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How Do I Feel About the Behavior? The Interplay of Affective Associations With Behaviors and Cognitive Beliefs as Influences on Physical Activity Behavior

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Abstract: Individuals have affective associations with health behaviors. In other domains such associations have been shown to influence behavior, but affective associations with health behaviors are not included in current health decision-making models. The authors examined whether affective associations with exercise predicted individuals' activity behavior and, if so, how they interfaced with other decision-making constructs to influence behavior. Adult participants (N = 433) reported their current physical activity behavior and affective associations with physical activity. Health belief model and theory of planned behavior constructs were also assessed. More positive affective associations with activity significantly predicted greater activity behavior. Moreover, the influence of the health belief model and theory of planned behavior constructs on activity behavior was mediated through affective associations. Affective associations were shown to play a central role in individuals' activity behavior, both as a mediator of the effects of cognitively based decision-making factors and as an independent predictor of activity behavior. The results suggest the need to include affective influences on behavior in formal models of health decision making and, potentially, to explore affectively based intervention routes to change behaviors.

Keywords*:* affective associations, health decision making, physical activity

Behaviors such as physical inactivity and poor dietary choices contribute to the occurrence of multiple chronic diseases (Mokdad, Marks, Stroup, & Gerberding, 2004). Because behaviors are individually chosen and regulated, reducing disease morbidity and mortality requires understanding how individuals make health behavioral decisions. In this article, we examine how feelings associated with health behavioral choices influence individuals' behavioral practices. We also explore how such associated feelings interface with cognitive constructs examined in existing health decision-making models to determine behavior. Throughout the article, we use the term *affective associations* to refer to the feelings associated with a specific health behavior and *cognitive beliefs* to refer to the information one knows and the thoughts one has about the behavior.

Affective Associations With Health Behaviors

Individuals have affective associations with a range of health behaviors. Moreover, those associations may influence behavioral choices. Long-term exercisers report increased positive affect during and following physical activity (Arent, Landers, & Etrier, 2000). This association of positive affect with exercise leads to increased motivation to engage in physical activity (Laverie, 1998) and prospectively predicts future activity behavior (McAuley, Jerome, Elavsky, Marquez, & Ramsey, 2003). Similarly, food choices are influenced by the "pleasantness" associated with consuming the food (Berridge, 1996), and associating greater pleasure with high fat foods is related to higher body weight (Mela & Sacchetti, 1991). Other work has demonstrated that individuals have affective associations with alcohol and marijuana use (Simons & Carey, 1998), smoking (Trafimow & Sheeran, 1998), and food choices (Shiv & Fedorikhin, 1999).

Although there is evidence to suggest that affective associations with health behaviors can influence behavioral choices, such associations have not been examined within the context of formal models of health decision making. Most current models assume that individuals engage in a rational process of weighing the benefits and costs of behavioral choices, and they then select the course of action with the most favorable benefit–cost ratio (Weinstein, 1993). Such constructs are central to the health belief model (Rosenstock, 1974), theory of reasoned action (Ajzen & Fishbein, 1980), and social cognitive theory (Bandura, 1986). Constructs from these models have been shown in prospective studies to be causally antecedent to health behaviors (e.g., Courneya, Friedenreich, Arthur, & Bobick, 1999; Quine, Rutter, & Arnold, 2000).

There are two related areas of health decision-making research that are consistent with the idea that affective associations might influence behavioral choices. First, general mood influences some components of health decision-making models (e.g., perceived self-efficacy; Salovey & Birnbaum, 1989) and can in-

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fluence behavioral intentions (Schuettler & Kiviniemi, in press). Second, the degree to which one experiences worry when thinking about risk for a health problem (which might be described as an affective association with a health issue) is associated with the likelihood of making behavioral changes (McCaul, Schroeder, & Reid, 1996).

Work in other decision-making domains demonstrates both the influence of affective associations on decision making and the interplay of affective associations and cognitive beliefs in decision processes. Most of this work has examined the role of generalized affect (e.g., overall positive or negative feelings) associated with a behavior or other object on decision making and behavior (see Bechara, 2005; Damasio, 1994, for discussion). For example, affective associations with behavioral choices can predict behavior over and above cognitive beliefs (Richard, van der Pligt, & de Vries, 1996), serve as cues indicating which choices of action are most appropriate (Damasio, 1994), and interfere with individuals' use of expected utility rules (Greene, Sommerville, Nystrom, Darley, & Cohen, 2001; see Shiv & Fedorikhin, 1999, for a demonstration in the domain of food choice).

