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The Self as a Container: Implications for Implicit Self-Esteem and Somatic Symptoms

Michael D. Robinson
Psychology Department
North Dakota State University

Katharine A. Mitchell and Ben S. Kirkeby
Department of Psychology
North Dakota State University

Brian P. Meier
Department of Psychology
Gettysburg College

If the self is a container, then it very much matters what is in that container. The authors borrow from this self-as-container spatial metaphor to suggest that individual differences in implicit self-esteem, based on a spatial compatibility task, should predict somatic symptoms such as muscle soreness, headaches, and breathing difficulties. Specifically, lower levels of implicit self-esteem, as measured by the Implicit Association Test, should predict a higher frequency and intensity of somatic symptoms. This prediction was investigated in two studies involving a total of 157 undergraduate participants. As predicted, correlations between implicit self-esteem and somatic complaints were robust and negative in direction, as measured by a questionnaire designed to tap anxious arousal (Study 2), momentary (Study 1) and daily (Study 2) reports of somatic symptoms, and informant reports (Study 2). The findings are consistent with spatial metaphor in suggesting that lower levels of implicit self-esteem are associated with tendencies to internalize negative evaluations, in turn biasing bodily symptom perception.

Container metaphors are often used to represent the self (Kövecses, 2000; Lakoff & Johnson, 1999). For example, metaphor-inspired phrases such as "you are what you eat," "he is rotten to the core," and "heart of gold" reveal a broad tendency to view the self in terms of that which is located within the body. From the perspective of spatial metaphor, it is also no coincidence that a spiritual affinity with others is represented in terms of physical closeness, that interesting ideas become "food" for thought, or that people seek to distance themselves from that which is "crappy," much as they expel feces from the body. The common core to these metaphors is the idea that the self, if it is good and healthy, must differentially repel negative objects and attract positive objects, whether those objects are physical or psychological.

The present investigation seeks to extend the self-as-container metaphor by examining its ability to explain individual differences in somatic symptoms, including those that are *online* (i.e., concurrent with experience). Such goals are important in extending the metaphor representation perspective to individual differences and to the actual subjective experiences that people have during the course of their everyday lives. Along the way, we will reinterpret a prominent reaction time (RT) measure in spatial-metaphoric terms and make a case for the metaphoric basis of somatic symptoms.

METAPHOR AND SUBJECTIVE EXPERIENCE

According to the metaphor representation perspective, metaphors are not solely used for communication or rhetoric purposes. Rather, this perspective makes the more far-reaching claim that metaphor-related mappings (e.g., LOVE IS INTOXICATION) actually structure subjective experience and do so in a manner that extends beyond the particular idioms that are expressed (Gibbs, 1994; Kövecses, 2000; Lakoff & Johnson, 1999). This perspective can be viewed as a profound challenge to Western thought, which tends to equate thought and experience with what can be regarded as "nonbodily" forms of representation (Barsalou, 1999; Lakoff & Johnson, 1999). In general, the metaphor representation perspective assumes that thought and experience are subtly and definitively shaped by our bodily natures (Lakoff & Johnson, 1999).

Our prior work has been inspired by such "embodied" theories, particularly in the area of affect or evaluation. Along these lines, we have shown that prominent metaphor-related mappings (e.g., up = good; up = white) influence affective representation processes even when such mappings are irrelevant to the task at hand (Meier & Robinson, 2004, 2005, in press; Meier, Robinson, & Clore, 2004). For example, Meier and Robinson (2004) found that positive affective words were evaluated faster when higher on a computer screen (i.e., up = good), whereas nega-

tive affective words were evaluated faster when lower on a computer screen (i.e., down = bad). Such results support the general idea that affective metaphor is obligatory, rather than merely convenient, in making affective evaluations (Gibbs, 1994; Lakoff & Johnson, 1999).

Yet, such work necessarily ignores an important source of human variation related to individual differences. Individual differences in subjective experience are pronounced, whether related to positive affect, negative affect, life satisfaction, or somatic symptoms (for a review, see Diener, Suh, Lucas, & Smith, 1999). Moreover, such individual differences in subjective experience can be regarded as extremely important for the individuals involved and for our society at large. For example, treatment for depression is costly and depressed individuals are much more likely to commit suicide (Segal, Williams, & Teasdale, 2002). Also, research has shown that a minority of individuals are responsible for the vast majority of health-care costs, itself a huge drain on the national economy (Davison & Pennebaker, 1996). Therefore, it seems important to expand the promise of "embodied" cognition frameworks to individual differences. We do so here in the context of relations between self-representation and perceived bodily functioning, specifically from the perspective of spatial metaphor.

