about this subjective experience (as we have done in the current study). We would suggest that the current study adds to the literature and to the knowledge base and complements the repeated-measures studies.

The results also demonstrated that short-term fluctuations in motivation to quit are associated with positive trends in known cessation-related variables (e.g., greater intention and confidence to quit, lower levels of cigarette dependence). These findings are consistent with the PRIME theory of addiction (West, 2006). According to this theory, cessation often is not a deliberative or planned behavior; instead, smokers experience a “motivational tension” that can manifest itself as short-term fluctuations in motivation to quit. The results also are consistent with Motivation Interviewing theory, which emphasizes the importance

of ambivalence in addiction and the role of the motivational interviewing therapist in resolving the ambivalence (Miller & Rollnick, 2002).

The current results suggest that smokers who are relatively more engaged in the cessation process are significantly more likely to report day-to-day fluctuations in motivation to quit as compared to those who are relatively less engaged in the cessation process. This conclusion applies both to psychological engagement (e.g., wanting to quit, intending to quit, having confidence in one's ability to quit) and behavioral engagement (e.g., fewer cigarettes per day, greater number of recent quit attempts). Effect sizes generally were in the medium-to-large range (Cohen, 1988). These results are consistent with the results of several recent intervention studies (e.g., Cropsey et al., 2013; Jardin et al., 2014). Many smokers in these studies who reported low motivation to quit at baseline were nonetheless aided by interventions designed for smokers who are motivated to quit. The authors suggest that dynamic and fluctuating motivation to quit may contribute to these outcomes. According to this rationale, short-term increases in motivation to quit may occur suddenly, and smokers may benefit if an intervention is readily available at these propitious moments.

Several limitations of the current study should be noted. The cross-sectional design limits the conclusions that can be drawn in several respects. The use of a convenience sample also is a limitation, though the sample was generally representative of smokers in Hawaii regarding ethnicity, motivation to quit, gender, cigarettes smoked per day, and other relevant variables (Pobutsky & St. John, 2010). A single item employed to measure day-to-day fluctuations in motivation to quit also is a limitation. Future research should employ multiple items to assess and validate additional survey instruments. Participants were required to smoke at least three cigarettes per day at baseline at baseline. Thus, the results would not necessarily generalize to intermittent or very light smokers.

5. Conclusions

The current findings add to the emerging consensus among researchers conceiving smoking cessation as a process, rather than as an event (e.g., Peters & Hughes, 2009; Shiffman, 2006). Other scholars have focused on the cessation process as consisting of a series of behavioral fluctuations: quit attempts, lapses, relapses, and cutting down on cigarettes per day smoked. The current findings demonstrate that the pre-quit-attempt phase of smoking cessation also is a dynamic and fluctuating process, albeit a psychological one. In addition, the current research is consistent with several recent studies showing that many smokers quit without prior planning (Ferguson, Shiffman, Gitchell, Sembower, & West, 2009; Larabie, 2005; Murray, Lewis, Coleman, Britton, & McNeill, 2009; Sendzik, McDonald, Brown, Hammond, & Ferrence, 2011; West & Sohal, 2006). Thus, the current findings contribute to a building conception of smoking cessation as a dynamic and chaotic process whereby motivation to quit shifts rapidly and quit attempts often are commenced suddenly with no prior planning. This updated conception of smoking cessation suggests that smokers may benefit from interventions that persist over time, and that opportunities for intervention may be more frequent and more common than previously thought.

Glossary

Contemplation ladder	11-point Likert scale used to assess motivation to quit smoking
Fagerstrom Test for Cigarette Dependence (FTCD)	6-item instrument used to assess intensity of cigarette addiction
Short-term fluctuations	Changes taking place over periods ranging from one to 30 days

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Mean values for smokers who do, and do not, indicate day-to-day fluctuations in motivation to quit smoking

TABLE 1

Dependent variable	Motivation to quit smoking changes from one day to the next					
	True		False		<i>t</i>	<i>p</i>
	Mean	SD	Mean	SD		
Do you want to quit smoking? ¹	4.00	1.06	3.03	1.54	14.50	<.001
Do you intend to quit smoking? ¹	3.97	1.00	3.11	1.47	13.70	<.001
Cut down cigs/day? ¹	4.06	1.00	3.22	1.43	13.54	<.001
Contemplation ladder ²	5.66	2.50	3.79	3.22	12.41	<.001
How confident you will quit smoking some day? ³	3.12	1.01	2.66	1.28	7.77	<.001
How confident you will quit smoking in next 6 mos? ³	2.43	1.01	1.96	1.13	8.50	<.001
Number of quit attempts in past year	2.19	2.65	1.05	2.10	8.69	<.001
Fagerstrom Test of Cigarette Dependence ⁴	4.97	2.32	5.32	2.41	2.76	<.01
Number of cigarettes per day	17.04	9.52	20.54	13.45	5.97	<.001

Note: Some survey items have been abridged to conserve space.

Note: For effect size *d*: small = 0.2, medium = 0.5, large = 0.8.

¹ Intention (1 = no, definitely not to 5 = yes, definitely).

² Range: 0–10 (0 = no thought of quitting, 10 = taking action to quit).

³ Confidence in quitting (1 = not at all confident to 5 = extremely confident).

⁴ Range: 0–10 (0 = very low dependence to 10 = very high dependence).