Overview of the Study

Given that individuals have affective associations with health behaviors, what role might these associations play in influencing behavioral choices? To address this question, we conducted a study to examine what role affective associations play in individuals' physical activity behaviors and how the influence of affective associations relates to existing decision-making models. We examined adults' cognitive beliefs about physical activity, their affective associations with activity, and their current activity behavior.

On the basis of the strong support in the literature for a role of affective associations as an influence on people's behavior, we hypothesized that affective associations with activity behavior would predict individuals' exercise practices. More specifically, as affective associations with activity behavior become more positive, we predict that the likelihood of engaging in physical activity will increase. To allow for a test of this hypothesis, the decision-making constructs assessed in the study included a measure of affective associations with physical activity behavior as well as measures of cognitive belief constructs from the theory of planned behavior and the health belief model, allowing us to examine whether affective associations predict activity behavior over and above the contribution of cognitive beliefs, which are known to be causally related to decision making.

In addition to this a priori hypothesis, we examined how affective associations might relate to and be integrated with the constructs included in current models. Although the literature on affect and decision making is quite consistent in showing that affect influences decision making, there is support in the literature for a variety of possible structural relations between affective associations and cognitive beliefs as determinants of behaviors. Given this diversity of support, we did not formulate an a priori hypothesis about the type of structural relation but rather examined each of three plausible hypotheses. First, in some models, affective and cognitive decision-making inputs are seen as independent, albeit capable of working together (e.g., Haidt, 2001; Sloman, 1996). These perspectives would predict two main effects: Affective associations and cognitive beliefs should both predict behavior but should do so independent of one another. Second, other perspectives posit that affective inputs alter information-processing strategies and thus should moderate the influence of cognitive factors on behavior (e.g., Ashby, Isen, & Turken, 1999; Schwarz, 2002). Finally, a third set of theories hold that affective cues can serve as "shorthand" for expected outcomes (e.g., Damasio, 1994; Wagar & Thagard, 2004) and would thus predict that the influence of cognitive beliefs on behavior should be, at least in part, mediated by affective associations.

Method

Participants and Procedure

The data collection protocol was approved by the appropriate Institutional Review Board prior to data collection. Four hundred thirty-three adults took part in the study (180 were male, 249 were female, and 4 did not indicate gender; the average age was 33.4 years, $SD = 16.2$ years; 69% were White). Participants were recruited in two ways. First, community participants ($n = 358$) were recruited at local community centers, completed surveys at home, and returned them by mail. Those participants received $20 for participation. College student participants ($n = 75$) participated in exchange for course extra credit and completed the survey in small groups of 5–15 students. The groups did not differ on any study variable aside from age, $t(427) = 8.25$, $p < .001$ (all other ts < 1, *ns*), nor did patterns of results differ across the two groups.

Measures

Three types of constructs were assessed: activity behavior, cognitive belief variables from the health belief model and theory of planned behavior, and affective associations with physical activity. All measures were from previously developed scales with published evidence for reliability and validity. In some cases, a subset of items was selected by identifying and using those items with the highest item–total correlations.

Vigorous Physical Activity

Activity was measured using the Centers for Disease Control and Prevention (CDC) Behavioral Risk Factor Surveillance System measure (CDC, 2002). Participants reported whether they engaged in vigorous activities for at least one 10-min period each week. Those answering "yes" then reported on how many days of the week they engaged in activity and how many hours and minutes they typically spent in vigorous activity on each day. Answers were used to calculate the number of minutes of vigorous activity per week. The resulting score was square-root transformed to reduce skew.

Cognitive Beliefs Constructs

Attitude toward physical activity. Attitudes toward physical activity were measured with five items assessing the expected value of engaging in physical activity (modified from Crites, Fabrigar, & Petty, 1994). Each question consisted of a semantic differential (e.g., undesirable–desirable) anchoring each end of a 7-point response scale following the prompt, "Engaging in physical activity is… ." The mean of the items served as an overall measure of attitudes ($\alpha = .85$).