THE SELF AS A SPATIAL ENTITY

Although not explicitly spatial in nature, a good number of self-theories seemingly incorporate spatial metaphor. Psychodynamic theories, especially those related to object relations, posit that significant others' views are incorporated into the self-concept (Baldwin, 1992). This incorporation or ingestion theme has been influential in recent social cognitive work related to transference (Andersen & Saribay, 2005), personal relationships (Aron et al., 2005), and culture (Markus & Kitayama, 1991). For example, research on romantic relationships shows that interpersonal closeness is profitably viewed in terms overlapping spatial representations of self and other, even to the point of being confused when the traits of the significant other mismatch the traits of the self (Aron, Aron, Tudor, & Nelson, 1991). Furthermore, the notion of an autonomous and separate self, independent from one's personal relationships, has been effectively challenged by theory and research related to culture (Markus & Kitayama, 1991) and gender (Cross & Madson, 1997). For many people, that is, the self is not an autonomous entity, but rather one contaminated or enriched—depending on one's perspective—by spatial-representational closeness with others.

Additionally, the theme of a spatial-bodily aspect to the self-concept has influenced a number of recent empirical studies. Burris and Rempel (2004) argued that people represent bodily, social, and symbolic threats to the self in fundamentally

similar terms. Threats to the self, in all cases, are viewed as unwanted violations of the boundaries of the self, which in general can be viewed in terms of the epidermis covering the body. Thus, we seek to repel rather than ingest threats to the self and this seems to be true regardless of whether one is thinking in terms of bodily, social, or symbolic threats (Burris & Rempel, 2004). Similarly, Rozin and colleagues (e.g., Rozin, 1999; Rozin, Haidt, & McCauley, 1999) have made a convincing case that the emotion of disgust, which at its core relates to the avoidance of contamination by foul substances (e.g., feces, worms, rotten food), has been co-opted to support more moralized and abstract forms of avoidance such as avoidance of objectionable sexual activities, flag-burning, and cigarette smoking (Haidt, 2001; Rozin, 1999). The general idea here is that metaphors related to contamination and ingestion appear to be quite powerful in the motivated avoidance of more abstract threats to the integrity of the self (Burris & Rempel, 2004; Goldenberg et al., 2001; Rozin, 1999).

Thus, there appears to be a spatial-bodily aspect to self-representation. If the SELF IS A BODY, then it stands to reason that abstract forms of self-representation, like implicit self-esteem, should influence the perceived functioning of the body. Before expanding on this theme, which is the basis for our predictions, it is necessary to first review literatures related to somatic symptoms and implicit self-esteem.

THE SELF, THE BODY, AND SOMATIC SYMPTOMS

Somatic symptoms are self-perceptions concerning possible body malfunction (Davison & Pennebaker, 1996). Such symptoms include potential signs of disease such as breathing difficulties, headaches, aches and pains more generally, indigestion, and so on. As bodily beings, we experience such symptoms from time to time, often in response to the current state of the body (e.g., Maier & Watkins, 2000). However, there are also perceptual and subjective factors that influence somatic symptoms, including those related to boredom, personality, and situational factors (for a review, see Pennebaker, 2000). Because somatic symptoms are thought to reflect objective and subjective factors, it would seem likely that metaphor representation processes could contribute to their experience.

Along these lines, it is certainly the case that there are cultural differences in bodily metaphor. For example, Yu (1995, 2003) has shown that metaphors for courage, anger, and love significantly differ across Chinese and American cultures. Chinese people, relative to Americans, are more likely to refer to their subjective experiences in body-related terms (e.g., courage = inflated gall bladder; Yu, 2003). It seems likely that such cultural differences would influence the qualities and correlates of subjective experience (Yu, 1995, 2003). Similarly, we suggest that individual differences in implicit self-esteem might also affect the experience

of somatic symptoms. We investigated this prediction in the context of an implicit self-esteem measure that we thought would be particularly sensitive to spatial-bodily metaphor.

THE CORRELATES OF IMPLICIT SELF-ESTEEM

Greenwald and Farnham (2000) recently offered an implicit measure of self-esteem based on the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998). The core of the test is the idea that, if two objects are associated in memory, then it should be relatively easy to perform a joint categorization task in which the same response is made for both objects. For a person high in implicit self-esteem, according to the logic of the test, it should be easier to categorize self-related words (e.g., *me*) with the same response that one also uses for pleasant words (e.g., *sunshine*). By contrast, it should be more difficult to categorize self-related words (e.g., *me*) with the same response that one also uses for unpleasant words (e.g., *filth*). If the task has validity, differential speed within the latter combined blocks should predict meaningful individual differences in behavior and experience.

There is a recent body of work attesting to the validity of the IAT (e.g., Banaji, 2001; Greenwald & Nosek, 2001). However, much of the evidence has either pertained to normative tendencies, such as universal racial biases (De Houwer, 2001), or to group differences, such as in-group racial preferences among Korean versus Japanese Americans (Greenwald et al., 1998). There have been fewer investigations concerning the individual difference correlates of IAT performance (Fazio & Olson, 2003; however, see Asendorpf, Banse, & Mücke, 2002; Greenwald & Farnham, 2000). This article joins the latter group of studies.

