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**Motivational Flexibility and Patterns of Exercise and Smoking Behavior**

A Dissertation Presented

by

**Susan Dyan Darlow**

to

The Graduate School

in Partial Fulfillment of the

Requirements

for the Degree of

**Doctor of Philosophy**

in

**Social/Health Psychology**

Stony Brook University

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Abstract of the Dissertation

**Motivational Flexibility and Patterns of Exercise and Smoking Behavior**

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**Doctor of Philosophy**

in

**Social/Health Psychology**

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Numerous theories are used to explain why people engage in health behaviors. However, these theories have some limitations, such as assuming that health is the main motivation for engaging in healthy behaviors, focusing mostly on healthy versus unhealthy behaviors, and not taking into account situational factors. To address these limitations, we developed a new concept called *motivational flexibility*, which is the idea that people can have multiple reasons for engaging in a behavior, and the main reason for engaging in the behavior can change across occurrences of the behavior. I hypothesized that motivational flexibility would be associated with greater behavior adherence, based on flexible goal adjustment research showing that the ability to disengage from failing goals and reengage with new goals is associated with success meeting goals (Rasmussen, Wrosch, Scheier, & Carver, 2006). However, a pilot study of motivational flexibility examining fruit and vegetable consumption found that endorsing more motives was associated with less consumption, especially when the most important reason for consumption varied day-to-day (Darlow & Lobel, 2011). That study suggested that motivational flexibility may be detrimental to some behaviors.

In the present study, student exercisers ( $n = 198$ ) and cigarette smokers ( $n = 116$ ) completed daily assessments for 14 days in which they indicated whether they exercised or smoked, and listed their reasons for doing so. Frequent variations among the most important motive(s) for smoking or exercising each day (“shifting”) was associated with greater frequency of smoking and enjoyment of exercise, respectively. However, shifting was associated with less enjoyment of exercise when the number of reasons listed for exercising each day was great. Results suggest that shifting may be indicative of an ability to adapt to changing environmental demands. However, the combination of having many reasons for engaging in a behavior and not feeling strongly committed to any single reason may be detrimental to adherence. Findings are discussed in light of situational and individual factors that may modify the influence of motivational flexibility on various behaviors.

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## Motivational Flexibility and Cigarette Smoking

Cigarette smoking directly contributes to many types of cancer, and to coronary heart disease, stroke, respiratory illness, reproductive problems in women, cataracts, peptic ulcers, hip fractures, and low bone density (U.S. DHHS, 2004). In addition, smoking has a negative effect on athletic performance (Louie, 2001) and increases negative mood on stressful days (Aronson, Almeida, Stawski, Klein, & Kozlowski, 2008). Adverse health effects are seen as early as adolescence (Louie, 2001). Nicotine is highly addicting (U.S. DHHS, 1988), and withdrawal results in irritability, depression, anxiety, restlessness, poor concentration, increased appetite, cigarette cravings, decreased heart rate, increased feelings of stress, and decreased energy (Hughes, 1992; Parrott, 2000; Perkins, Epstein, & Pastor, 1990).

Most smokers begin smoking during adolescence (Escobedo, Anda, Smith, Remington, & Mast, 1990). Cigarette smoking is common among college students, with almost one in three college students smoking at least one cigarette per month (Wechsler, Rigotti, Gledhill-Hoyt, & Lee, 1998). About half of college smokers identify as “social smokers,” or those who mostly smoke in the presence of others (Moran, Wechsler, & Rigotti, 2004). Young adult smokers such as college students are less likely to quit smoking than older adults (Khuder, Dayal, & Mutgi, 1999).

There are many reasons why people smoke despite the well-known adverse consequences to health. Among habitual smokers, addiction to nicotine is a major reason why people smoke (West & Schneider, 1987). The withdrawal symptoms such as cigarette cravings and irritability can make it difficult to make it through an entire day without smoking. Stress and negative affect predict cravings (Kassel, Stroud, & Paronis, 2003; Perkins & Grobe, 1992), and expecting cigarettes to alleviate a negative mood is associated with smoking (Wetter, Brandon, & Baker,

1992). Enjoyment of smoking, boredom, and desire for social acceptance are also commonly cited reasons for smoking (Ho, 1989; Prokhorov et al., 2003). Many college students smoke because they believe it helps them study for exams (West & Lennox, 1992). Many women also frequently report smoking for relaxation and to avoid weight gain (Marcus et al., 1999; Pirie, Murray, & Luepker, 1991; Westmaas & Langsam, 2005). Finally, people's social networks may influence whether or not they smoke. Adolescents are more likely to smoke if their friends do (Gritz et al., 1998), and some people smoke only in social situations.

Psychosocial research on cigarette smoking has examined predictors of smoking initiation, characteristics of smokers, and smoking cessation. However, health behavior theories that have examined cigarette smoking have focused mostly on smoking cessation. Two examples of these theories are the *theory of planned behavior* and the *transtheoretical model*. The theory of planned behavior proposes that intention to engage in a behavior (e.g., quitting smoking) is the key predictor of that behavior. The three predictors of intention are attitudes toward the behavior, perceived pressure from others to engage in the behavior, and perceived control over engaging in the behavior (Ajzen & Madden, 1986). The transtheoretical model describes engagement in a health behavior over time, in which people are categorized into one of five stages of change for a given behavior (Prochaska & Velicer, 1997). Though the transtheoretical model has some predictive validity for smoking cessation (Prochaska & Velicer, 1997; Prokhorov, de Moor, Hudmon, Hu, Kelder, & Gritz, 2002), findings related to the theory of planned behavior have been mixed (Godin, Valois, Lepage, & Desharnais, 2006; Norman, Conner, & Bell, 1999).

While health behavior theories can be valuable in explaining behavior, there are some limitations. For example, health behavior theories generally do not explain the adoption of unhealthy behaviors such as smoking or binge drinking; these theories usually examine the

adoption of healthy behaviors such as smoking cessation or exercise. This exclusion of unhealthy behaviors demonstrates a lack of clarity regarding possible differences in the adoption processes of healthy versus unhealthy behaviors. For example, reasons for engaging in healthy behaviors like exercise are likely to be quite different from reasons for engaging in unhealthy behaviors like cigarette smoking. In addition, health behavior theories are generally trait-based, in that they do not take into account situational or sociocultural factors. To address these limitations, we proposed a conceptual framework of health behavior motives that can be used to explain smoking behavior.

### *Motivational Flexibility*

People often have multiple reasons for engaging in a behavior. For example, they may frequently drink alcohol both for social reasons and for stress release. Does the dominant reason for engaging in a behavior in a given instance change frequently, or is it unchanging?

*Motivational flexibility* is the idea that the dominant reason for engaging in a behavior varies across instances of that behavior. In other words, people can be less motivationally flexible (e.g., smoke mostly for stress release) or more motivationally flexible (e.g., smoke for stress release one day, but for social reasons the next day). In other words, motivational flexibility contains two components: 1) possessing multiple reasons to engage in a behavior and 2) the primary reason for engaging in a behavior changing across instances of the behavior. This shifting of motives can occur either inside or outside our awareness, as our reasons for engaging in a behavior are sometimes nonconscious (Bargh, 1990).

Motivational flexibility addresses several weaknesses of theories regarding motivation and health behaviors. First, motivational flexibility is a concept that defines motivation in terms of reasons for engaging in a behavior. Most health behavior theories assume that people engage

in health behaviors for health-related reasons. This is not always the case. For example, some smokers quit due to financial reasons or pressure from close others, as opposed to quitting for health reasons. In addition, most health behavior theories apply specifically to healthy behaviors such as flossing or quitting smoking. They do not describe the processes associated with adopting unhealthy behaviors, such as smoking cigarettes or binge drinking. Motivational flexibility can be applied to any behavior, healthy or unhealthy. Third, most health behavior theories also focus on the *adoption* of a health behavior. Motivational flexibility can be applied to individuals across the full spectrum of behavior: those who are just beginning a behavior as well as those who have been engaging in the behavior for an extended period of time. Finally, many theories of motivation and health behavior are trait-based. However, people's attitudes and goals related to behaviors are often situationally influenced. It is also possible that people could be motivationally flexible regarding one behavior but not another.

Motivational flexibility is related to the concept of flexible goal adjustment, which refers to the ability to “disengage” from a goal when facing failure and to “reengage” by forming other goals (Wrosch, Scheier, Miller, Schulz, & Carver, 2003). The ability to disengage from a failing goal is adaptive, as persisting with a task that cannot be achieved may result in a decrease in self-esteem and well-being (Henderson, Gollwitzer, & Oettingen, 2007). Having flexible goals is generally related to success in achieving those goals (Rasmussen, Wrosch, Scheier, & Carver, 2006; Wrosch et al., 2003). The inability to attain rigid short-term goals may result in feeling helpless and may threaten one's self-esteem (Getz & Rainey, 2001). Therefore, harboring flexible goals may buffer the effects of not being able to attain a goal, and performance may continue since there are other goals to be attained. On the other hand, flexible goal adjustment may also be indicative of being less committed to any particular goal.

Flexible goal adjustment is different from motivational flexibility in that the former refers to the ability to alter goals in response to changing circumstances (i.e., when the goal becomes impossible), while the latter refers to possessing multiple reasons for engaging in a health behavior with changes occurring among the primary reason for engaging in the behavior, regardless of the impetus for this change. Both concepts describe an ability to adapt to the environment when challenges arise. In flexible goal adjustment, people alter their goal when it is beyond attainment. Motivational flexibility suggests that motives that lead to goal-directed behavior can vary. If a motive becomes insufficient in inducing behavior, then a person who is motivationally flexible may engage in the behavior if they harbor another reason to do so. For example, if people smoke both because their friends smoke and also because smoking makes them feel relaxed, then they have another reason to smoke whether their friends are present or not. Because of the possession of multiple motives that shift in their importance across behavior occurrences, it is possible that motivational flexibility will be related to greater behavior adherence. However, an application of motivational flexibility to fruit and vegetable consumption showed that endorsing more motives was associated with less consumption, especially when the most important reason for consumption varied day-to-day (Darlow & Lobel, 2011). Given that fruit and vegetable consumption is very different from cigarette smoking (e.g., one is a healthy behavior, while the other is unhealthy), will motivational flexibility predict smoking differently?

### *Objectives and Hypotheses*

The purpose of the study was to examine predictors of smoking behavior in young adults and to test a new idea regarding behavior motivation, based on daily assessments. The first objective was to examine the influence of specific motives for and barriers to smoking on

smoking behavior. Based on previous research on reasons for smoking (e.g., Prokhorov et al., 2003; West & Schneider, 1987), we hypothesized that motives associated with craving, stress release, and situational cues would be associated with greater frequency of smoking, while social motives would be associated with less smoking. Regarding specific barriers to smoking (i.e., reasons for *not* smoking on a given day), we hypothesized that not smoking due to feeling sick would be associated with greater frequency of smoking, while not smoking due to lack of desire would be associated with less smoking.

The second objective of the study was to test motivational flexibility in student smokers, specifically, 1) to determine the number of reasons to smoke in a sample of student smokers, 2) to determine how often variations in the most important motive(s) for smoking occur across days, and 3) to examine associations between flexibility and smoking behavior. Flexibility was determined by taking into account how often the most important motive(s) for smoking changed day-to-day and the number of reasons for smoking being reported. We found inter-individual variability in the motivational flexibility components for fruit and vegetable consumption (Darlow & Lobel, 2011a), so we hypothesized that we would also find variability in the flexibility components for cigarette smoking.

If motivationally flexible people have multiple reasons for engaging in a behavior, and different motives can ascend over time to become the primary reason why a behavior is enacted, then the probability that people will engage in that behavior should be greater. However, it is also possible that a greater number of reasons will be more strongly related to behavior than how often the most important motive guiding behavior shifts across instances of the behavior, as shifting may be indicative of being less committed to any particular behavior motive. It is also possible that having fewer reasons will be more strongly related to behavior, as commitment to a

single reason may be difficult when there are other competing reasons. A curvilinear association may exist in which behavior may be associated with having either very few or many reasons. However, the main reason why many smokers continue to smoke is because they are addicted (West & Schneider, 1987). In this case, such smokers may not need other reasons to smoke. Therefore, motivational flexibility may only be associated with greater frequency of smoking in smokers who are not addicted. Thus, we hypothesized that motivational flexibility would be associated with cigarette smoking in smokers who do not smoke daily.

## Method

### *Participants*

Undergraduate students at a northeastern public university volunteered for the study online. Students were invited to participate if they reported smoking cigarettes at least once a month. Participation incentives included satisfying a research participation requirement for an undergraduate psychology course, as well as receipt of a “motivational profile” that discussed participants’ overall motivation for cigarette smoking and offered advice regarding the most beneficial type of exercise, a healthy alternative to cigarette smoking, for their specific smoking motives. In addition, all participants in the study were entered into a raffle to win a \$50 gift card.