Social norms. Eight items assessed perceptions of social norms about physical activity (e.g., "[Important others] give me encouragement to stick with my physical activities;" items selected from Povey, Conner, Sparks, James, & Shepherd, 2000; Sallis, Grossman, Pinski, Patterson, & Nader, 1987). Participants responded on 7-point scales ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The mean of the items served as a measure of social norms ($\alpha = .83$).

Perceived behavioral control. Participants responded to three items about their perceived control over activity behavior (e.g., "I believe I have personal control over doing regular physical activity;" items modified from Povey et al., 2000). Agreement with each item was indicated on a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The mean of the items served as a measure of perceived behavioral control (α = .84).

Perceived severity and susceptibility. Participants reported their perceptions of severity of and susceptibility to three health problems (diabetes, heart disease, and stroke) associated with physical activity. Participants rated how serious each disease would be if they had it (1 = *not at all serious*, 7 = *very serious*) and how likely it was that they would suffer from the disease at some point in their lives (1 = *extremely unlikely*, 7 = *extremely likely*). The means of the disease ratings served as measures of perceived severity and susceptibility (αs = .90 and .78, respectively).

Benefits and barriers. Six items assessed perceived benefits of physical activity (e.g., "helps me stay in shape"). Participants indicated to what extent each item was a benefit using a 7-point scale that ranged from 1 (*doesn't influence my physical activity*) to 7 (*is an important reason why I engage in physical activity*). The mean of the six items served as the measure of perceived benefits (α = .86). Participants also rated six barriers to engaging in physical activity (e.g., "lack of motivation"). Each was rated on a 7-point scale ranging from 1 (*does not keep me from physical activity at all*) to 7 (*has a very strong influence on keeping me from exercising*). Ratings of the six items were averaged to form a measure of perceived barriers (α = .70). Benefits and barriers scales were developed by Steinhardt and Dishman (1989).

Affective Associations With Activity Behavior

Three items assessed affective associations with physical activity (selected from Crites et al., 1994). The items tap multiple facets of affective associations and have been used successfully to assess associations with health behaviors (e.g., Giner-Sorolla, 2004; Simons & Carey, 1998). Each item asked participants to report how they feel when considering physical activity (e.g., sorrow–joy). Participants responded using 7-point scales with 1 and 7 anchored by each end of the semantic differential. The mean of the three items served as the measure of affective associations (α = .89).

Results

Preliminary Analyses

Prior to hypothesis testing, we examined distributions and correlations for all variables (see Table 1 for means, standard deviations, and correlations for key decision-making and behavioral variables). Several constructs were associated with demographic characteristics, so those demographic variables were included as controls in all analyses (age, gender, education, and relationship status were controlled; models without controls did not differ in any results pattern). Perceived behavioral control was significantly negatively skewed (64% of scores were 6 or greater on a 7-point scale; skew = –1.47, skew *SE* = 0.12, skew/*SE* ratio = 12.25). Because the item was both skewed and had restricted range as a continuous variable, the measure was transformed to a categorical variable based on a median split. The categorical variable was used in all analyses. Patterns of results did not differ with the continuous measure.

Do Affective Associations Influence Activity Behavior?

The correlation presented in Table 1 shows that affective associations were significantly related to activity behavior, $r(365) = 0.23$, $p < .001$; as affective associations became more positive, reported activity behavior increased. To ensure that this relation was not simply a reflection of the correlation between various cognitive belief variables and affective associations (see Table 1), we estimated two regression models, one for the theory of planned behavior and one for the health belief model, in which both demographic variables and the constructs in the decision-making model were entered and thus controlled prior to examining the relation of affective associations to behavior. In both models, affective associations were significantly associated with activity behaviors even when demographics and cognitive beliefs variables were controlled: theory of planned behavior model affect–behavior slope ($b = 1.35$), $t(362) = 2.19$, $p < .05$; health belief model affect–behavior slope ($b = 1.74$), $t(349) = 3.06$, $p < .01$.