Greenwald and Farnham (2000) showed that individuals high in IAT self-esteem were less affected by success or failure feedback following a performance task. These data support the validity of the test in that people high (versus low) in explicit self-esteem also tend to be less affected by social feedback (Baumeister, Tice, & Hutton, 1989). However, other studies have been somewhat less sanguine concerning the idea that variability in implicit self-esteem taps important individual differences (Bosson, Swann, & Pennebaker, 2000; Schimmack & Diener, 2003). For example, Bosson et al. (2000) examined the reliability and validity of a number of measures of implicit self-esteem and found many of them to be lacking. In the same context, tried-and-true explicit measures of self-esteem acted in a robust and predictable manner (Bosson et al., 2000). Given the latter data (Bosson et al., 2000; Schimmack & Diener, 2003), it is desirable to examine more critically the construct of implicit self-esteem and its individual difference correlates (Fazio & Olson, 2003; Robinson & Neighbors, 2006).

A METAPHOR-BASED CONCEPTION OF IAT SELF-ESTEEM AND SOMATIC SYMPTOMS

In these studies, we sought to advance a spatial metaphor conception of IAT self-esteem. Normatively, people are slow to categorize self-related words (e.g., *me*) and unpleasant words (e.g., *filth*) with the same response key. By contrast, they are fast to categorize self-related words (e.g., *me*) and pleasant words (e.g., *happy*) with the same response key. We suggest that this compatibility effect relies on spatial metaphor (as discussed by Lakoff & Johnson, 1999). The self, instinctually and habitually, is protected from negative objects; by contrast, positive objects are literally (e.g., a juicy steak) and metaphorically (e.g., a sweet person) ingested into the self. This spatial dynamic, manifest in metaphor, allows individuals to distance the self from undesirable objects and to self-identify with desirable ones.

To the extent that representations of the self are distanced from representations of unpleasant meaning, what exists within the self must be pleasant. By contrast, to the extent that spatial metaphor provides a weaker basis for the individual's transactions with the environment, what exists within the self could be unpleasant, specifically because unpleasant material is allowed to contact (and metaphorically infect: Rozin et al., 1999) the self. Beneficial food sources, attractive mates, and biologically noxious entities provide an evolutionary basis for spatial metaphor in that the body should generally be healthier to the extent that it comes into contact with pleasant (e.g., potential mate), but not unpleasant (e.g., toxic food source), objects (Meier & Robinson, 2005; Neumann, Förster, & Strack, 2003). However, our proposal is that principles related to contamination are metaphorically extended beyond physical substances and that similar spatial principles pertain to connotative representations of the self (i.e., implicit self-esteem).

Somatic symptoms represent a useful focus for this spatial theory because they are, for good reason, seen as endemic to the body (or self, in metaphorical terms). Based on the SELF IS A BODY metaphor, we therefore predicted that more favorable self-evaluations, in the IAT, would be associated with fewer somatic symptoms.

OVERVIEW OF STUDIES

Two studies examined correlations between IAT self-esteem and somatic symptoms. On the dependent measure side, we adopted a variety of approaches to measuring somatic symptoms. Study 1 examined momentary reports of somatic symptoms, specifically based on an experience-sampling protocol. Study 2 examined a wider variety of dependent measures in an effort to examine the generality of this correlational phenomenon. Participants in Study 2 were asked to report on experiences of anxious arousal over the last week. In Study 2, we also assessed somatic symptoms within an experience-sampling protocol related to daily experiences.

Finally, in Study 2, we obtained informant reports related to the somatic symptoms of the participant. In total, we adopt a variety of approaches to examine the hypothesis that individuals higher in IAT self-esteem should experience fewer somatic symptoms, consistent with our analysis based on spatial metaphor.

STUDY 1

Method

Participants. Ninety-six undergraduates (53 women, 43 men) from the University of Illinois completed the study in return for extra credit (for the laboratory portion of the study) and \$20 (for the experience-sampling portion of the study).

Procedures. Session 1 was completed in small groups of 2–5. Participants completed the implicit self-esteem measure described below. They also signed up for session 2, which involved instructions for the experience-sampling protocol. Due to the fact that we had a limited number of palmtop computers, we ran the experience-sampling portion of the study over the course of five consecutive weeks.

Within the experience-sampling protocol, participants were instructed how to use the computers in an initial training session. They were told that there would be six random pages per day for 7 consecutive days and that they must complete at least five of the six reports per day. Random pages occurred between the hours of 10 a.m. and 10 p.m. Audible beeps announced that a report was due. If there was no response within 2 min, another set of beeps issued from the computer. If there was no response within another 2 min (i.e., 4 min total), the report was considered missing.

If a participant completed more than 35 reports, all were used. However, for purposes of documenting compliance, we replaced values greater than 35 with 35. Of these 35 required reports, the average person completed 32.3 ($M = 92.2\%$; range = 62.9% to 100%). We deemed compliance with the protocol to be quite good, especially given the random nature of the pages.