One hundred sixteen student smokers participated in the study. Power analysis, based on Cohen’s  $d = .15$  indicating a medium effect, showed that this number is sufficient for adequate power. Participants' age ranged from 18 to 28 ( $M = 20.0$ ), and gender was 57.5% female and 42.5% male. The ethnic self-identification of participants was as follows: 50.4% European American, 39.1% Asian American/Pacific Islander, 7.8% Latino/Hispanic, 1.7% African American/Black, and 0.9% Other/Mixed, reflecting the ethnic composition of the university.

### *Procedure*

The entire daily diary study was completed online to enhance student participation (Bolger, Davis, & Rafaeli, 2003). Participants were told that they were being invited to participate in a study on smoking behavior. If they agreed to participate, they were directed to a webpage where they read the consent form and then indicated how many cigarettes they smoked each day. They were then sent an e-mail notification to complete their entries every day for two weeks. When participation was complete, participants received their research participation credit, and they were sent an individualized “motivational profile” according to whether their reasons for smoking align most with appearance, enjoyment, or social reasons.

### *Measures*

Baseline smoking status was measured by one item. Respondents endorsed one of five options: less than one cigarette per day but more than one cigarette per month, 1-5 cigarettes per day, 6-10 cigarettes per day, 11-20 cigarettes per day, and more than 20 cigarettes per day. Respondents who endorsed the “Less than once cigarette per day but more than one cigarette per month” option were coded as “light smokers”, while all others were considered daily smokers.

All daily entries were completed online using PsychData software. Each diary entry consisted of the following items: *did you smoke today* (yes/no), *if no, why not* (open-ended, participants could skip to end of entry if no cigarettes were smoked during the day), *how many times did you smoke today*, *what is the total number of cigarettes you smoked today*, *around what time did you smoke your last cigarette* (participants were instructed to complete the following questions pertaining to the last cigarette smoked), *what were your reasons for smoking* (open-ended response, able to list up to eight reasons), and *how important was each reason to you* (on a scale of 1 to 5 with “1” being “not important at all” and “5” being “very important”).

### *Data Coding*

The coding scheme for the reasons given for smoking was adapted from relevant studies of reasons for smoking (e.g., Ho, 1989; McGee & Stanton, 1993). Reasons listed for smoking were coded into the following motive categories: 1) stress release, 2) craving, 3) boredom, 4) habit/context, 5) social, and 6) appetite suppression. Reasons listed were coded by three trained research assistants, with disagreements resolved by a study investigator. Interrater reliability was assessed by calculating Cohen's Kappa, 0.76 ( $p < .001$ ), which indicates substantial reliability (Landis & Koch, 1977).

After each reason for smoking was coded, the number of times the most important motive(s) for smoking changed from day-to-day was counted. This score ranged from 0 (no day-to-day shifting in the most important motive endorsed) to 13 (most important motive changed every day). To take into account variation in the number of days smoked, the number of shifts was divided by the number of days smoked.

To examine the number of reasons listed for smoking, the total number of reasons that participants listed over the 14 days was counted (possible scores ranging from 1 to 112). As with shifting, this number was divided by the number of days smoked to take into account variations in frequency of smoking.

On the days that participants did not smoke, they were asked to list their reasons for not smoking, which we refer to as "barriers" to smoking cigarettes. In the absence of previous research on barriers to smoking, we created a coding scheme. Reasons listed for not smoking were coded into the following barrier categories: 1) absence of cues, 2) no time or opportunity, 3) didn't want to, 4) trying to quit or cut down, 5) cigarettes not available, and 6) not feeling

well. Cohen's Kappa was 0.87 ( $p < .001$ ), indicating nearly high agreement (Landis & Koch, 1977).

## Results

All 116 participants completed the baseline assessment. Fifty-two participants (44.8%) reported smoking less than one cigarette per day but more than one per month; 31 (26.7%) reported smoking 1-5 cigarettes per day; 18 (15.5%) reported smoking 6-10 cigarettes per day; and, 15 (12.9%) reported smoking 11-20 cigarettes per day. None of the participants reported smoking more than 20 cigarettes per day. The 52 participants who did not report smoking every day were considered light smokers (44.8%), while all other participants were considered daily smokers (55.2%). Descriptive statistics are displayed in Table 1.1. Independent samples  $t$ -tests showed that daily smokers smoked on more days during the 14-day assessment,  $t(114) = -11.79$ ,  $p < .001$ , and changed their most important motive(s) for smoking each day more often,  $t(114) = -2.17$ ,  $p < .05$ , than light smokers.

Of 1,624 possible daily entries (14 per 116 participants), 1,545 daily entries were completed, a 95.1% response rate. Of the 1,545 daily entries, students reported smoking cigarettes in 935 entries (60.5% of days assessed). Table 1.2 summarizes the frequency and importance of motives listed by participants for smoking and not smoking.

### *Which Motives Predict Smoking?*

Using linear regression, we examined the association between the six motive categories and smoking. This was done by first entering all motive categories separately, then again by entering all the categories into one multivariate model. The number of times participants endorsed each motive category was divided by the total number of reasons they listed, yielding a

proportion score for each motive category. The outcome variables were number of days smoked and average number of cigarettes smoked each day, both calculated from the daily data.

The univariate analyses yielded the following: smoking due to boredom,  $t(113) = -2.21, p < .05$ , or for social reasons,  $t(114) = -3.00, p < .01$ , was associated with smoking fewer cigarettes each day across the 14 days. Smoking out of habit or for contextual reasons was associated with more days of smoking over the 14 days,  $t(114) = 3.61, p < .001$ , and smoking more cigarettes on average over the 14 days,  $t(113) = 3.81, p < .01$ . Smoking cigarettes for stress release, craving, and appetite suppression was not significantly associated with any of the daily smoking variables.

The multivariate regression model showed that smoking for stress release,  $t(110) = -2.11, p < .05$ , craving,  $t(110) = -2.87, p < .01$ , and for social reasons,  $t(110) = -4.06, p < .001$ , was associated with smoking on fewer of the 14 days. Smoking for craving,  $t(109) = -2.31, p < .05$ , boredom,  $t(109) = -2.81, p < .01$ , and social reasons,  $t(109) = -2.36, p < .05$ , was also associated with smoking fewer cigarettes each day on average over the 14 days. Analyses of the variance inflation factor showed that multicollinearity did not occur in these models (Kleinbaum et al., 1998).

#### *Which Barriers Predict Smoking?*

To examine the influence of each of the six barrier categories on smoking, the same analysis format was used as that for examining the motive categories. The number of times participants endorsed each barrier category was divided by the total number of barriers they listed over the 14 days. Both univariate and multivariate linear regression was performed. Analyses were conducted for 97 participants who did not smoke on at least one of the 14 days.

The remaining 19 participants reported smoking on all 14 days, so they did not have the opportunity to list reasons for not smoking.

Univariate analyses revealed that failing to smoke due to cigarettes not being available was associated with smoking on more of the 14 days,  $t(95) = 2.08, p < .05$ , and not smoking due to not feeling physically well was associated with smoking more cigarettes on average over the 14 days,  $t(95) = 3.23, p < .01$ . Both refraining from smoking due to an absence of contextual cues,  $t(95) = -3.02, p < .01$ , and no desire to do so,  $t(95) = -3.83, p < .001$ , were associated with smoking on fewer days, and no desire to smoke was also associated with smoking fewer cigarettes on average over the 14 days,  $t(95) = -3.40, p < .01$ . Not smoking cigarettes due to lack of time or opportunity or due to desire to quit were not significantly associated with any of the daily smoking variables when examined independently.

The multivariate analyses showed that refraining from smoking due to an absence of contextual cues,  $t(91) = -2.64, p < .05$ , and no desire to do so,  $t(91) = -3.17, p < .01$ , were associated with smoking on fewer of the 14 days. These analyses also showed that not smoking due to lack of desire was associated with smoking fewer cigarettes each day on average,  $t(91) = -2.26, p < .05$ , while not smoking due to not feeling well was associated with smoking more cigarettes each day on average,  $t(91) = 2.25, p < .05$ . Multicollinearity was not a problem in these models.

### *Does Motivational Flexibility Predict Smoking?*

Multilevel modeling was used to examine the relationship between motivational flexibility and daily cigarette smoking. Multilevel modeling allows for analysis of both within-person and between-person factors. The within-person factor that was examined was change in smoking behavior over time. The between-person factors were the components of motivational

flexibility: 1) the average number of reasons listed over the 14 days, and 2) the number of times the most important motive(s) changed over the 14 days. Using lagged multi-level models, the within-person model allowed for assessment of individual change in smoking behavior over a two-week time period, and of the influence of each day's behavior on behavior occurring on subsequent days. The between-person model allowed us to examine individual differences in motivational flexibility on smoking across individuals. Analyses were conducted using PROC NLMIXED for binary outcomes in SAS 9.2 statistical software. Whether the participant was a daily or social smoker at baseline was controlled for. Motivational flexibility was examined as a predictor of smoking and its related variables on day  $t+1$ , controlling for behavior on the previous day. Since it is possible that one of the components of motivational flexibility may have a larger influence than the other, both components were examined independently as between-person factors. Variables representing these two motivational flexibility components were centered at the grand mean.

Being a daily smoker at baseline was associated with cigarette smoking over the 14 days,  $t(115) = 10.22, p < .001$ . Shifting among the most important motive(s) listed each day was associated with cigarette smoking,  $t(115) = 1.99, p < .05$ . The results of the multilevel modeling analysis are presented in Table 1.3.

The multilevel analyses were run for both light and daily smokers separately. Shifting among the most important motive was associated with a greater likelihood of smoking,  $t(51) = 2.21, p < .05$ , in light smokers. No significant trends were found for daily smokers. Results for the light smokers can be found in Table 1.4.

### *Polynomial Trends*

To explore the possibility of a curvilinear relation between the motivational flexibility components and smoking, we conducted hierarchical polynomial regression analyses in which the flexibility components (average number of reasons listed over the 14 days, and the number of times the most important motive(s) changed, entered into separate regression equations) were the predictor variables. The number of days smoked over the 14-day assessment was examined as the outcome variable.

A linear relation was found between shifting among the most important motive(s) listed each day (centered) and number of days smoked over the 14 days, with an  $r^2$  of 0.05,  $p < .05$ . Adding a cubic term added a significant further increment,  $sr^2 = .06$ ,  $F(1, 112) = 7.71$ ,  $p < .01$ . The resulting equation was: days smoked =  $8.39 - 6.72 \text{ shifting} + 4.53 \text{ shifting}^2 + 64.83 \text{ shifting}^3$ . This equation is illustrated in Figure 1. The predicted number of days smoked is lowest when shifting is below average (at least one standard deviation below the mean). The predicted number of days smoked increases as shifting reaches average levels, and then increases substantially as shifting approaches at least one standard deviation above the mean. Significant polynomial trends were not found for the average number of reasons listed.

Since an association was found between motive shifting and cigarette smoking for light but not daily smokers, polynomial trends were examined separately for these two groups. For light smokers, a linear relation was found between shifting and number of days smoked over the 14 days,  $r^2 = 0.10$ ,  $p < .05$ . A cubic term added a significant further increment,  $sr^2 = .12$ ,  $F(1, 48) = 7.37$ ,  $p < .01$ . The corresponding equation was: days smoked =  $4.73 - 8.79 \text{ shifting} + 16.12 \text{ shifting}^2 + 83.22 \text{ shifting}^3$ , which is illustrated in Figure 2. Like the trend for the entire sample of smokers, the predicted number of days smoked is lowest when shifting is below average (at least

one standard deviation below the mean). The predicted number of days smoked increases as shifting reaches average levels, and then dramatically increases as shifting approaches above average levels (at least one standard deviation above the mean). Significant polynomial trends were not found for daily smokers.

## Discussion

The purpose of the study was to examine predictors of daily smoking behavior, specifically, motives to smoke, number of reasons given for smoking, and how often the most important reason changed across occurrences of smoking. Analyses of motives associated with smoking revealed that smoking for mostly social and craving reasons was associated with smoking fewer cigarettes and on fewer days during the assessment period. Smoking out of habit or due to situational cues, on the other hand, was associated with more days of smoking during the 14-day assessment period and more cigarettes smoked on average each day, even though these findings were no longer statistically significant in the multivariate model. Barriers to smoking were also examined as predictors of daily smoking behavior. For those who did not smoke on all 14 days, not smoking mostly due to not feeling physically well was associated with smoking more cigarettes on average each day. Not smoking due to having no desire to do so was associated with both fewer days of smoking and fewer cigarettes smoked each day on average.