Nature of the Relation: Moderator Effects

We next examined whether affective associations moderated the relation between cognitive beliefs and behavior. For each decision-making construct, we estimated a stepwise regression model in which affective associations and a cognitively based decision-making variable (both mean centered for the analysis) were entered on Step 2 as predictors of activity behavior (demographic controls were entered on Step 1). The interaction of the two variables was entered on Step 3 to examine whether the interaction term significantly improved the variance accounted for by the model. In every case, the main effect variables accounted for a significant portion of variance (F_{change} values range from 8.88

Table 1
Means, Standard Deviations, and Intercorrelations for Decision-Making and Behavior Variables With Demographics Partialed Out

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9
1. Severity	4.39	1.88	—	.52***	–.07	.01†	–.08	.07	–.08	–.10†	–.02
2. Susceptibility	3.31	1.51	—	–.02	.23***	–.10†	.10†	–.12*	–.13*	–.05	
3. Benefits	5.33	1.36	—	–.03	.27***	.26***	.21***	.29***	.13**		
4. Barriers	3.69	1.21	—	–.22***	–.06	–.22***	–.24***	–.25***			
5. Attitudes	6.14	0.90	—	.31***	.51***	.71***	.21***				
6. Social norms	4.92	1.18	—	.34***	.24***	.11*					
7. Behavioral control	5.98	1.20	—	.43***	.27***						
8. Affective associations	5.52	1.21	—	.23**							
9. Behavior (transform)	11.34	11.36	—								

†$p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

to 24.35, all ps < .001), but in no case were the interaction terms significant (all F_{change} scores < 2.48, *ns*). Thus, we conclude that affective associations do not moderate the cognitive beliefs–exercise behavior relation.

Nature of the Relation: Mediated Effects

We next examined whether the effects of decision-making variables on behavior were mediated through affective associations. To demonstrate mediation, the independent variable and mediator must both predict the dependent variable, the independent variable must predict the mediator, and, when the mediator is controlled in the model, the relation between the independent variable and the dependent variable must be significantly reduced (Baron & Kenny, 1986). The correlations reported in Table 1 test the independent variable–dependent variable, independent variable–mediator, and mediator–dependent variable relations. With the exception of severity and susceptibility, all relevant variables were significantly related to behavior and to affective associations. Given the lack of relation, severity and susceptibility were not further examined.

To test the difference in the strength of the independent variable–dependent variable (cognitive beliefs–behavior) relation with the mediator (affective associations) controlled, we estimated regression models in which the relevant decision-making variable and the affective associations variable were simultaneously entered as predictors of exercise behavior. We then compared the size and the significance of the cognition–behavior slope in this model with the slope for a model in which affect was not included. One can conclude that the effect is completely mediated when the independent variable–dependent variable slope becomes nonsignificant after inclusion of the mediator (Baron & Kenny, 1986). To assess partial mediation (i.e., the independent variable has both direct effects on the dependent variable and indirect effects through the mediator), we computed a Sobel (1982) test for changes in the strength of relation (using algorithms developed by Preacher & Hayes, 2004). A significant Sobel test indicates that the strength of the relation between the independent variable and the dependent variable is significantly smaller when the mediator is included in the model.

Results of these analyses are presented in Figure 1. For three of the five decision-making constructs (benefits, attitudes, and social norms), the influence of the construct on activity behavior was completely mediated through affective associations (i.e., a nonsignificant independent variable–dependent variable path and a significant Sobel test). The remaining two decision-making variables (barriers and perceived behavioral control) were partially mediated—the Sobel test indicated that the independent variable–dependent variable relation was significantly smaller with the mediator controlled, but the significant independent variable–dependent variable relation indicated that there was still a direct effect in addition to the mediated effect. In every case, inclusion of affective associations in the model significantly reduced the strength of the cognitive belief–behavior relation. It is interesting to note that the opposite was not true; in every case, affective associations still significantly predicted behavior even with cognitive beliefs controlled. This suggests that a model in which affective associations are mediated by cognitive beliefs is not a plausible alternative hypothesis.

Further Influences of Affective Associations

Finally, we examined whether the only influence of affective associations on behavior was from the mediated effects of cognitive variables. In other words, are affective associations systematically related to behavior after one accounts for the variance in affective associations due to cognitive beliefs? To examine this question, we first estimated regression models in which the cognitive beliefs measures were used to predict affective associations and then calculated the residual score for the affective associations variable. This score represents the variance in affective associations not accounted for by cognitive beliefs. We then regressed activity behavior on each residual score, again controlling for demographic variables. A significant residual score slope would indicate that there is a systematic relation between affective associations and activity behavior over and above the influence of the mediated cognitive beliefs variables. For both the theory of planned behavior and for the health belief model, the residual slope was significant (theory of planned behavior β = .11, p < .05; health belief model β = 0.15, p < .01), indicating that the relation between affective associations and behavior included affective associations effects independent of those that mediate cognitive beliefs.