Measures

IAT. We programmed an IAT to assess implicit self-esteem. For all blocks, category labels (e.g., *not me* or *me*) were presented to the left and right of a computer screen. Word stimuli were selected at random from the relevant block list and presented in the center of the computer screen. Responses were made with the 1 and 9 keys at the top of the keyboard. A 150-msec blank screen followed accurate

responses before the next trial began. Inaccurate responses were punished by an "Incorrect!" error message for 1,500 msec.¹

Block 1 (20 trials) consisted of *not me* versus *me* categorizations. Block 2 (30 trials) consisted of *unpleasant* versus *pleasant* categorizations. Blocks 3 (20 trials) and 4 (50 trials) asked participants to press the 1 key for *not me* or *unpleasant* words and to press the 9 key for *me* or *pleasant* words. Block 5 (40 trials) reversed *me* versus *not me* categorizations such that *me* words now required a 1 response, whereas *not me* words required a 9 response. Blocks 6 (20 trials) and 7 (50 trials) asked participants to press the 1 key for *me* or *unpleasant* words and to press the 9 key for *not me* or *pleasant* words. Following the general scoring in the literature, blocks 4 and 7 were retained for analysis, whereas the other blocks were dropped.

Prior to the computation of implicit self-esteem scores, we deleted trials associated with an incorrect response (8.3% of trials). We then log-transformed latencies to reduce skew. Finally, we replaced latencies 2.5 SDs below and above the grand latency mean with these cutoff values (2.7% of latencies). Latencies were then averaged within blocks. Normatively, implicit self-esteem tends to be biased in a positive direction. This was true within this study as well. A one-way analysis of variance (ANOVA) indicated that participants were faster within the *me/pleasant* block ($M = 635$ ms) than within the *me/unpleasant* block ($M = 824$ msec), $F(1, 117) = 164.09, p < .01$. A second one-way ANOVA indicated that participants were more accurate within the *me/pleasant* block ($M = 93.7\%$) than within the *me/unpleasant* block ($M = 89.7\%$), $F(1, 117) = 26.26, p < .01$.

To score IAT self-esteem, we subtracted *me/pleasant* latency means from *me/unpleasant* latency means. The higher the score, the faster participants were within the *me/pleasant* block relative to the *me/unpleasant* block. To estimate the reliability of the measure, we calculated two independent IAT latency scores, one involving odd trials and one involving even trials. Consistent with previous research, the task was reliable, as indicated by a split-half correlation, $r = .81, p < .01$.

Momentary somatic symptoms. Within the experience-sampling protocol, participants were asked to rate the extent to which they were currently experiencing four somatic symptoms (*coughing/sore throat, headache, faintness/dizziness, and nausea/upset stomach*) on a scale of 1 (*not at all*) to 6 (*extremely*). To estimate the reliability of the scale, we averaged across pages and then computed a Cronbach's alpha. The measure was reliable, $\alpha = .85$.

¹Words for the IAT were as follows. *Me* words consisted of *I, me, mine, my, and self*. *Not me* words consisted of *it, other, their, them, and their*. *Pleasant* words consisted of *candy, child, clown, flower, kiss, mother, palace, silk, smile, and sunset*. *Unpleasant* words consisted of *army, cancer, coffin, dirt, jail, pimple, skull, snake, spider, and trash*. Because there were fewer *not me* and *me* words, they were sampled twice as often.

RESULTS

A first regression analysis indicated that participant gender did not interact with IAT self-esteem in predicting somatic symptoms, $p > .45$. We then computed a Pearson correlation to assess the main prediction, namely a negative relationship between implicit self-esteem and somatic symptoms. The correlation was significant, $r = -0.21, p = .04$. This correlation provides positive evidence for the spatial theory that motivated the study. The somewhat small magnitude of the correlation is in line with other studies examining the individual difference correlates of somatic symptoms, such as shyness or repression (Davison & Pennebaker, 1996).

DISCUSSION

In the IAT self-esteem task, we created an *unpleasant* leftward location and a *pleasant* rightward location through consistent stimulus-response mappings. Metaphorically, it is convenient to think of filling the left location with *garbage* and *vermin* and the right location with *loved ones, flowers, and candy*. Many people, high in IAT self-esteem (e.g., Greenwald & Farnham, 2000), should experience relative difficulties assigning self-related words to the *unpleasant* location. However, such tendencies are variable and for some individuals (i.e., those low in IAT self-esteem) mental mappings allow for *unpleasant* objects to contact the self. Given that contact is equated with internalization (Rozin et al., 1999), we predicted that people low in IAT self-esteem would view the body's functioning in a more negative light. As expected, those low in IAT self-esteem perceived more body dysfunction in their momentary experiences. The experience-sampling protocol used in Study 1 eliminates retrospective biases and allows for strong inferences concerning dispositional functioning (Bolger, Davis, & Rafaeli, 2003). However, replication seemed desirable.

STUDY 2

Study 2 examined the hypothesized relation between IAT self-esteem and somatic complaints in three distinct ways. One, we administered a scale designed to measure anxiety-linked somatic disturbances that are of potential clinical significance. Two, we conducted another experience-sampling study, this time within the context of daily somatic symptoms. Three, we sought to expand our analysis by collecting informant reports of somatic distress. To the extent that individuals low in IAT self-esteem complain about the occurrence of somatic symptoms in a relatively public way, we expected IAT self-esteem to also correlate with these observer reports of somatic disturbance.