These findings exemplify the importance of situational cues to an addictive behavior such as cigarette smoking, which has been noted in previous research (Brownell, Marlatt, Lichtenstein, & Wilson, 1986; Waters, Shiffman, Sayette, Paty, Gwaltney, & Balabanis, 2004). Cigarette smoking may become automatic in certain situations where smoking repeatedly occurs, such as while driving or after waking up or eating a meal, an idea referred to as the cue reactivity paradigm (Drummond, Tiffany, Glautier, & Remington, 1995). Light smokers and those who

smoke mostly for social reasons have presumably not developed these learned associations between environmental cues and smoking. Research on self-reported smoking behavior indicates that those who smoke mainly in the presence of others perceive themselves as less addicted to nicotine compared to more frequent users (Moran et al., 2004). The danger is that the more social and light smokers smoke, the greater the likelihood that they will form these associations and will become addicted.

It is counterintuitive that craving and addiction as a reported motive was associated with less daily smoking. Although smokers who smoke more cigarettes are clearly more addicted to nicotine and the act of smoking than those who smoke less, perhaps smokers think of their behavior more contextually than in terms of addiction. That is, although most daily smokers may be aware that they are addicted to cigarettes, they might also rationalize their daily behavior in terms of situational and environmental influences. This lends support to the idea that smoking cessation therapy should emphasize the smoker's identification of these situational influences and breaking the association between the environment and smoking (Marlatt & George, 1984). It is also possible that those who explicitly cite addiction or craving as reasons for smoking are aware of their behavior as a problem and, hence, may be attempting to monitor their smoking.

The study also tested a new idea called motivational flexibility, which is the idea that people can have multiple reasons for engaging in a behavior, and the dominant reason for engaging in the behavior can vary across instances of that behavior. Based on research on flexible goal adjustment (e.g., Wrosch et al., 2003), we hypothesized that motivational flexibility would be associated with greater frequency of smoking, particularly in those who do not smoke every day. Findings partially supported this hypothesis, in that shifting among the most important motive(s) over the 14-day assessment was associated with greater frequency of

smoking. We identified a polynomial trend in that the relationship between motive shifting and smoking was particularly robust when shifting was at least above average. The relationship between motive shifting and smoking, and the corresponding polynomial trend, was found in light smokers, but not daily smokers. It is possible that many light smokers do not have a primary reason that guides their smoking episodes, so some may have more triggers that can be activated, which may result in more smoking. Daily smokers do not need so many triggers because they smoke everyday out of habit or addiction. It is also possible that light smokers who smoke more often feel the need to rationalize their behavior, as illustrated by these smokers listing a variety of reasons as being important for each day that they smoked.

We did not replicate the association between motivational flexibility and behavior that we found for fruit and vegetable consumption (Darlow & Lobel, 2011). That is, for fruit and vegetable consumption, motivational flexibility had a negative influence on behavior; possessing more motives for consuming fruits and vegetables was associated with less consumption, and this association became stronger as shifting among the most important motive increased. In contrast, we found that shifting among the most important reason was associated with daily smoking behavior, but the number of reasons listed was not associated with behavior. We also did not find an interaction between number of motives and shifting for smoking behavior. The difference in findings may be due in part to methodological variation in the two studies. Specifically, the component of motivational flexibility that identifies number of reasons for engaging in a behavior was defined differently in the two studies. For the fruit and vegetable study, we defined this variable as the total number of motives for fruit and vegetable consumption that were endorsed over the 14-day assessment. As motivational flexibility is a new concept, we have since refined how the variables are operationalized. For the present study, the

frequency of reasons component was defined as the average number of reasons listed over the total number of days smoked, which more accurately represents our proposed definition of motivational flexibility. That is, one component of motivational flexibility is the number of reasons one possesses for engaging in a behavior. By only examining the number of coded motive categories that one endorses, some information is lost. Hence, we decided to look at how many individual reasons are being listed. In addition, the examination of fruit and vegetable consumption is different from the current study in that the sample size from the fruit and vegetable study was only 48 participants, which is less than half of the sample size for the current study.

Another likely explanation for the differences in findings is that the behaviors themselves are quite different. For one, it is widely known that fruit and vegetable consumption is healthy, while cigarette smoking is unhealthy. In addition, the desired outcome of these behaviors is different: restraint from smoking cigarettes, but increased consumption of fruits and vegetables. Finally, smoking is addicting and often an automatic or habitual behavior. To further understand differences in the influence of motivational flexibility on these behaviors, it may be valuable to examine flexibility in an unhealthy dietary behavior, such as consumption of junk food.

The study had several strengths. First, we used daily diary methods, which represent a state-of-the-art measurement tool that captures people's daily experiences and minimizes respondent retrospection, and therefore is thought to yield more accurate data (Bolger et al., 2003). Examining behavior on a daily basis was the best way to assess motivational flexibility, since flexibility refers to variations in daily health behavior motives. Second, some data were analyzed using multilevel modeling, which allows for the analysis of both within- and between-person factors. Both main effects and interactions were entered into these models, creating a

more comprehensive test of study hypotheses. We also examined not only motives for smoking cigarettes, but also barriers to smoking. In research on cigarette smoking, barriers have only been examined in the context of smoking cessation (e.g., Asher et al., 2003). Finally, the compliance rate was very high (approximately 95%). This is likely due to the study being completed online, which we reasoned would take less effort for participants than a paper-and-pencil journal (Bolger et al., 2003).

The study has some limitations as well. First, all measures were self-reported, so it is possible that the participants underreported smoking. However, past research has shown that self-report measures of smoking are reliable and have good predictive validity in young adults and adolescents (Eppel, O'Loughlin, Paradis, & Platt, 2006; Hatziaandreu, Pierce, Fiore, Grise, Nivotny, & Davis, 1989). In addition, we obtained a convenience sample of university students. These results may not generalize to older smokers, since young adults often have different reasons for engaging in health behaviors than older adults (Curry, Grothaus, & McBride, 1997). Young adults are a key group to focus on in cigarette smoking research, as smoking initiation frequently occurs during this time (Escobedo, et al, 1990), and quit rates are lower in this age group than in older adults (Khuder et al., 1999).

### *Conclusions*

The current study found that day-to-day shifting among the most important motive listed for smoking was associated with a greater frequency of smoking, based on daily assessments of smoking. This association was significant for light but not daily smokers. Future research should continue to assess smoking behavior in those who do not smoke everyday. Given the known negative consequences of smoking and the fact that these smokers are likely not addicted to smoking, it is critical to understand their perceptions of their behavior so that appropriate

interventions can be developed. Motivational flexibility should also continue to be examined in other behaviors. Thus far, we have applied this new idea both to cigarette smoking and fruit and vegetable consumption. Given the differences we found for these two behaviors, it is valuable to examine motivational flexibility in other healthy behaviors such as exercise, which is more effortful than fruit and vegetable consumption. Motivational flexibility should also be examined in other unhealthy behaviors related to diet, such as consumption of junk food. Finally, whether motivational flexibility is a trait or varies across behaviors within people should also be investigated. Research that examines such questions can help to uncover why people engage in unhealthy and healthy behaviors and move us farther along in learning how to encourage healthful behavior change.

## Motivational Flexibility and Exercise Behavior

Exercise has many health benefits. It increases longevity, prevents obesity, and reduces risk of coronary heart disease, stroke, Type II diabetes, hypertension, colon cancer, and osteoporosis (U.S. DHHS, 1996). The benefits to mental health are great as well, with positive effects on depressive symptoms, anxiety, relaxation, sleep, and well-being (King, Oman, Brassington, Bliwise, & Haskell, 1997; McAuley & Rudolph, 1995; Ross & Hayes, 1988; Sallis & Owen, 1999). Despite the many benefits of exercise, rates of activity among people who live in the United States are low, with over half not engaging in the recommended amount of physical activity, specifically 150 minutes per week of at least moderate intensity activity (CDC, 2007). Women exercise less than men do (Caspersen, Pereira, & Curran, 2000; Salmon, Owen, Crawford, Bauman, & Sallis, 2003), and exercise rates decrease with age (Gordon-Larsen, Nelson, & Popkin, 2004), with declines beginning as young as age 13 (U.S. DHHS, 1996). Exercise can be distinguished from physical activity in that the former refers to planned or structured activity, while the latter refers to any kind of activity, intentional or not (Caspersen, Powell, & Christenson, 1985). In addition, numerous aspects of physical activity and exercise can be measured, such as frequency, intensity, and duration (Sallis & Owen, 1999). The current study will focus on frequency, intensity, duration, and enjoyment of exercise.

Perceived barriers to exercise, such as lack of time, energy, money, and safe access to adequate exercise facilities, are some of the main reasons that people report for not exercising (Bock, Marcus, Pinto, & Forsyth, 2001; Salmon et al., 2003). Inadequate reasons *for* exercise are also a likely reason why rates are so low. If people do not have a desirable reason to exercise, then it is unlikely that they will exercise. Most research on exercise motivation has been done using theories such as *protection motivation theory* (Rogers, 1975), which suggests that people

exercise because they are motivated to prevent disease. Although prevention of disease and illness is a commonly cited reason to exercise (Bryan & Rocheleau, 2002), people cite a variety of reasons for exercising, such as to improve appearance, enjoyment, relaxation, or to spend time with a social network (Bryan & Rocheleau, 2002; Davis, Fox, Brewer, & Ratusny, 1995). Questionnaires designed to assess people's motives for exercise, such as the Reasons for Exercise Inventory (Silberstein, Striegel-Moore, Timko, & Rodin, 1988) show that individuals may endorse multiple reasons for exercising (Davis et al., 1995, Silberstein et al., 1988). However, research on motivation to exercise has not yet focused on the possibility that people's reasons for exercising vary over time.

### *Motivational Flexibility*

Based on theories of goal-setting and evidence that people have multiple reasons for exercise, we offer a new concept called *motivational flexibility*. This is the idea that the dominant reason for engaging in a behavior varies across instances of that behavior. In other words, people can be less motivationally flexible (e.g., exercise each day to burn calories) or more motivationally flexible (e.g., exercise to burn calories one day, but for social reasons the next day). Motivational flexibility contains two components: 1) possessing multiple reasons to engage in a behavior and 2) the primary reason for engaging in a behavior changing across instances of the behavior.

Motivational flexibility addresses some weaknesses of current health behavior theories. For example, many health behavior theories assume that people engage in health behaviors for health-related reasons. Motivational flexibility defines motivation in terms of reasons for engaging in a behavior, regardless of whether those reasons are health-related or not. Also, health behavior theories focus primarily on healthy behaviors, such as flossing or quitting

smoking. Motivational flexibility can be applied to both healthy and unhealthy behaviors. Finally, many theories of motivation and health behavior are trait-based. However, people's attitudes and goals related to behaviors are likely to be situationally influenced. For example, training to run in a race may be the main reason for someone's exercise. However, once the race is over, that person may have different reasons for exercising. It is also possible that people could be motivationally flexible regarding one behavior but not toward another.

Motivational flexibility is associated with flexible goal adjustment, which refers to the ability to disengage from a goal when facing failure and to reengage by forming other goals (Wrosch, Scheier, Miller, Schulz, & Carver, 2003). The ability to disengage from a failing goal is adaptive, as persisting with an impossible task may result in decreased self-esteem and well-being (Henderson, Gollwitzer, & Oettingen, 2007). Failing to attain rigid short-term goals may result in feeling helpless and may threaten one's self-esteem (Getz & Rainey, 2001). Therefore, having flexible goals may buffer the effects of failing to attain a goal, and performance may continue since there are other goals to be attained. Having flexible goals is generally related to success in achieving those goals (Rasmussen, Wrosch, Scheier, & Carver, 2006; Wrosch et al., 2003). However, it is also possible that flexible goal adjustment may be indicative of being less committed to a particular goal.

Flexible goal adjustment is the ability to alter goals in response to changing circumstances (i.e., when the goal becomes impossible), while motivational flexibility refers to possessing multiple reasons for engaging in a health behavior with changes occurring among the primary reason for engaging in the behavior. If a motive becomes insufficient in inducing behavior, then a person who is motivationally flexible may engage in the behavior if they have another reason to do so. For example, if people exercise both because exercise helps them lose

weight and also to “blow off steam,” then they have another reason to exercise once they have lost weight. Because of the possession of multiple motives that vary in their importance over time, it reasons that motivational flexibility will be related to greater behavior adherence. However, a previous test of motivational flexibility has shown that this may not be the case. A study of motivational flexibility in fruit and vegetable consumption showed that endorsing more motives was associated with less consumption, especially when the main motive for consumption changed frequently day-to-day (Darlow & Lobel, 2011a). It is possible that we may find the same trend for exercise.