Discussion

The degree to which individuals associated positive affect with physical activity was significantly related to their self-reported activity behavior; as participants' affective associations with activity grew more positive, their activity behavior increased. Moreover, the decision-making impact of constructs in the health belief model and theory of planned behavior was mediated through affective associations. The findings suggest that a *behavioral affective associations model*, in which the effects of cognitive beliefs about a health behavior are mediated through affective associations with the behavior, can account for an individuals' activity behavior decision making. In this model, affective associations with activity behavior play a central role in the decision-making processes individuals use when deciding whether to engage in health-related behaviors, such as physical activity. Although our cross-sectional design precludes making causal statements about the relation between affective associations and activity behavior, the findings of our mediational analysis and the fact that an alternative mediational model did not account for the data, coupled with literature demonstrating that both cognitive beliefs and affective associations are causally antecedent to behavior (e.g., Courneya et al., 1999; McAuley et al., 2003; Quine et al., 2000), make the assertion that affective associations are a part of the process of decision making about activity behavior quite plausible.

Implications

Why might affective associations mediate the cognitive components of decision-making models? Some theories of affect and decision making posit that affective associations can serve as a "cognitive shorthand, " allowing people to make decisions more quickly and efficiently (Damasio, 1994; Frijda, 1988). Consistent with our findings, these theories suggest that one determinant of individuals' affective associations with behaviors are their un-