Method

Participants. Study 2 data was conducted within the context of a course on personality at the University of Illinois. Participants received course credit on the basis of their compliance. Sixty-one (25 women, 36 men) of the participants completed the IAT self-esteem measure.

Procedures. The following reported results pertain to implicit self-esteem, laboratory questionnaires, daily reports, and informant reports. All four measures were collected at different times during the semester, with at least 1 week separating each measure. Participants completed the implicit self-esteem measure about midway through the semester. Within another laboratory session during the semester, they completed a measure pertaining to anxious arousal symptoms. The daily self-reports were collected for 2 weeks during the semester. Finally, informants were asked to report on the typical somatic experiences of each participant in the study.

The daily protocol required end-of-day (i.e., post-7 p.m.) reports each day for 14 days. To increase compliance, we asked participants to return each daily questionnaire the next day after it was completed. Of the 14 required daily reports, the average participant returned 13.05 ($M = 93.2\%$; range = 50% to 100%). Thus, compliance with the protocol was excellent.

Each participant was also asked to identify six informants that knew the participant at least reasonably well. Informant questionnaires were mailed to these individuals. We provided a stamp-addressed envelope, identified the participant in question, and made a general plea for compliance. On average, 4.32 of the 6 identified informants returned the informant questionnaires ($M = 72.0\%$; range = 50% to 100%). We were pleased with this response rate, especially given that informants were given no concrete rewards for their time and effort.

Measures

IAT. The IAT used in Study 2 was quite similar to that used in Study 1. In block 4 (60 trials), participants pressed the 1 key for *not me* or *unpleasant* words and the 9 key for *me* or *pleasant* words. In Block 7 (60 trials), participants pressed the 1 key for *me* or *unpleasant* words and the 9 key for *not me* or *pleasant* words. The instructions for each block, the interstimulus interval, and the procedures for penalizing errors were all identical to Study 1.²

²Words for *me* and *not me* categories were the same as in Study 1. *Pleasant* words consisted of *charm, dream, health, humor, idea, life, praise, pride, safety, soul, trust, and victory*. *Unpleasant* words consisted of *anger, cost, crime, despair, fraud, liar, misery, murder, panic, shame, sin, and threat*. Because there were fewer *not me* and *me* words, they were sampled twice as often.

Inaccurate trials within blocks 4 and 7 were dropped (5.05% of trials). Response times were log-transformed to normalize skew. Latencies 2.5 *SDs* below and above the grand latency mean were replaced with these cutoff values (2.8% of latencies). The resulting latencies, as well as accuracy scores, were averaged across trials within a block. A one-way ANOVA performed on latency means revealed that performance was faster within the *me/pleasant* block ($M = 770$ msec) than within the *me/unpleasant* block ($M = 1,021$ msec), $F(1, 60) = 117.09, p < .01$. Participants were also more accurate within the *me/pleasant* block ($M = 97.1\%$) than within the *me/unpleasant* block ($M = 92.8\%$), $F(1, 60) = 17.04, p < .01$. We also computed separate latency-based IAT scores for performance on odd versus even trials. These independent assessments of implicit self-esteem were correlated, $r = .74, p < .01$. Thus, the IAT possessed reasonable split-half reliability.

Anxious arousal. Participants were asked to report on their experiences of anxious arousal symptoms using the relevant scale of the Mood and Anxiety Symptom Questionnaire (Watson & Clark, 1991). All items reference physiological symptoms that imply potentially pathological bodily states (e.g., *felt faint, had pain in my chest, had to urinate frequently*). Participants were asked to indicate the extent to which they had experienced each of 17 symptoms over the previous week ($\alpha = .86$), using a scale of 1 (*not at all*) to 5 (*extremely*).

Daily somatic symptoms. For each of 14 days, participants reported on their bodily functioning. An initial section of the questionnaire asked participants to rate the proportion of the day that they experienced different feelings and bodily symptoms. They were given eight response options (1 = 0% of my waking day; ... 3 = 5% to 25% of my waking day; ... 6 = 75% to 95% of my waking day; ... 8 = 100% of my waking day). Somatic symptoms consisted of *aches, digestive problems, and respiratory problems*. The reliability of the measure was reasonable ($\alpha = .86$).

In a subsequent part of the daily questionnaire, participants were asked to recall the "most emotional event" of the day and then to write two to three sentences describing it. After recalling the event, they were asked to indicate the extent to which they had experienced four different somatic symptoms (*burning sensation in stomach, heart beating faster, sweating palms, and tightness in chest*) in response to the event ($\alpha = .80$), using a scale of 1 (*not at all*) to 8 (*strongest experience in my life*).

Informant somatic symptoms. Informants were asked to think about the typical day of the participant in question. They indicated the degree to which the participant tends to experience three somatic symptoms (*aches, digestive problems, and respiratory problems*). They were given eight response options that were similar to those used on the daily questionnaire (1 = 0% of his/her waking day; ... 3

= 5% to 25% of his/her waking day; ... 6 = 75% to 95% of his/her waking day; ... 8 = 100% of his/her waking day). The measure was reasonably reliable ($\alpha = .70$).