In contrast, an examination of motivational flexibility in cigarette smokers showed that shifting among the most important motive(s) for smoking was associated with a greater likelihood of smoking each day (Darlow & Lobel, 2011b). Therefore, there may be different trends regarding motivational flexibility for different types of behaviors. Shifting among the most important motive for smoking each day was associated with greater engagement in behavior among cigarette smokers, while shifting among the guiding behavior motive acted as a moderator of the relationship between endorsing more motives and eating fewer fruits and vegetables (Darlow & Lobel, 2011a). Cigarette smoking and fruit and vegetable consumption are quite different behaviors. For example, fruit and vegetable consumption is healthy, while cigarette smoking is unhealthy. In addition, the socially desirable form of these behaviors is different: specifically, restraint from smoking cigarettes, but increased consumption of fruits and vegetables. Finally, smoking is addicting and often an automatic or habitual behavior. Exercise is healthy and generally not addicting, so it is possible that motivational flexibility in exercise will manifest differently than in smoking. However, exercise is more effortful than fruit and

vegetable consumption, so it is possible that motivational flexibility will be associated with exercise differently than with fruit and vegetable consumption.

### *Current Study*

The purpose of the present study was to examine predictors of exercise in young adults and to test a new idea called motivational flexibility, based on daily assessments. Since exercise is a complex concept (Brownson et al., 2000), we examined frequency, duration, intensity, and enjoyment of exercise. The first objective was to examine the association of specific motives for and barriers to exercise with exercise behavior. Based on research showing that exercise motives related to improving well-being are associated with exercise (Maltby & Day, 2001), we hypothesized that motives associated with health promotion would be positively associated with exercise. Given the relationship between social support and exercise (Courneya, Plotnikoff, Hotz, & Birkett, 2000), we also hypothesized that reasons to exercise related to spending time with one's social network would also be positively associated with exercise. Finally, we hypothesized that exercising for mostly appearance reasons would be associated with less exercise, as concern with appearance is generally associated with poor outcomes such as decreased self-esteem (Strelan, Mehaffey, & Tiggemann, 2003).

Regarding specific barriers to exercise (i.e., reasons for *not* exercising on a given day), we only formed hypotheses for two barriers shown in past research to be associated with exercise: lack of time and not being in the mood to exercise. We hypothesized that we would replicate the association between perceived lack of time and low levels of exercise (Salmon et al., 2001). We also hypothesized that citing not being in the mood as a barrier to exercise would also be associated with low levels of exercise, as we interpreted this barrier as an indicator of low enjoyment of exercise (Salmon et al., 2001).

The second objective of the study was to examine motivational flexibility in student exercisers. Motivational flexibility contains two components: 1) number of reasons for engaging in a behavior, and 2) how often variations in the most important motive(s) across instances of the behavior occur. Flexibility is the combination between these two components; that is, having multiple reasons for exercising, with the most important motive(s) for exercise varying across instances of the behavior. We assessed how often the most important motive(s) for exercising changed day-to-day and the number of reasons reported for exercising. We found inter-individual variability in the motivational flexibility components for both fruit and vegetable consumption and cigarette smoking (Darlow & Lobel, 2011a; Darlow & Lobel, 2011b), so we hypothesized that we would also find variability in the flexibility components for exercise. That is, we believed we would find variation among the average number of reasons listed for exercising each day, as well as how often the most important motive(s) for exercising changed day-to-day.

If people have multiple reasons for engaging in a behavior, and different motives can ascend over time to become the primary reason why a behavior is enacted, then the probability that people will engage in that behavior should be greater, consistent with research on flexible goal adjustment (Rasmussen et al., 2006; Wrosch et al., 2003). However, it is also possible that having fewer reasons will be more strongly related to behavior, as commitment to one motive may be lower when there are multiple competing motives present. This possibility was illustrated in our examination of motivational flexibility in fruit and vegetable consumption (Darlow & Lobel, 2011a). Specifically, we found that possessing multiple motives for consuming fruits and vegetables was associated with less consumption, especially when the most important reason for

consumption changed frequently. Thus, we did not advance a specific hypothesis regarding the association of motivational flexibility and exercise frequency, intensity, duration, and enjoyment.

## Method

### *Participants*

Undergraduate students at a northeastern public university volunteered for the study online. Students age 18 and over were invited to participate if they reported engaging in moderate or vigorous exercise at least weekly. Participation incentives included satisfying a research participation requirement for an undergraduate psychology course, as well as receiving a “motivational profile” that discussed participants’ overall motivation for exercise and offered advice regarding the most beneficial type of exercise for their specific motives. In addition, all participants in the study were entered into a raffle to win a \$50 gift card.

One hundred ninety-eight student exercisers participated in the study. Power analysis (Cohen, 1988) showed that this number is more than sufficient to detect a medium effect size ( $d = 0.15$ ). Participants' age ranged from 18 to 31 ( $M = 19.7$ ), and gender was 69% female and 31% male. The ethnic self-identification of participants was as follows: 50% European American, 34% Asian American/Pacific Islander, 6% Latino/Hispanic, 5% African American/Black, and 5% Other/Mixed, reflecting the ethnic composition of the university.

### *Procedure*

Data were collected online to enhance student participation. Participants were told that they were being invited to participate in a study on exercise behavior. If they agreed to participate, they were directed to a webpage where they read the consent form and completed the Godin Leisure Time Exercise Questionnaire (GLTEQ; Godin & Shephard, 1985). They were then sent an e-mail notification to complete their entries every day for two weeks. When

participation was complete, participants received their research participation credit, and they were sent an individualized “motivational profile” according to whether their reasons for exercise align most with appearance, enjoyment, or social reasons.

### *Measures*

The GLTEQ (Godin & Shephard, 1985) is a four-item, psychometrically robust measure designed to assess weekly frequency of mild, moderate, and strenuous/vigorous exercise. A composite measure of exercise was calculated with the following formula, using corresponding values for the metabolic equivalent of each task (MET): (strenuous exercise \* 9) + (moderate exercise \* 5) + (mild exercise \* 3). Intensity of exercise is defined for respondents in the measure instructions. Specifically, strenuous exercise is defined as exercise that makes the “heart beat rapidly” (e.g., running, soccer). Moderate exercise is defined as exercise that is “not exhausting” (e.g., fast walking, dancing). Mild exercise is defined as exercise that requires “minimal effort” (e.g., yoga, golf). This instrument, which is commonly used to obtain self-reports of exercise, was chosen for its brevity and established validity. This measure can be found in Appendix 1.

Daily entries were completed using PsychData software. Each entry consisted of the following items: *did you exercise today* (yes/no), *if no, why not* (open-ended, participants could skip to end of entry if no exercise done during the day), *what did you do* (open-ended response), *how many times did you exercise today, for how many minutes did you exercise, did you break a sweat during your exercise session* (yes/no/a little), *what were your reasons for exercising* (open-ended response; able to list up to eight reasons each day), *how important was each reason to you* (on a scale of 1 to 5 with “1” being “not important at all” and “5” being “very important”), and *how much did you enjoy the exercise session* (on a scale of 1 to 5 with “1” being “did not enjoy

at all” and “5” being “enjoyed very much”). Exercise was defined for the participants as any planned or structured physical activity.

### *Data Coding*

The coding scheme for the reasons given for exercising was adapted from relevant studies of reasons for exercising (e.g., Cash, Novy, & Grant, 1994; Markland & Hardy, 1993). Reasons listed for exercising were coded into the following motive categories: 1) routine (e.g., habit), 2) appearance/weight management (e.g., to burn calories, to lose weight), 3) health (e.g., to feel more energized, sleep better, to improve health), 4) social (e.g., to spend time with friends), and 5) stress management (e.g., to “blow off steam”). Reasons listed were coded by three trained research assistants, with disagreements resolved by a study investigator. Interrater reliability was assessed by calculating Cohen’s Kappa, 0.80 ( $p < .001$ ), which indicates substantial reliability (Landis & Koch, 1977).

After each reason for exercising was coded, the number of times the most important motive(s) for exercising changed from day-to-day was counted. This score ranged from 0 (no day-to-day shifting among the most important motive endorsed) to 13 (most important motive changed every day). To take into account variation in the number of days exercised, the number of shifts was divided by the number of days exercised.

To examine the number of reasons listed for exercising, the total number of reasons that participants listed over the 14 days was counted (possible scores ranging from 1 to 112). As with shifting, this number was divided by the number of days exercised to take into account variations in frequency of exercise.

On days that participants did not exercise, they were asked to list their reasons for not exercising, which we refer to as “barriers” to exercise. We created a coding scheme based on

other studies of exercise barriers (Booth, Bauman, Owen, & Gore, 1997; Brown, 2005). Reasons listed for not exercising were coded into the following barrier categories: 1) too busy (e.g., too much homework, didn't have time), 2) no condition to exercise (e.g., physically ill or did not eat enough), 3) social and other resources not available (e.g., gym was closed, work-out friends were not around), 4) not in the mood (e.g., didn't feel like it, not motivated), 5) other social activities (e.g., holiday/social event, out of town/on vacation), and 6) exercised yesterday or recently. Cohen's Kappa was 0.82 ( $p < .001$ ), indicating substantial interrater reliability (Landis & Koch, 1977) in the coding of barriers.

## Results

All 198 participants completed the baseline assessment. Of 2,772 possible daily entries (14 entries per 198 participants), 2,711 daily entries were completed, a 97.8% response rate. Of the 2,711 daily entries, students reported exercising in 1,513 entries (55.8% of days assessed). Table 2.1 summarizes the frequency and importance of reasons listed by participants for exercising and not exercising. Descriptive statistics and correlations of study variables are displayed in Table 2.2.

### *Which Motives Predict Exercise?*

Using linear regression, we examined the association between each of the five motive categories and exercise. This was done by first entering all motive categories separately, then again by entering all the categories into one regression model, to take into account possible overlap of motive categories. The number of times participants endorsed each motive category was divided by the total number of reasons they listed, yielding a proportion score for each motive category. The exercise outcome variables calculated from the daily 14-day assessment

were: number of days exercised, average number of minutes spent exercising, and average enjoyment of exercise.

Exercising for health reasons predicted more days of exercise over the 14 days,  $t(196) = 2.84, p < .05$ , and more enjoyment of exercise, averaged over the 14 days,  $t(195) = 2.11, p < .05$ .

Exercising for routine reasons predicted fewer days exercised over the 14 days,  $t(196) = -2.50, p < .05$ , and less enjoyment of exercise, averaged over the 14 days,  $t(195) = -2.15, p < .05$ .

Exercising for social reasons was associated with more minutes spent exercising each day, averaged across the 14 days,  $t(192) = 3.14, p < .01$

When all of the motive categories were entered into one regression model, we found that exercising for social reasons continued to be associated with more minutes spent exercising each day, averaged across the 14 days,  $t(189) = 2.51, p < .05$ . Analyses of the variance inflation factor showed that multicollinearity did not occur in these models (Kleinbaum et al., 1998).

We also examined associations between the motive categories and the exercise variables assessed at baseline, specifically strenuous, moderate, and mild weekly exercise. Weekly strenuous exercise at baseline was negatively associated with exercising for social reasons,  $t(193) = -2.24, p < .05$ . Moderate,  $t(191) = 2.08, p < .05$ , and mild weekly baseline exercise,  $t(192) = 2.14, p < .05$ , was positively associated with exercising for social reasons. When examining associations between the motive categories and the baseline exercise variables, weekly strenuous baseline exercise was negatively associated with exercising for social reasons,  $t(190) = -2.38, p < .05$ , while weekly moderate baseline exercise was positively associated with exercising for social reasons,  $t(188) = 2.19, p < .05$ .

### *Which Barriers Predict Exercise?*

To examine the association between each of the five barrier categories and exercise, the same analysis format was used as that for examining the motive categories. The number of times participants endorsed each barrier category was divided by the total number of barriers they listed over the 14 days. Both univariate and multivariate linear regression analyses were conducted. Analyses were conducted for 184 participants who did not exercise on at least one of the 14 days. The remaining 14 participants reported exercising on all 14 days, so they did not have the opportunity to list reasons for not exercising.

Univariate analyses revealed that failing to exercise due to being too busy was associated with more time spent exercising each day,  $t(178) = 2.37, p < .05$ . Not exercising due to not being in the mood to do so was associated with less enjoyment of exercise,  $t(181) = -3.10, p < .01$ , while not exercising due to other social activities was associated with more enjoyment of exercise,  $t(181) = 2.18, p < .05$ , averaged across the 14 days.