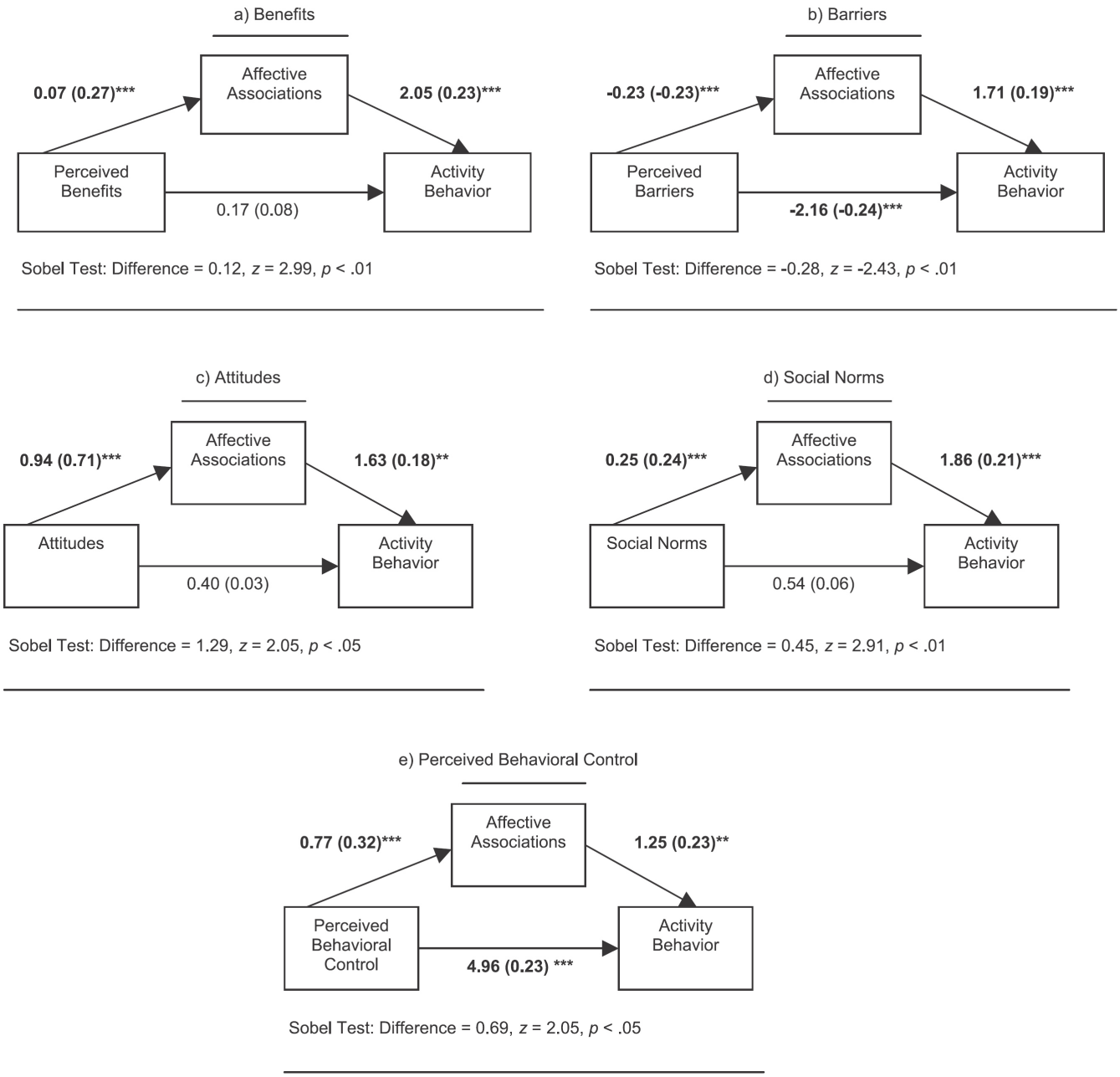

Figure 1. Tests of the mediational role of affective associations for components of the health belief model and theory of planned behavior. Unstandardized regression coefficients are shown outside of the parentheses, and standardized coefficients are reported in the parentheses. **p < .01. ***p < .001.

derlying cost–benefit beliefs. Such an affective mediational route would allow for quicker decisions because the affective associations can signal decision choices without the individual having to work through the cognitive beliefs each time a decision is made.

There are, of course, potential downsides to affective associations guiding behavior. It is often the case that individuals do not engage in behavioral practices that are most adaptive from a cost–benefit perspective. This might result from the fact that there are almost certainly sources of affective associations other than mediated cost–benefit beliefs. Consistent with this perspective, our analyses showed that variance in affective associations not reflective of cost–benefit beliefs also predicted activity behavior.

Why is this point important? Although the factors that influence the positivity or negativity of people's affective associations over and above their cognitive beliefs remain unaddressed, it is certainly possible that those factors may not be ones that will lead to positive affective associations with healthier behavioral choices (see Shiv & Fedorikhin, 1999, for an example of affective associations and cognitive beliefs leading to opposite decisions). Associations such as feeling bad when exercising; en-

joying the taste experience of high fat and high sugar foods; and pleasant feelings when consuming alcohol, drugs, or cigarettes are all affective associations that would guide individuals toward less healthy behavioral choices.

To the extent that affective associations influence behavioral practices, it may be useful to consider intervention approaches that target those associations. For example, a variety of advertising techniques have demonstrated effectiveness for changing affective associations (Aylesworth, Goodstein, & Kalra, 1999; Pechmann & Stewart, 1989). Application of such techniques to health persuasion might provide effective tools to encourage behavior change.

Limitations

There are, of course, several limitations to the present study that should be noted. First, our measures of affective associations are paper-and-pencil self-report measures. As such, they are tapping "real" affective experiences associated with the behavior only indirectly and may not fully account for the role of, for example, physiological arousal associated with affect as an influence on behavior. Further work examining more direct and perhaps implicit measures of affective experience might provide a richer set of data on the nature and operation of such associations. Second, our work relied on retrospective self-reports of behavior. Although the self-report measures we used are well validated, they still suffer from the shortcomings inherent in such measures. In future work, it would be beneficial to examine the relations between affective associations and behavior using non-self-report operationalizations of behavior. Finally, it should be acknowledged that our study design is cross-sectional and assessed decision-making constructs and behavioral practices only at a single time point. As such, our ability to draw strong causal conclusions about the relations between our variables is limited. Future longitudinal research examining this question would allow us to more cleanly delineate the causal relations between affective associations and behavioral practices.

Conclusion

Current theories of health behavioral decision making focus primarily on cognitive beliefs as influences on behavioral practices. Our work demonstrates that individuals' decisions about ongoing health-related behaviors are also guided by the affective associations individuals have with the behavior. Indeed, the influence of several common cognitively based decision-making variables on individuals' activity behavior was mediated by their affective associations with physical activity. These findings suggest the need for modifications to our existing set of health decision-making models and for consideration of ways to use affective associations as intervention tools to change individuals' behavioral practices.

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