RESULTS

A first set of regression analyses revealed that none of the associations between IAT self-esteem and somatic symptoms interacted with participant gender, $ps > .70$. We therefore collapsed across this variable. We then correlated IAT self-esteem with each of the four dependent measures. IAT self-esteem correlated with anxious arousal symptoms, defined as those reflecting potentially pathological bodily states, $r = -.27, p < .05$. There was also a correlation between IAT self-esteem and daily reports of somatic symptoms, $r = -.25, p < .05$. Recall that participants were asked to indicate their reactions to the "most emotional event" of the day, following which they reported on their somatic reactions to this event. Implicit self-esteem, as measured by the IAT, correlated with such reports, $r = -.39, p < .01$. In sum, Study 2 replicates Study 1 in suggesting that there are robust relations between implicit self-esteem and self-reports of somatic symptoms.

Study 2 also sought to extend Study 1 regarding the question of whether implicit self-esteem predicts informant- (in addition to self-) reports of somatic symptoms. Because this correlation was also significant, $r = -.32, p < .05$, we conclude that individual differences in implicit self-esteem predict public (i.e., observable) behaviors associated with somatic distress.

DISCUSSION

Study 2 highlighted the generality of associations between IAT self-esteem and somatic symptoms. The IAT correlated with reports of anxious arousal, which relate to somatic disturbances similar to those found in panic disorder (e.g., shaky hands, trouble swallowing, frequent urination). Study 2 also replicated Study 1 with reference to an experience-sampling protocol. IAT self-esteem correlated with daily reports of somatic disturbance, whether in general or in reaction to the most emotional event of the day.

Results involving self-reported symptoms are relatively silent concerning behavioral manifestations of somatic distress. A person might, for example, worry about digestion-related difficulties, but keep such concerns to themselves. Alternatively, a person might share such concerns about bodily functioning with others, either directly through speech or indirectly through health-related behaviors such as purchasing cold medicine or antacids more often. The latter behaviors could be observed by others, who in turn could report on such difficulties in apparent bodily functioning. To examine the extent to which IAT self-esteem influences observ-

able sickness-related behaviors, we obtained informant reports in Study 2. The data are relatively clear in suggesting that participants low in IAT self-esteem not only perceive more disturbances within the body, but that they also convey such concerns to others.

GENERAL DISCUSSION

We predicted that a tendency to associate the self with unpleasant objects should manifest itself in lower implicit self-esteem on the one hand and invasion of the body by unpleasant connotation on the other. On the basis of this spatial logic, we predicted that participants lower in IAT self-esteem would report more somatic symptoms, which are typically viewed as occurring within the body. Two studies, examining a variety of dependent measures, provided support for our predictions. For example, IAT self-esteem predicted momentary (Study 1) and daily (Study 2) somatic symptoms as well as informant reports (Study 2). These results have significant implications for a number of literatures, including those related to implicit self-esteem, somatic symptoms, and metaphor theory.

Implicit Self-Esteem

Implicit self-esteem is typically viewed in terms of positive, but unconscious, associations to self-linked objects (Greenwald & Banaji, 1995; Pelham, Carvallo, & Jones, 2005). Among the more prominent measures of implicit self-esteem are (a) the name-letter effect (i.e., people prefer the letters of their own name to other letters: Koole, Dijksterhuis, & van Knippenberg, 2001), (b) the mere-ownership effect (i.e., people wish to hold onto objects that are chosen by the self: Beggan, 1992), and (c) the IAT self-esteem effect, as examined here. In general, it seems safe to say that social cognition research has documented the strength and ubiquity of such self-favoring biases, but that it is somewhat of an open question whether variations in implicit self-esteem predict (i.e., correlate with) other variables theoretically linked to self-esteem (Fazio & Olson, 2003; Robinson & Neighbors, 2006).

In addition, there have been methodological challenges to the IAT. Some very recent investigations have shown that the IAT appears to be sensitive to nonevaluative associations, such as those related to stimulus salience (Rothermund & Wentura, 2004) or matching operations (Mitchell, 2004). Although it is quite beyond the scope of this investigation to comment extensively on such controversies, we do generally agree with Greenwald, Nosek, Banaji, and Klauer (2005) that the IAT may be particularly valid within investigations—such as this one—in which the stimuli define natural rather than ad hoc categories.

In another study, Karpinski (2004) showed that IAT self-esteem scores were higher when individuals were asked to distinguish self-words from those related to *Adolph Hitler*. By contrast, IAT self-esteem scores were lower when individuals were asked to distinguish self-words from those related to *Santa Claus*. In both cases, however, there was self-favoritism, defined in terms of faster *me* + *positive* than *me* + *negative* block scores. We therefore suggest that the test may well be influenced by the contrast category (Karpinski, 2004), but that such influences are not fatal to the test. Rather, they are simply part of interpreting relevant scores (Nosek, Greenwald, & Banaji, 2005). Such challenges to the IAT aside, a central question remains—what is the IAT measuring? It is in relation to this question that a spatial-metaphoric view may hold considerable promise.