The multivariate model showed that failing to exercise due to being too busy,  $t(177) = -3.43, p < .01$ , not being in the mood,  $t(177) = -3.49, p < .01$ , and other social activities,  $t(177) = -2.85, p < .01$ , were associated with less days exercised over the 14-day assessment. Failing to exercise due to being in no condition to exercise,  $t(173) = -1.99, p < .05$ , or not being in the mood,  $t(173) = -2.25, p < .05$ , was associated with less time spent exercising each day, averaged across the 14-day assessment. Failing to exercise due to not being the mood was also associated with less enjoyment of exercise, averaged across the 14 days,  $t(176) = -2.76, p < .01$ .

Weekly strenuous baseline exercise was positively associated with failing to exercise due to intentionally taking time off from exercise (due to recent exercise),  $t(179) = 3.68, p < .001$ , and negatively associated with failing to exercise due to being too busy,  $t(179) = -2.47, p < .05$ .

There were no problems with multicollinearity in the multivariate regression analyses of exercise barriers. None of the exercise variables assessed at baseline were associated with barriers to exercise.

### *Does Motivational Flexibility Predict Exercise?*

Both multilevel modeling and hierarchical regression analyses were used to examine the relationship between motivational flexibility and aspects of exercise. Multilevel modeling was used to examine the relationship between motivational flexibility and aspects of exercise that occur daily, specifically, whether or not exercised occurred, how many minutes were spent exercising, and how much exercise was enjoyed. Hierarchical regression analyses were used to examine the relationship between motivational flexibility and the exercise variables assessed at baseline, specifically, weekly strenuous, moderate, and mild exercise.

Multilevel modeling allows for analysis of both within-person factors and between-person factors. The within-person factor that was examined in these analyses was change in behavior over time, specifically change in exercise frequency, duration, and enjoyment. The between-person factors were the components of motivational flexibility: 1) the average number of reasons listed over the 14 days, and 2) the number of times the most important motive(s) changed over the 14 days. Using lagged multi-level models, the within-person model allows for the assessment of individual change in exercise behavior (frequency, duration, and enjoyment) over a two-week time period, as well as the effect of each day's behavior on behavior occurring on subsequent days. The between-person model allowed us to test the effects of individual differences in motivational flexibility on exercise across individuals. For frequency of exercise, analyses were done using PROC NLMIXED for binary outcomes (i.e., either exercised on day  $t$  or did not) in the SAS 9.2 statistical software. PROC MIXED was used to analyze the influence

of the motivational flexibility components on enjoyment and amount of time spent exercising each day. The baseline exercise composite was controlled for in these analyses. Motivational flexibility was examined as a predictor of exercise and its related variables on day  $t+1$ , controlling for behavior on the previous day. Since it is possible that one of the components of motivational flexibility (i.e., number of reasons and amount of shifting among the most important motive) may have a larger influence than the other, both components were examined independently as between-person factors. The variables representing the components were centered at the grand mean. Significant interactions were examined using generalized simple slopes analysis for interactions found in regression (Preacher, Curran, & Bauer, 2006). Slopes were plotted at high (1 SD above the mean), average (at the mean), and low (1 SD below the mean) values to examine whether slopes were significantly different from zero.

Baseline exercise was associated with number of days exercised over the 14 days,  $t(193) = 4.20, p < .001$ . Exercise decreased across the 14 days,  $t(193) = -2.39, p < .05$ . Shifting among the most important reason(s) listed each day was associated with daily enjoyment of exercise,  $t(188) = 2.45, p < .05$ . A significant interaction was found between average number of reasons listed and amount of shifting,  $t(188) = -3.08, p < .01$ . Simple slopes analyses indicated no statistically significant trends, but shifting was marginally associated with less enjoyment of exercise when the number of reasons listed was above average, simple slope =  $-1.01, t = -1.68, p = .09$ . The results of this analysis are presented in Table 2.3. No significant predictors were found in the multilevel analyses of number of minutes spent exercising.

Hierarchical regression analyses were used to examine associations between motivational flexibility and baseline strenuous, moderate, and mild exercise. The motivational flexibility components (the average number of reasons listed over the 14 days, and the number of times the

most important reason changed over the 14 days) were entered on the first step, and the interaction between the two components was entered on the second step. Listing more reasons to exercise each day was associated with less weekly mild baseline exercise,  $t(190) = -2.00, p < .05$ . No significant associations were found for weekly moderate or strenuous baseline exercise.

### Discussion

The purpose of this study was to examine predictors of daily exercise behavior, including motives and barriers for exercise, number of reasons given for exercising, and how often the most important reason changed across occurrences of exercise. We used a comprehensive definition of exercise, in which we measured number of days exercised, amount of time spent exercising, and enjoyment of exercise. Our baseline assessment of exercise included mild, moderate, and strenuous weekly exercise.

We first used regression techniques to examine the association between motives for and barriers to exercise and the exercise variables. We found that exercising for health reasons was associated with both greater frequency and enjoyment of exercise versus exercising for mostly routine reasons, though these associations were not statistically significant when all motive categories were entered into the model. Nevertheless, this association is consistent with research showing that those who consistently exercise endorse more intrinsic motives for exercise (e.g., enjoyment, physical and mental well-being), while extrinsic motives for exercise (e.g., appearance, social norms) are more commonly cited in beginners to exercise (Ingledeu, Markland, & Medley, 1998). Those who view exercise as influencing one's well-being and who enjoy it should be more successful in maintaining an exercise regimen as opposed to those who simply view exercise as a routine.

We also found that exercising for mostly social reasons was associated with spending more time exercising each day. Our examination of associations between the motive categories and the baseline exercise variables showed that exercising for social reasons was associated with more mild and moderate baseline exercise as opposed to strenuous weekly baseline exercise. Social support is strongly related to exercise (Courneya et al., 2000), though the nature of this relationship may vary depending on how support is defined (Darlow & Xu, 2011). For example, people can be encouraged by their close others to exercise, and close others can also model exercise behavior. We examined support to exercise in the form of exercising with close others. Exercising with friends may offer an opportunity to catch up with one's social network, but may also decrease the likelihood of strenuous activity. Speaking during strenuous exercise becomes burdensome unless the intensity of activity is decreased. Nevertheless, the social network can be used to enhance exercise levels.

Some associations between barriers to exercise and the exercise variables were also found. Specifically, failing to exercise due to not being in the mood was associated with lower frequency and less enjoyment of exercise, as well as less time spent exercising. Enjoyment of exercise is associated with the behavior itself (Leslie, Owen, Salmon, Bauman, & Sallis, 1999). Exposing students to many forms of exercise should increase the likelihood of students finding a form of exercise they enjoy, which should enhance exercise levels. Finally, not exercising due to being too busy was associated with fewer days of exercise during the 14-day assessment. The association between perceived lack of time and low levels of exercise is commonly found in research (e.g., Salmon et al., 2003). Many universities accommodate students' busy schedules by providing a fitness center on campus. Exercise can be difficult to fit into one's schedule, but even short bouts of exercise are beneficial (Boreham et al., 2005). Students should be informed about

the benefits of including short workouts into their schedules, as well as where to find local and inexpensive fitness facilities.

Another objective of our study was to test a new concept called motivational flexibility in student exercisers. Motivational flexibility is the idea that people can have multiple reasons for engaging in a behavior, and the dominant reason for engaging in the behavior can vary across occurrences of that behavior. Based on daily assessments, we found that day-to-day shifting among the most important motive(s) to exercise was associated with greater enjoyment of exercise, although we did not find any statistically significant associations between motivational flexibility and exercise behavior. When the average number of reasons listed was at least above average, however, shifting among the most important motive(s) was marginally associated with less enjoyment of exercise. In other words, shifting is beneficial except when the number of reasons listed are high; that is, four or more reasons listed on average across the 14 days). It is possible that enjoyment mediates associations between motivation and exercise. Given the association between enjoyment of exercise and the behavior itself in other studies (Leslie et al., 1999), enjoyment of exercise could be targeted by exercise interventions as a variable to be changed, as opposed to interventions focusing only on exercise behavior.

Frequent switching among the behavior motive(s) that guide behavior on a given day suggests an ability to adapt to changing environmental demands. It is also possible that “shifTERS” may be different on some unknown variable related to perceptions of the self or of one’s behaviors. Therefore, it may be valuable to examine constructs such as self-concept clarity or cognitive complexity in association with motivational flexibility, specifically the day-to-day shifting component. Shifting among behavior motives is not always associated with positive outcomes, however; shifting among the most important motive(s) for exercising was associated

with less enjoyment of exercise when participants listed a large number of reasons. Although this trend only reached marginal statistical significance, it demonstrates that the combination of endorsing multiple behavior motives and the most important motive guiding behavior each day frequently varying may be associated with negative perceptions of healthy behavior. It is also possible that people who list a large number of reasons, with frequent changes among the most important motive(s) each day, may demonstrate a lack of commitment towards the behavior.

Although we did not find associations between motivational flexibility and exercise behavior, findings from the present study partly replicated previous studies of motivational flexibility in cigarette smoking and fruit and vegetable consumption. In the investigation of cigarette smoking, shifting among the most important motive(s) for smoking was associated with more days on which smoking occurred (Darlow & Lobel, 2011b). In the present study, day-to-day shifting among reasons for exercising was associated with greater daily enjoyment of exercise, except for those who listed several reasons for exercising each day. That is, an exerciser who exercises mostly for one reason on some days but other reasons on other days reports greater enjoyment of exercise, possibly because she has other reasons to exercise that motivate her and are important to her. A similar statement can be said for smoking; a smoker who mostly smokes in social situations may also smoke alone if he has other reasons for smoking that are important to him, such as for reducing negative emotion.

The investigations of motivational flexibility in healthy behaviors (i.e., exercise and fruit and vegetable consumption) show that shifting among behavior motives is not always beneficial. The study of motivational flexibility and fruit and vegetable consumption (Darlow & Lobel, 2011a) found that shifting among the most important motive for eating fruits and vegetables was associated with greater consumption. However, possessing more motives for consuming fruits

and vegetables was associated with less consumption, and this association became more robust as shifting among the most important motive increased. This demonstrates that motivational flexibility may be negatively associated with behavior. Although we did not find an association between motivational flexibility and exercise behavior, we found a similar association between motivational flexibility and enjoyment of exercise. Exercise is more effortful than fruit and vegetable consumption; indeed, the most frequently listed reason for eating fruits and vegetables was simply that they were already a part of the meal. Therefore, it is possible that students think about these two healthy behaviors in different ways. In addition, the component of motivational flexibility that identifies number of reasons for engaging in a behavior was operationalized differently in these two studies, as we refined our definitions of the motivational flexibility variables. Also, the sample size for the current study is significantly larger than that of the fruit and vegetable study.

The present study has several strengths. First, we used daily diary methods, a state-of-the-art measurement tool that captures people's daily experiences and minimizes respondent retrospection, which should yield more accurate data (Bolger, Davis, & Rafaeli, 2003). The compliance rate for entry completion was very high (approximately 98%). This is likely due to the study being completed online, which we reasoned would take less effort for the participants than a paper-and-pencil journal (Bolger et al., 2003). Third, some of the data were analyzed using multilevel modeling, which allows for the analysis of both within- and between-person factors. Both main effects and interactions were entered into these models, creating a comprehensive test of study hypotheses. Finally, given the complexity of exercise as a construct, we examined different aspects of exercise. We showed that some motives have different associations with various aspects of exercise.

The study has some limitations as well. First, all measures were self-reported, so it is possible that the participants overreported exercise because of social desirability. Self-reported exercise, however, is comparable to data received from objective measures such as accelerometers (Troiano et al., 2008). In addition, participants reported their exercise every day, which should increase the accuracy of reporting. We also collected data from a convenience sample of university students. These results may not generalize to the overall population, since young adults frequently have different reasons for engaging in health behaviors than older adults (Curry, Grothaus, & McBride, 1997; Davis et al., 1995). For this reason, motivational flexibility for exercise should be examined in older adults as well.

The current study, which examined patterns of motivation to exercise, highlighted the importance of enjoyment of exercise, as well as exercising with a social network. We found that those who fail to exercise because they are not in the mood or do not feel motivated exercise on fewer days, spend less time exercising, and enjoy exercise less. We also found that shifting among the most important reason for exercising each day was associated with enjoyment of exercise but not actual exercise behavior. Future research should examine enjoyment of exercise as a possible mediator in the relationship between motivation and exercise, and whether enjoyment has differential influences across various health behaviors. Motivational flexibility has thus far been examined in three health behaviors (i.e., fruit and vegetable consumption, cigarette smoking, and exercise), and differential associations were found in each study. Health behaviors may differ from each other on several dimensions: whether they are healthy or unhealthy, how much effort is needed for engagement, and how socially desirable the behavior is, to name a few. Future research on motivational flexibility should consider these dimensions. Capturing the manner in which people think about their engagement in health behaviors can lead

to fruitful and innovative health behavior interventions and may also have implications for general behavior motivation.

