Published in final edited form as:
*J Health Psychol*. 2008 October ; 13(7): 884–894. doi:10.1177/1359105308095062.

# How Do You Feel? Self-esteem Predicts Affect, Stress, Social Interaction, and Symptom Severity during Daily Life in Patients with Chronic Illness

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## Abstract

Self-esteem has been demonstrated to predict health and well-being in a number of samples and domains using retrospective reports, but little is known about the effect of self-esteem in daily life. A community sample with asthma ($n$ = 97) or rheumatoid arthritis ($n$ = 31) completed a self-esteem measure and collected Ecological Momentary Assessment (EMA) data 5x/day for one week using a palmtop computer. Low self-esteem predicted more negative affect, less positive affect, greater stress severity, and greater symptom severity in daily life. Naturalistic exploration of mechanisms relating self-esteem to physiological and/or psychological components in illness may clarify causal relationships and inform theoretical models of self-care, well-being, and disease management.

### Keywords

chronic illness; daily life; Ecological Momentary Assessment (EMA); self-esteem

Self-esteem is often defined as an individual's self-perception of his/her abilities, skills, and overall qualities that guides and/or motivates specific cognitive processes and behaviors. Although it is typically defined as a stable, self-referent appraisal of character, ability, and behavior (McCrae & Costa, 1988), some difference in opinion regarding the stability of its nature exists (Gergen, 1971; McCrae & Costa, 1988). Similarly, self-esteem is often viewed as a global psychosocial construct in empirical research, but some literature focuses on its multidimensional characteristic that incorporates different components of self-evaluation (Katz, Rodin, & Devins, 1995). Some of these specific sub-components include, for example, body/appearance self-esteem, social self-esteem, achieving self-esteem, and identification self-esteem (e.g. Katz et al., 1995; Malcarne, Hansdottir, Greenbergs, Clements, & Weisman, 1999). For this report we conceptualize self-esteem as a global, relatively stable, measurable trait that can be used to characterize individual differences.

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COMPETING INTERESTS: None declared.

## Self-esteem and chronic illness

In cases where an individual is diagnosed with a chronic illness, central components of quality of life are likely to be impacted. In the hopes of better understanding the impact of chronic disease on health and well-being, research has focused both on the impact of disease on the individual as well as how individual characteristics may influence the impact of the disease on the person. With regard to self-esteem, researchers have consistently noted lowered self-esteem (e.g. Weaver & Narsavage, 1992; Weaver, Richmond, & Narsavage, 1997) and 'universal helplessness' among patients diagnosed with chronic illness (Skevington, 1993). For instance, patients who view their chronic pain as uncontrollable take on the role of the victim to the oppressing disease, depleting their personal coping resources (including reduced self-esteem). Extensive research has examined self-esteem within chronic diseases, such as cancer (e.g. Cantor, 1986; Curbow, Somerfield, Legro, & Sonnega, 1990; Dreifuss-Kattan, 1990; Foltz, 1987; Greer & Burgess, 1987; Katz et al., 1995; Mages & Mendelsohn, 1979; McCrae & Costa, 1988; Schain, 1986; Valentine, 1978), COPD (e.g. Hesselink et al., 2004; Weaver et al., 1997), cystic fibrosis (Moise, Drotar, Doershuk, & Stern, 1987), asthma (e.g. Brook & Tepper, 1997; Hesselink et al., 2004; Panides & Ziller, 1981), rheumatoid arthritis (e.g. Goodenow, Reisine, & Grady, 1990; Nagyova, Stewart, Macejova, van Dijk, & van den Heuvel, 2005), chronic bronchitis (Nicolson & Anderson, 2003), chronic lung disease (Blake, 1991), systemic sclerosis (Malcarne et al., 1999), multiple sclerosis (e.g. Walsh & Walsh, 1989; Walsh & Walsh, 2001), and synovitis (Skevington, 1993). Most empirical studies suggest that self-esteem and chronic illness either have a direct or indirect effect on one another (e.g. Weaver & Narsavage, 1992; Weaver et al., 1997); nevertheless discrepancies about their exact relationship remain. For example, among adolescents with chronic illness, scores on self-esteem measures were higher, unrelated, or uniquely related to some, but not all, diseases (Adams & Weaver, 1986; Bisschop, Kriegsman, Beekman, & Deeg, 2004; McAnarney, 1985). These uncertainties about the nature and role of self-esteem in chronic illness require further exploration and further suggest that research to date is limited in methodology, a point we turn to next.