A Spatial View of IAT Self-Esteem

Given the ubiquity of SELF = BODY metaphors (Kövecses, 2000), and given that the body is the perceived locus of somatic disturbance (Pennebaker, 2000), we predicted and found that perceptions of bodily functioning were biased in a negative direction among individuals low in implicit self-esteem. By contrast, we know of no parallel results in the more extensive literature on explicit self-esteem. With the success of the current predictions, which were based on spatial metaphor (Kövecses, 2000; Lakoff & Johnson, 1999), it is worth broadening the discussion to consider other potential correlates of implicit self-esteem.

According to spatial metaphor, implicit self-esteem should correlate with one's appreciation for objects that contact the self, specifically via principles of spatial contagion (Rozin et al., 1999). From this perspective, implicit self-esteem should predict one's level of satisfaction with personal possessions—like one's house, car, or clothing—that frequently come into contact with the self. Following similar principles, people low in implicit self-esteem should become increasingly dissatisfied with personal relationships over time, specifically because mental representations of the other are merged with mental representations of the self as the relationship progresses (Aron et al., 1991). In short, implicit self-esteem may be viewed as a source of mental contagion that should “rub off” on objects that it touches, either decreasing (low implicit self-esteem) or increasing (high implicit self-esteem) their value (as in the mere ownership effect; Beggan, 1992).

Additionally, implicit self-esteem might be useful in understanding the phenomenon of repression. Repressors distance negative memories and experiences from the self, much as those high in implicit self-esteem have difficulties associating the self with unpleasant connotation. Viewing implicit self-esteem as a potential measure of repression has some straightforward predictions that can be tested. The tendency to forget negative personal events relative to positive personal events, which is a normative pattern (Taylor, 1991), may be particularly true of individuals high in implicit self-esteem. Similarly, the tendency to differentially

weigh positive aspects of the self, relative to negative aspects of the self, when rating life satisfaction (Diener, Lucus, Oishi, & Suh, 2002), may be more pronounced among individuals high in implicit self-esteem.

Thinking of the self as a spatial entity is also consistent with Lewin's (1935) early model of motivation as well as extant models of self-regulation, which frequently invoke spatial metaphor (Carver & Scheier, 1999; Meier & Robinson, 2005). Consistent with such spatial-dynamic theories of self-regulation (e.g., Lewin, 1935), research has indicated that people are often significantly faster to pull positive objects closer to the self and push negative objects away from the self (e.g., Chen & Bargh, 1999). Such effects can only be understood by assuming that people implicitly conceptualize the spatial relationship between the self (as a body) and desirable or undesirable objects (Neumann et al., 2003). We suggest that spatial metaphor may also underlie performance on the IAT task and therefore that this task may be particularly useful in predicting outcomes that can profitably be viewed in terms of spatial metaphor.

For example, we know that subjective experience is more “somaticized” in certain cultures relative to others (Shweder, 1991). If the principles derived here are sound, then levels of implicit self-esteem may be more predictive of somatic symptoms among cultures, like China (Yu, 1995), that more frequently use bodily metaphor to understand their subjective experiences. We are unaware of research along these lines, but it would constitute a natural and fascinating extension of the present research direction.

On the Nature of Somatic Complaints

Experience is a nonverbal entity linking implicit representations of the self, bodily experience, and the goal-dependent interpretation of concurrent perceptual input (Kihlstrom, Mulvaney, Tobias, & Tobis, 2000). Nevertheless, it generally appears to be the case that our understanding of emotional experiences far outstrips our understanding of somatic experiences (e.g., Lang, 1994). For this reason, there are many useful questions for future research on somatic symptoms (Davison & Pennebaker, 1996). The same is true in the present context.

One question is whether IAT self-esteem is associated with objective or merely subjective illness-related processes. We are undecided regarding this issue. In favor of a perceptual hypothesis, analyses involving specific somatic symptoms (not reported earlier) indicated that IAT self-esteem correlated with all symptoms in the same direction. That is, it did not matter whether the symptoms pertained to the respiratory track, digestive organs, or muscle tension; in all cases, the same negative correlation was found. Because diseases often have very specific effects on the body, relatively broad associations between an individual difference measure and somatic symptoms suggest a perceptual, rather than physical, basis (Davison & Pennebaker, 1996). However, in favor of a reality-based alternative hypothesis,

there are prior data indicating that implicit cognitive processes predict relatively objective somatic outcomes such as age of death (Christenfeld, Phillips, & Glynn, 1999; Peterson, Seligman, Yurko, Martin, & Friedman, 1998). Therefore, it seems critical to extend the present analysis by examining actual health-related outcomes, which may or may not vary by implicit self-esteem.

Of course, given some of the results reported in Study 2, the relation between IAT self-esteem and somatic symptom reports should not be viewed as *merely* a subjective one. Either through explicit or implicit communications, participants low in IAT self-esteem apparently reveal to others that they have more frequent somatic disturbances, as indicated by the informant data. Given the latter association, some further questions present themselves. Do individuals low in IAT self-esteem miss more work or school days due to perceived bodily sickness? Do they purchase more medicine? These questions have theoretical and practical relevance. This is particularly true because sick days and medical treatment seeking constitute huge drains on the national economy (Davison & Pennebaker, 1996).