## Additional Analyses: Motivational Flexibility and Individual Differences

The studies of motivational flexibility in student exercisers and smokers show some associations between aspects of flexibility and behavior. Specifically, frequent variations among the motive(s) that guide(s) a behavior each day are associated with greater frequency of smoking and enjoyment of exercise. Self-perceptions may influence these associations. Given the novelty of motivational flexibility, it is important to determine its unique contribution to behavior when taking into account other possible influences. Self-regulatory focus, for example, is the idea that motives can be positively or negatively focused (Higgins, 1997). Motives with a positive focus are directed toward gains and are promotion-oriented, while motives with a negative focus aim to avoid undesirable outcomes and are prevention-oriented. Promotion and prevention orientations measured as traits are positively correlated (Fuglestad, Rothman, & Jeffery, 2008). If being promotion-focused is related to being prevention-focused more generally, can people be motivated to engage in a given behavior by both promotion- and prevention-focused motives? We hypothesized that the motivational flexibility components (i.e., listing more reasons for engaging in a behavior, and the most important motive(s) for engaging in the behavior changing across days) would be associated with both promotion and prevention orientations in student exercisers and smokers.

Self-concept clarity, resilience, and affect are all associated with one's sense of self and may also contribute to the relationship between motivational flexibility and behavior. Internalizing cultural standards of attractiveness indicates sensitivity towards environmental cues, such as situations where appearance is called into attention (Darlow & Lobel, 2010). Is internalization of cultural attractiveness standards related to flexibility?

It is possible that motivational flexibility indicates underlying cognitive complexity; some people may have a greater ability to perceive multiple reasons to engage in a behavior. People who are able to “call upon” another reason to engage in the behavior to motivate themselves may also have different cognitive abilities than people who are less flexible. Is motivational flexibility associated with perceiving more reasons to *not* engage in a behavior? For example, if motivational flexibility in exercisers is indicative of having more interchangeable reasons for exercising, will there also be more reasons for *not* exercising on a given day? We hypothesized that the motivational flexibility components would be associated with listing more barriers to exercise and cigarette smoking on days when the behavior did not occur.

## Method

### *Participants*

The sample consisted of 198 student exercisers and 116 student smokers.

### *Procedure*

All data was collected online. Participants who agreed to participate were directed to a webpage where they read the consent form and completed the Godin Leisure Time Exercise Questionnaire (GLTEQ; Godin & Shephard, 1985) if they were part of the exercise sample (measure can be found in Appendix 1), or they were asked to indicate how many cigarettes they smoked each day if they were in the smoking sample. They also completed the measures for self-regulatory focus, self-concept clarity, resilience, affect, and internalization of attractiveness ideals. They then completed entries every day for two weeks.

### *Measures*

Participants in the exercise sample were asked to complete the following items in each entry: *did you exercise today* (yes/no), *if no, why not* (open-ended, participants could skip to end

of entry if no exercise done during the day), *what did you do* (open-ended response), *how many times did you exercise today*, *for how many minutes did you exercise*, *did you break a sweat during your exercise session* (yes/no/a little), *what were your reasons for exercising* (open-ended response; able to list up to eight reasons each day), *how important was each reason to you* (on a scale of 1 to 5 with “1” being “not important at all” and “5” being “very important”), and *how much did you enjoy the exercise session* (on a scale of 1 to 5 with “1” being “did not enjoy at all” and “5” being “enjoyed very much”).

Each entry for cigarette smokers consisted of the following items: *did you smoke today* (yes/no), *if no, why not* (open-ended, participants could skip to end of entry if no cigarettes were smoked during the day), *how many times did you smoke today*, *what is the total number of cigarettes you smoked today*, *around what time did you smoke your last cigarette* (participants were instructed to complete the following questions pertaining to the last cigarette smoked), *what were your reasons for smoking* (open-ended response, able to list up to eight reasons), and *how important was each reason to you* (on a scale of 1 to 5 with “1” being “not important at all” and “5” being “very important”).

Self-regulatory focus, self-concept clarity, resilience, affect, and thin ideal internalization, and other health behaviors were assessed at the baseline assessment. These measures can be found in Appendix 2.

Self-regulatory focus was assessed using the Regulatory Focus Questionnaire (RFQ; Higgins et al., 2001), which measures general tendencies toward promotion and prevention orientations. Participants indicate the score that best applies to them on eleven items, all scored on a five-point scale with (1 = *Never or seldom*, 5 = *Very often*) and broken into subscales for promotion and prevention orientations. An example of a promotion orientation item is “Do you

often do well at things that you try?” and a prevention orientation item is “Not being careful enough has gotten me into trouble at times.” This measure has adequate internal consistency for both the promotion ( $\alpha = .71$ ) and prevention ( $\alpha = .82$ ) orientation subscales (Higgins et al., 2001).

Self-concept clarity was assessed using the Self-Concept Clarity Scale (SCCS; Campbell et al., 1996), which is designed to measure the extent to which one’s identity is clearly defined and temporally stable. Participants indicate the degree to which they agree with twelve items, all scored on a five-point Likert scale (1 = *Strongly disagree*, 5 = *Strongly agree*). Examples of items are “I spend a lot of time wondering about what kind of person I really am” and “My beliefs about myself seem to change very frequently.” This measure has high internal consistency ( $\alpha = .86$ ) and is correlated with self-esteem, conscientiousness, and agreeableness, as well as low levels of neuroticism (Campbell et al., 1996).

Resilience was assessed using the Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003). This 25-item measure was designed to assess the ability to effectively cope with stress. Participants indicate the degree to which they agree with each item, all scored on a five-point scale (0 = *Rarely true*, 4 = *True nearly all of the time*). Examples of items are “Can deal with whatever comes” and “Not easily discouraged by failure.” The measure shows high internal consistency ( $\alpha = .89$ ) and convergent validity with hardiness, social support, and less perceived stress (Connor & Davidson, 2003).

Affect was assessed using the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988), which includes two ten-item subscales that measure positive and negative affect. Participants indicate on a five-point scale (1 = *Very slightly or not at all*, 5 = *Extremely*) how they generally feel. Items in the positive affect subscale include “Enthusiastic”

and “Alert,” while items in the negative affect subscale include “Afraid” and “Irritable.” Both the positive ( $\alpha = .88$ ) and negative affect ( $\alpha = .87$ ) subscales are internally consistent. Scores on the positive affect subscale are associated with social activity, while negative affect scores are correlated with perceived stress (Watson et al., 1988).

Thin ideal internalization was examined using the eight-item Internalization subscale of the Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ; Heinberg, Thompson, & Stormer, 1995). The Internalization subscale was designed to assess the degree to which people endorse Western cultural standards of thinness. Participants indicate the degree to which they agree with each item, all scored on a five-point Likert scale (1 = *Strongly disagree*, 5 = *Strongly agree*). An example of an item is “I believe that clothes look better on thin models.” The authors of the scale have shown that the Internalization subscale has convergent validity with measures of body image and eating disturbances and high internal consistency ( $\alpha = .88$ , Heinberg et al., 1995).

#### *Data Coding and Analysis*

Reason for exercising and smoking were coded, and the number of times the most important motive(s) for exercising or smoking changed from day-to-day was counted. This score ranged from 0 (no day-to-day shifting among the most important motive endorsed) to 13 (most important motive changed every day). To take into account variation in the number of days exercised or smoked, the number of shifts was divided by the number of days exercised or smoked.

To examine the number of reasons listed for exercising or smoking, the total number of reasons that participants listed over the 14 days was counted (possible scores ranging from 1 to

112). As with shifting, this number was divided by the number of days exercised or smoked to take into account variations in frequency of the behavior.

On days that participants did not exercise or smoke, they were asked to list their reasons for not engaging in the behavior, which we refer to as “barriers.” As with the number of reasons listed for exercising or smoking, the total number of barriers that participants listed over the 14 days was counted (possible scores ranging from 1 to 112). This number was divided by the number of days when exercising or smoking did *not* occur. As there were some participants who exercised or smoked on all 14 days of the assessment period, analyses of barriers were only conducted for 184 out of the 198 exercisers and 97 out of the 116 smokers.

Pearson’s correlations were examined among average number of reasons listed each day for exercise or smoking, amount of shifting among the most important motive(s) listed for each day of exercise or smoking, promotion and prevention orientations, self-concept clarity, resilience, positive and negative affect, internalization of cultural attractiveness standards, and average number of barriers listed for each day of *not* exercising or smoking. Hierarchical regression analyses were then done to examine the associations between motivational flexibility and the individual difference variables. Average number of motives listed across the 14 days and the number of times the most important motive(s) listed shifts (both variables centered) were entered on Step One. Interaction effects (motivational flexibility) were entered on Step Two. Correlation and regression analyses were run separately for the exercisers and smokers. Main effects are reported for Model Two (interaction included in model).

## Results

Correlations and descriptive statistics can be found in Table 3.1 for exercisers and Table 3.2 for cigarette smokers.

*Exercisers (N = 198)*

Listing more reasons each day, averaged over the 14 days, was associated with less positive affect,  $t(186) = -2.59, p < .05$ , and listing more barriers on days that exercise did not occur,  $t(177) = 35.91, p < .001$ . Shifting among the most important motive(s) listed for exercise each day was associated with resilience,  $t(192) = 2.00, p < .05$ , and less negative affect,  $t(184) = -2.00, p < .05$ .

A significant interaction was found between average number of reasons and motive shifting for thin ideal internalization,  $t(186) = 2.29, p < .05$ . Number of reasons is associated with thin ideal internalization when shifting is below average, simple slope = 1.47,  $t = 2.70, p < .01$ , average, simple slope = 1.99,  $t = 2.65, p < .01$ , and above average, simple slope = 2.51,  $t = 2.60, p < .05$ . The relationship between average number of reasons listed and thin ideal internalization becomes more robust as shifting among the most important motive increases.

*Smokers (N = 116)*

Listing more reasons to smoke each day, averaged over the 14 days, was associated with listing more barriers to smoking on days that smoking did not occur,  $t(93) = 14.71, p < .001$ . Shifting among the most important motive(s) for smoking each day was associated with thin ideal internalization,  $t(108) = 2.14, p < .05$ .

## Discussion

The analysis of associations between motivational flexibility and individual difference variables revealed that listing more reasons to exercise seems to be associated with generally negative outcomes (i.e., less positive affect, listing more barriers to exercise), while frequent shifting among the most important motive(s) for exercise was associated with generally positive outcomes (i.e., resilience and less negative affect). These results were not mirrored in the sample

of cigarette smokers. However, we also found that smokers who list more reasons for smoking also tended to list more barriers to smoking. We also found that listing more reasons for smoking was associated with greater internalization of cultural thinness standards, and this association became stronger as shifting among the most important motive(s) for smoking increased.

Our examination of motivational flexibility in exercisers showed that shifting among the most important motive(s) for exercising was associated with greater daily enjoyment of exercise. Therefore, there seems to be a trend in which motive shifting is associated with positive outcomes such as resilience. “Shifters” may be different on some third variable, such as optimism or cognitive complexity. Similarly, resilience might influence the relationship between motive shifting and healthy behaviors.

Interestingly, we did not find the same results for motivational flexibility and cigarette smoking that we did for exercise. We found an interaction between number of reasons listed and motive shifting for thin ideal internalization, which may be associated with sensitivity to environmental cues (Darlow & Lobel, 2010). However, it is also possible that this was a spurious finding. Shifting among the most important motive(s) for cigarette smoking was associated with greater frequency of smoking, indicating that shifting may not be associated with exclusively healthy behaviors. Shifting may indicate an ability to adapt to changing environmental demands, though we did not find an association between resilience and shifting in smokers. The fact that there were differential associations between motivational flexibility and variables associated with the self in the two samples suggests two possibilities: 1) motivational flexibility is not a trait; it operates differently when it is applied to behaviors that vary in terms of their healthfulness, effort needed, and social desirability; and, 2) exercisers and cigarette smokers are inherently different. Some research has touched upon the second possibility (e.g., Kaczynski, Manske, Mannell, &

Grewal, 2008). Future research should investigate the first possibility: that motivational flexibility differs across behaviors due to aspects of the behavior such as whether it is healthy or unhealthy and how much effort is required for the behavior.