An additional question pertains to the causal direction of our relationship. We have been assuming that implicit self-esteem biases the perception of bodily functioning. However, the reverse direction of influence is also plausible. To the extent that bacteria, viruses, and other diseases undermine bodily functioning, it is reasonable to think that changes in implicit self-representation might follow (e.g., Maier & Watkins, 2000). Such an analysis is consistent with research on "contagion" effects involving negative objects and their ability to alter self-representation (e.g., Rozin et al., 1999). Such an analysis is also consistent with research showing that implicit associations are fairly sensitive to recent environmental events (e.g., Blair, 2002). Such considerations suggest that it may be profitable to examine implicit self-esteem before and after physical illness. This spatial framework might predict that physical illness would undermine implicit self-esteem.

Implications Related to the Spatial Self and Metaphor Theory

The social psychology of the self, like cognitive psychology, has borrowed heavily from the "amodal" views of cognition criticized by Barsalou (1999). For this reason, the self is typically viewed as an abstract information-processing structure rather than a bodily entity (Kihlstrom et al., 1988). However, a brief survey of at least some important self-motives reveals that they are often viewed in spatial terms. For example, the three fundamental interpersonal motives, somewhat abstractly labeled affiliation, independence, and power, have been relabeled "moving toward" (affiliation), "moving away from" (independence), and "moving against" (power), presumably to emphasize their spatial dynamics (Horney, 1945).

In addition, the most basic processes of self-regulation involve approaching desired end states and avoiding undesired end states (Meier & Robinson, 2005). Al-

though this may be true of all viable organisms (Schneirla, 1959), it is also true that only humans may be capable of co-opting such spatial realities to represent abstract goals that are not strictly spatial in nature (e.g., to obtain a PhD; Meier & Robinson, 2005). In addition to approach-avoidance metaphor, it is also notable just how frequently interpersonal power or control is depicted in terms of an up-down representation of the self (up = in control; down = loss of control: e.g., Lakoff & Johnson, 1999; Tolaas, 1991). It is likely due to this deep metaphoric mapping that the word for depression, closely associated with a perceived lack of control over one's life, also refers to a sunken region relative to the surrounding plane (Meier & Robinson, in press).

The perceived health of the self, we suggest, also borrows heavily from spatial metaphor. In this connection, a healthy self is typically viewed in terms of an entity able to repel threats to functioning, whether physical (e.g., a germ) or psychological (e.g., an insult) in nature (Burris & Rempel, 2004). It is possible that this sort of spatial metaphor follows from the fact that contact with spoiled substances or germs does indeed jeopardize the health of the self (Rozin et al., 1999). Therefore, hardy or healthy people are those capable of repelling threats to the self without internalizing them. This idea guided the present predictions, which were supported. Hence, it seems that a wider consideration of spatial metaphor in the domain of self-processes could be especially generative.

We are equally, if not more, excited about the implications of our results for metaphor representation processes. Quite a bit of data shows that people often use metaphors to describe their subjective experiences (e.g., Fainsilber & Ortony, 1987; Gibbs & Franks, 2002). Yet, the "aliveness" of affective metaphor has sometimes been questioned (e.g., Glucksberg, 2001). According to such frameworks, the use of metaphor in speech and description may be convenient for communication purposes, but not necessarily indicative of the underlying representational processes involved (Glucksberg, 2001; Murphy, 1996). Such criticisms of the metaphor representation position call for RT methods, which are sensitive to the *online* use of metaphor (Gibbs, 1994; Meier & Robinson, 2005). We have shown here that a RT measure, namely one related to implicit self-esteem, predicts the experience and display of somatic symptoms. The results therefore encourage the use of RT measures in the domain of metaphor representation processes (Gibbs, 1994).

Beyond this contribution, we also emphasize another one. Metaphor can be used to understand normative tendencies within a given culture, cultural differences, or individual differences. Although normative and cultural differences have played a prominent role in metaphor theory, individual differences, within a given culture, have often been neglected. This is unfortunate in two ways. One, individual difference studies offer somewhat unique opportunities for establishing construct validity (Cronbach & Meehl, 1955). Two, it is notable that individual differences in subjective experience are very pronounced. This is true in relation to subjective well-being variables (Diener et al., 1999) as well as in relation to so-

matic symptoms (Watson & Pennebaker, 1989). Therefore, an especially generative metaphor-related theory should predict individual differences as well as normative and culture-specific patterns. The current data help to make this case.

CONCLUSION

Spatial metaphor led us to propose that individuals low in implicit self-esteem would perceive more somatic disturbances in their bodies. Two studies, using experience-sampling protocols as well as other assessment methods, confirmed such an association. We conclude that lower levels of implicit self-esteem render the self more vulnerable to unpleasant associations to the body, the metaphoric locus of the self. The findings have significant implications for our understanding of implicit self-esteem, somatic complaints, and metaphor representation processes.

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