## Conclusion

The purpose of this investigation was to test a new idea called *motivational flexibility*, which is the idea that people can have multiple reasons for engaging in a behavior, and the main reason for engaging in the behavior can change across occurrences of the behavior. This idea was developed to redress limitations of current health behavior theories, such as assuming that health is the main motivation for engaging in healthy behaviors, focusing on mostly healthy versus unhealthy behaviors, and not taking into account situational factors. We hypothesized that motivational flexibility would be associated with greater behavior adherence, based on flexible goal adjustment research showing that the ability to disengage from failing goals and reengage with new goals was associated with success meeting goals (Rasmussen et al., 2006). Examining student exercisers and cigarette smokers, we partly confirmed this hypothesis. Specifically, frequent variations among the most important motive(s) for smoking or exercising each day (“shifting”) was associated with greater frequency of smoking and enjoyment of exercise, respectively. However, shifting was associated with less enjoyment of exercise when the number of reasons listed for exercising each day was great. Similar results were found in an assessment of motivational flexibility and fruit and vegetable consumption.

Results from the present investigation suggest that shifting may be indicative of an ability to adapt to changing environmental demands. This possibility is illustrated in our finding that shifting and resilience are correlated in exercisers. However, the combination of having many reasons for engaging in a behavior and not feeling strongly committed to any single reason may be detrimental to adherence of healthy behaviors. It is notable that motivational flexibility was associated with exercise and fruit and vegetable consumption differently than with cigarette smoking. Health behaviors can differ on several dimensions; for example, they may differ in

their healthfulness, effort needed for engagement, and social desirability. It is possible that motivational flexibility's differential associations with behaviors may be moderated by these dimensions, and future research could explore this possibility. It is likely that cognitive processes associated with the adoption and maintenance of health behaviors differ according to the nature of the behaviors themselves. Investigating how people think about these behaviors may benefit research and the development of health behavior interventions and may add to the field of knowledge regarding general behavior motivation.

Table 1.1

*Descriptive Statistics of Study Variables for Daily and Light Smokers.*

Variable <sup>a</sup>		# of days smoked	# of cigarettes smoked	Average # of reasons	Motive shifting
	All	--	.55***	.04	.23*
# of days smoked	Daily		.48***	-.04	-.07
	Light		-.13	.09	.32*
# of cigarettes smoked	All			-.05	.03
	Daily		--	-.03	-.07
	Light			-.16	-.14
Average # of reasons	All			--	.31**
	Daily				.37**
	Light				.24
Motive shifting	All				--
	Daily				
	Light				
	All	8.0 (4.1)	4.0 (3.1)	3.1 (2.1)	0.5 (0.3)
<i>M(SD)</i>	Daily	10.8 (2.7)	5.5 (3.1)	3.2 (2.2)	0.6 (0.3)
	Light	4.7 (2.8)	2.2 (1.8)	3.0 (2.0)	0.5 (0.3)

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ ; *Note.* <sup>a</sup> Range of values: Number of days spent smoking (1-14), Number of cigarettes smoked, on average (1-15); Average number of reasons listed per day (1-8), Motive shifting (0-0.9)

Table 1.2

*Motives for Smoking or Not Smoking.*

Smoking

	Frequency <sup>a</sup>	Mean Importance <i>M (SD)</i>
Stress release	848 (29.6%)	3.9 (1.0)
Craving	538 (18.8%)	3.4 (1.1)
Bored	347 (12.1%)	3.1 (1.2)
Habit/Context	688 (24.0%)	3.5 (1.1)
Social	422 (14.7%)	3.3 (1.1)
Appetite suppressant	21 (0.7%)	3.7 (1.3)

<sup>a</sup> Total = 2, 864

Not Smoking

Category	Frequency <sup>a</sup>
Absence of cues	274 (15.0%)
No time	330 (18.1%)
Didn't want to	447 (24.5%)
Trying to quit	334 (18.3%)
Cigarettes not available	291 (16.0%)
Not feeling well	145 (8.0%)

<sup>a</sup> Total = 1,821

Table 1.3

*Effects of Average Number of Reasons and Shifting on Daily Cigarette Smoking (N = 116).*

	Coefficient <sup>a</sup>	SE <sup>b</sup>	<i>p</i>
Intercept	-2.94	0.38	<.001
Baseline Consump	2.38	0.23	<.001
Time	-0.03	0.02	.122
Number of Reasons	0.01	0.09	.933
Shifting	1.25	0.63	.049
Time * Reasons	0.00	0.01	.765
Time * Shifting	-0.07	0.06	.233
Reasons * Shifting	0.25	0.23	.264

*Note.* <sup>a</sup> Regression coefficient estimate; <sup>b</sup> SE = standard error

Table 1.4

*Effects of Average Number of Reasons and Shifting on Daily Cigarette Smoking in Light Smokers (n = 52).*

	Coefficient <sup>a</sup>	SE <sup>b</sup>	<i>p</i>
Intercept	-0.61	0.21	.005
Time	-0.01	0.02	.633
Number of Reasons	0.03	0.10	.810
Shifting	1.59	0.72	.032
Time * Reasons	-0.01	0.01	.624
Time * Shifting	-0.05	0.07	.483
Reasons * Shifting	0.04	0.22	.852

*Note.* <sup>a</sup> Regression coefficient estimate; <sup>b</sup> SE = standard error

Table 2.1

*Motives for Exercising or not Exercising.*

Exercising

	Frequency <sup>a</sup>	Mean Importance <i>M (SD)</i>
Routine	1,061 (19.1%)	4.0 (1.0)
Appearance	1,388 (25.3%)	4.4 (0.8)
Health	1,570 (28.6%)	4.5 (0.8)
Social/Fun	1,037 (18.9%)	4.1 (1.0)
Stress release	428 (7.8%)	4.3 (0.8)

<sup>a</sup> Total = 5,484

Not Exercising

Category	Frequency <sup>a</sup>
Too busy	1,689 (46.1%)
No condition to exercise	320 (8.7%)
Resources not available	332 (9.1%)
Not in the mood	739 (20.2%)
Other social activities	266 (7.3%)
Exercised yesterday or recently	315 (8.6%)

<sup>a</sup> Total = 3,661

Table 2.2

*Correlations, Means, and Standard Deviations of Study Variables (N = 198).*

Variables <sup>a</sup>	1	2	3	4	5	6	7	8	9
1. Strenuous exercise <sup>b</sup>	--	.04	.07	.66***	.41***	.33***	.09	.03	.02
2. Moderate exercise <sup>b</sup>		--	.40***	.67***	.07	.08	.06	-.02	.01
3. Mild exercise <sup>b</sup>			--	.64***	.05	.09	.02	-.15*	-.04
4. Exercise comp <sup>b</sup>				--	.29***	.27***	.09	-.04	-.02
5. # of days exercised <sup>c</sup>					--	.13	.13	.04	.09
6. Avg. minutes spent exercising <sup>c</sup>						--	.17*	.09	.03
7. Avg. enjoyment of exercise <sup>c</sup>							--	.17*	.18**
8. Avg. number of reasons <sup>c</sup>									.26***
9. Motive shifting <sup>c</sup>									--
<i>M</i>	3.2	3.5	4.4	58.8	7.6	62.6	4.0	3.6	0.6
<i>SD</i>	1.9	2.5	3.7	26.6	3.3	31.3	0.7	2.2	0.2

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ ; *Note.* <sup>a</sup> Range of values: Strenuous exercise (0-9), Moderate exercise (0-17), Mild exercise (0-25), Baseline exercise composite (13-165), Number of days spent exercising (1-14), Average number of minutes spent exercising (14.8-207.7), Average enjoyment of exercise (1-5), Average number of reasons listed per day (1-8), Motive shifting (0-0.9); <sup>b</sup> Calculated from baseline data; <sup>c</sup> Calculated from daily data.

Table 2.3

*Effects of Average Number of Reasons and Shifting on Daily Enjoyment of Exercise.*

	Coefficient <sup>a</sup>	SE <sup>b</sup>	<i>p</i>
Intercept	3.88	0.12	<.001
Baseline Exercise	0.00	0.00	.267
Time	0.00	0.01	.365
Number of Reasons	0.04	0.03	.204
Shifting	0.64	0.26	.015
Time * Reasons	0.00	0.00	.987
Time * Shifting	-0.04	0.02	.103
Reasons * Shifting	-0.28	0.09	.002

*Note.* <sup>a</sup> Regression coefficient estimate; <sup>b</sup> SE = standard error

Table 3.1

*Correlations, Means, and Standard Deviations of Study Variables in Exercisers (N = 198).*

Variables <sup>a</sup>	1	2	3	4	5	6	7	8	9	10
1. Avg. number of reasons <sup>b</sup>	--	.26***	-.08	.09	-.04	-.01	-.15*	-.01	.10	.94***
2. Motive shifting <sup>b</sup>		--	.11	.02	.05	.14	.10	-.14	.01	.26***
3. Promotion orient <sup>c</sup>			--	.33***	.52***	.68***	.58***	-.35***	-.08	-.11
4. Prevention orient <sup>c</sup>				--	.40***	.25***	.25**	-.13	-.06	.06
5. Self-concept clarity <sup>c</sup>					--	.53***	.48***	-.38***	-.24**	-.09
6. Resilience <sup>c</sup>						--	.71***	-.39***	-.15*	-.05
7. Positive affect <sup>c</sup>							--	-.20**	-.13	-.23**
8. Negative affect <sup>c</sup>								--	.23**	-.01
9. Thin ideal int <sup>c</sup>									--	.09
10. Avg. # of barriers <sup>b</sup>										--
<i>M</i>	3.6	0.6	22.2	17.7	42.7	67.9	36.5	22.0	21.8	3.1
<i>SD</i>	2.2	0.2	3.9	4.1	9.1	14.4	7.2	7.1	7.9	2.3

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ ; *Note.* <sup>a</sup> Range of values: Average number of reasons listed per day (1-8), Motive shifting (0-0.9), Promotion orientation (7-30), Prevention orientation (7-25), Self-concept clarity (19-60), Resilience (20-100), Positive affect (14-50), Negative affect (10-50), Thin ideal internalization (8-40), Average number of barriers listed (1-8); <sup>b</sup> Calculated from daily data; <sup>c</sup> Calculated from baseline data.

Table 3.2

*Correlations, Means, and Standard Deviations of Study Variables in Smokers (N = 116).*

Variables <sup>a</sup>	1	2	3	4	5	6	7	8	9	10
1. Avg. number of reasons <sup>b</sup>	--	.31**	-.02	-.04	-.03	-.02	-.08	.03	-.05	.86***
2. Motive shifting <sup>b</sup>		--	-.05	-.06	.05	-.13	-.15	.02	.19*	.17
3. Promotion orient <sup>c</sup>			--	.13	.45***	.55***	.54***	-.47***	-.22*	-.04
4. Prevention orient <sup>c</sup>				--	.28**	.05	.04	-.15	-.07	-.12
5. Self-concept clarity <sup>c</sup>					--	.51***	.36***	-.71***	-.45***	-.10
6. Resilience <sup>c</sup>						--	.69***	-.58***	-.28**	-.04
7. Positive affect <sup>c</sup>							--	-.29**	-.27**	-.17
8. Negative affect <sup>c</sup>								--	.49***	.06
9. Thin ideal intern <sup>c</sup>									--	-.02
10. Avg. # of barriers <sup>b</sup>										--
<i>M</i>	3.1	0.5	20.8	15.5	34.9	61.4	33.5	25.5	24.7	3.1
<i>SD</i>	2.1	0.3	3.9	4.4	8.7	16.7	7.1	8.7	8.1	2.1

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ ; *Note.* <sup>a</sup> Range of values: Average number of reasons listed per day (1-8), Motive shifting (0-0.9), Promotion orientation (8-28), Prevention orientation (5-25), Self-concept clarity (12-54), Resilience (14-100), Positive affect (16-50), Negative affect (10-50), Thin ideal internalization (8-40), Average number of barriers listed (1-8); <sup>b</sup> Calculated from daily data; <sup>c</sup> Calculated from baseline data.

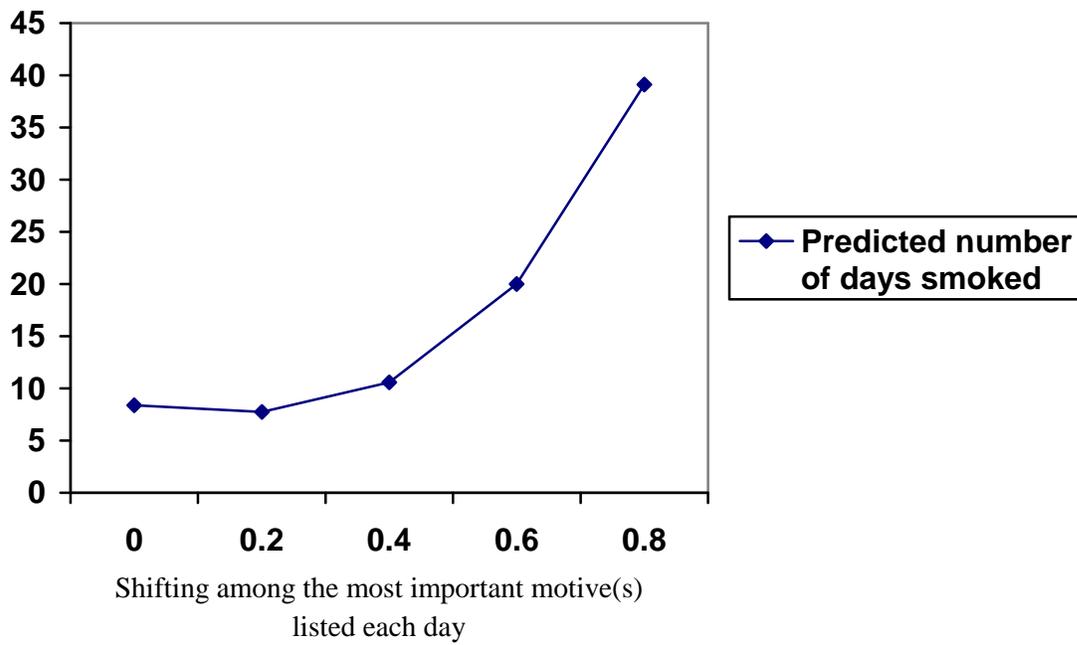


Figure 1.

*Cubic trend for shifting and number of days smoked over the 14 day assessment. The predicted number of days smoked increases as shifting reaches average levels, and then increases substantially as shifting approaches at least one standard deviation above the mean.*

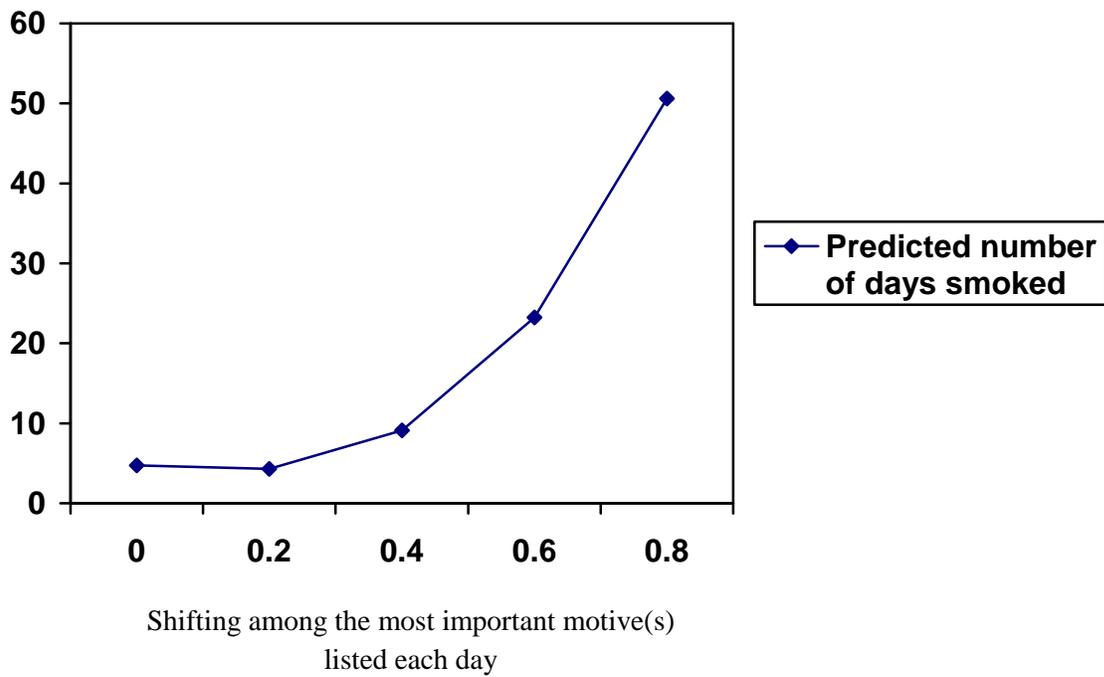


Figure 2.

*Cubic trend for shifting and number of days smoked in light smokers. The predicted number of days smoked increases as shifting reaches average levels, and then dramatically increases as shifting approaches above average levels (at least one standard deviation above the mean).*

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## Appendix 1

### Godin Leisure Time Exercise Questionnaire (Godin & Shepard, 1985)

- 1) Considering a **7-day period** (a week), how many times on the average do you do the following kinds of exercise for **more than 15 minutes** during your **free time**:

a) **STRENUOUS EXERCISE (HEART BEATS RAPIDLY)**

(i.e., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling)

Times per week:

b) **MODERATE EXERCISE (NOT EXHAUSTING)**

(i.e., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)

Times per week:

c) **MILD EXERCISE (MINIMAL EFFORT)**

(i.e., yoga, archery, fishing from river bank, bowling, horseshoes, golf, snowmobiling, easy walking)

Times per week:

- 2) Considering a **7-day period** (a week), during your **leisure time**, how often do you engage in any regular activity long enough to **work up a sweat** (heart beats rapidly)? Please circle the answer that best applies to you.

1-Often

2 Sometimes

3 Never/Rarely

Appendix 2

**Regulatory Focus Questionnaire** (Higgins et al., 2001)

This set of questions asks you about specific events in your life. Please indicate your answer to each question by indicating the appropriate number next to it.

**Never or  
seldom**

**Sometimes**

**Very  
often**

**1**

**2**

**3**

**4**

**5**

- \_\_\_\_\_ 1. Compared to most people, are you typically unable to get what you want out of life?
- \_\_\_\_\_ 2. Growing up, would you ever “cross the line” by doing things that your parents would not tolerate?
- \_\_\_\_\_ 3. How often have you accomplished things that got you “psyched” to work even harder?
- \_\_\_\_\_ 4. Did you get on your parents’ nerves often when you were growing up?
- \_\_\_\_\_ 5. How often did you obey rules and regulations that were established by your parents?
- \_\_\_\_\_ 6. Growing up, did you ever act in ways that your parents thought were objectionable?
- \_\_\_\_\_ 7. Do you often do well at different things that you try?
- \_\_\_\_\_ 8. Not being careful enough has gotten me into trouble at times.
- \_\_\_\_\_ 9. When it comes to achieving things that are important to me, I find that I don’t perform as well as I ideally would like to do.
- \_\_\_\_\_ 10. I feel like I have made progress toward being successful in my life.
- \_\_\_\_\_ 11. I have found very few hobbies or activities in my life that capture my interest or motivate me to put effort into them.

### Self-Concept Clarity Scale (Campbell et al., 1996)

Please indicate your answer to each question by indicating the appropriate number next to it.

**Strongly  
disagree**

**Sometimes  
agree**

**Strongly  
agree**

**1**

**2**

**3**

**4**

**5**

- \_\_\_\_\_ 1. My beliefs about myself often conflict with one another.
- \_\_\_\_\_ 2. On one day, I might have one opinion of myself and on another day, I might have a different opinion.
- \_\_\_\_\_ 3. I spend a lot of time wondering about what kind of person I really am.
- \_\_\_\_\_ 4. Sometimes I feel that I am not really the person that I appear to be.
- \_\_\_\_\_ 5. When I think about the kind of person I have been in the past, I'm not sure what I was really like.
- \_\_\_\_\_ 6. I seldom experience conflict between the different aspects of my personality.
- \_\_\_\_\_ 7. Sometimes I think I know other people better than I know myself.
- \_\_\_\_\_ 8. My beliefs about myself seem to change very frequently.
- \_\_\_\_\_ 9. If I were asked to describe my personality, my description might end up being different from one day to another day.
- \_\_\_\_\_ 10. Even if I wanted to, I don't think I would tell someone what I'm really like.
- \_\_\_\_\_ 11. In general, I have a clear sense of who I am and what I am.
- \_\_\_\_\_ 12. It is often hard to make up my mind about things because I don't really know what I want.

**Connor-Davidson Resilience Scale** (Connor and Davidson, 2003)

Please use the following scale to indicate the degree to which you have felt the following over the past month:

<b>Not true at all</b>		<b>Sometimes true</b>		<b>True nearly all of the time</b>
<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>

- \_\_\_\_\_ 1. Able to adapt to change
- \_\_\_\_\_ 2. Close and secure relationships
- \_\_\_\_\_ 3. Sometimes fate or God can help
- \_\_\_\_\_ 4. Can deal with whatever comes
- \_\_\_\_\_ 5. Past success gives confidence for new challenges
- \_\_\_\_\_ 6. See the humorous side of things
- \_\_\_\_\_ 7. Coping with stress strengthens
- \_\_\_\_\_ 8. Tend to bounce back after illness or hardship
- \_\_\_\_\_ 9. Things happen for a reason
- \_\_\_\_\_ 10. Best effort no matter what
- \_\_\_\_\_ 11. You can achieve your goals
- \_\_\_\_\_ 12. When things look hopeless, I don't give up
- \_\_\_\_\_ 13. Know where to turn for help
- \_\_\_\_\_ 14. Under pressure, focus and think clearly
- \_\_\_\_\_ 15. Prefer to take the lead in problem solving
- \_\_\_\_\_ 16. Not easily discouraged by failure
- \_\_\_\_\_ 17. Think of self as strong person
- \_\_\_\_\_ 18. Make unpopular or difficult decisions
- \_\_\_\_\_ 19. Can handle unpleasant feelings
- \_\_\_\_\_ 20. Have to act on a hunch
- \_\_\_\_\_ 21. Strong sense of purpose
- \_\_\_\_\_ 22. In control of your life
- \_\_\_\_\_ 23. I like challenges
- \_\_\_\_\_ 24. You work to attain your goals
- \_\_\_\_\_ 25. Pride in your achievements

**Positive and Negative Affect Schedule** (Watson, Clark, & Tellegen, 1988)

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you generally feel this way, that is, how you feel on the average. Use the following scale to record your answers.

Very slightly  
or not at all

Moderately

Extremely

**1**

**2**

**3**

**4**

**5**

1. Interested \_\_\_\_\_
2. Distressed \_\_\_\_\_
3. Excited \_\_\_\_\_
4. Upset \_\_\_\_\_
5. Strong \_\_\_\_\_
6. Guilty \_\_\_\_\_
7. Scared \_\_\_\_\_
8. Hostile \_\_\_\_\_
9. Enthusiastic \_\_\_\_\_
10. Proud \_\_\_\_\_
11. Irritable \_\_\_\_\_
12. Alert \_\_\_\_\_
13. Ashamed \_\_\_\_\_
14. Inspired \_\_\_\_\_
15. Nervous \_\_\_\_\_
16. Determined \_\_\_\_\_
17. Attentive \_\_\_\_\_
18. Jittery \_\_\_\_\_
19. Active \_\_\_\_\_
20. Afraid \_\_\_\_\_

**Sociocultural Attitudes Towards Appearance Questionnaire** (Heinberg, Thompson & Stormer, 1995)

Please use the following scale to indicate the degree to which you agree or disagree with the following statements:

**strongly  
disagree**

**neither  
agree nor  
disagree**

**strongly  
agree**

**1**

**2**

**3**

**4**

**5**

- \_\_\_\_\_ \*1. Women who appear in TV shows and movies project the type of appearance that I see as my goal.
- \_\_\_\_\_ \*2. I believe that clothes look better on thin models.
- \_\_\_\_\_ \*3. Music videos that show thin women make me wish that I were thin.
- \_\_\_\_\_ \*4. I do not wish to look like the models in the magazines.
- \_\_\_\_\_ \*5. I tend to compare my body to people in magazines and on TV.
- \_\_\_\_\_ 6. In our society, fat people are not regarded as unattractive.
- \_\_\_\_\_ \*7. Photographs of thin women make me wish that I were thin.
- \_\_\_\_\_ 8. Attractiveness is very important if you want to get ahead in our culture.
- \_\_\_\_\_ 9. It's important for people to work hard on their figures/physiques if they want to succeed in today's culture.
- \_\_\_\_\_ 10. Most people do not believe that the thinner you are, the better you look.
- \_\_\_\_\_ 11. People think that the thinner you are, the better you look in clothes.
- \_\_\_\_\_ 12. In today's society, it's not important to always look attractive.
- \_\_\_\_\_ \*13. I wish I looked like a swimsuit model.
- \_\_\_\_\_ \*14. I often read magazines like *Cosmopolitan*, *Vogue*, and *Glamour* and compare my appearance to the models.

\* Thin ideal internalization subscale