## Ecological Momentary Assessment

Prior studies concerning psychosocial constructs often rely on self-report methods such as surveys, home-mailed questionnaires, or interviews to collect their data. These techniques depend on retrospective recall, which can be biased if encompassing relatively long reporting intervals (e.g. more than two weeks), and appear to tap more into global semantic judgments and beliefs rather than reflecting actual experiences (e.g. Robinson & Clore, 2002a, 2002b; Smyth & Stone, 2003). Alternative approaches, such as Ecological Momentary Assessment (EMA), allow for the collection of ambulatory data in the natural environment. Observations such as this provide unique information about the relationship between symptoms or disease processes and specific characteristics of the natural environment in which they take place. For example, EMA has been used in research on the effects of mood, location, and physical positioning on ambulatory blood pressure (Schwartz, Warren, & Pickering, 1994), quality of life and symptom reporting, as well as coping strategies in patients with asthma (Leopold & Schandry, 2001; Nazarian, Smyth, & Sliwinski, 2006), affect (e.g. Riis et al., 2005; Stone, Smyth, Pickering, & Schwartz, 1996), and diurnal pain patterns in patients with chronic pain disorder, migraine, and rheumatoid arthritis (Godaert, Sorbi, Peters, Dekkers, & Greenen, 2001). This method of data collection provides high ecological validity, and the multiple momentary reports allow analysis of typical or trait-like levels of variables in 'real-life' (Stone & Shiffman, 1994).

### Self-esteem and affect

Previous literature suggests that low self-esteem causes more negative affect for chronic disease patients than healthy populations (e.g. Bisschop et al., 2004). As self-esteem can be an important coping resource, one of the concerns raised by the combination of low self-esteem and chronic illness is an increased difficulty in preventing the negative affect from developing into a more severe case of depression. This is an important issue for long-term care as symptom severity, frequency of complications, interferences, and restrictions reported by patients are affected by negative affect and degrees of depression (Bisschop et al., 2004; Stone, Bluhm, & White, 1984).

### Self-esteem and stress

Self-esteem has also been reported to predict stress in individuals with chronic disease (Adams & Weaver, 1986) and was found to cause more problems for type II diabetes patients (Maki, 2004). The stress and coping model proposed by Lazarus and Folkman (1984) suggests that a potential stressor (e.g. external event) causes people to undergo two cognitive appraisal processes. Whereas primary appraisal focuses on the nature (positive, negative, or neutral) and respective level of threat an event presents, secondary appraisal determines whether one's available coping abilities and resources are sufficient to overcome the stressor. Individuals with low self-esteem may lack the coping resources necessary to regulate environmental stressors (Schneiderman et al., 2005). The present study examines self-esteem as one of the coping resources used in the appraisal process. Self-esteem is expected to predict an individual's perceived frequency and degree of stressful thoughts and experiences. Using EMA to gather these appraisals at a momentary rate presents a unique and new understanding of how patients perceive immediate stressors depending on their level of self-esteem.

### Self-esteem and social interaction

As a chronic illness may change a person's schema of themselves and the people around them, psychosocial resources are used to stabilize social relationships and interactions. If these resources (e.g. self-esteem) are lacking, the stability may not develop and social relationships may be disrupted. Self-esteem may be an important link between chronic illness and disruptions in social relationships (Nicolson & Anderson, 2003). Individuals with low self-esteem may fail to preserve or form new social relationships because they are less likely to seek out social activities. The poor self-concept associated with low self-esteem in patients with chronic illness may hinder them from escaping their 'disease focused world', making it difficult to immerse themselves in social interactions and maintain relationships. Further, it may be that low self-esteem predicts fewer social interactions because the individual is not physically able to expend the effort to engage in interpersonal contact. Lower expectations of pleasantness associated with social interactions may also block motivation to interact with others. Evidence suggests that the overall quality of social support in chronic illness is more important than its quantity (Goodenow et al., 1990). However, ongoing patient reports on their daily experiences of social interactions, and their perceived pleasantness, have not been examined. These implications about self-esteem and social interaction in chronic illness are cause for a more detailed analysis.

### Self-esteem and symptom severity

Self-esteem has been shown to be related to perceived symptom severity (Panides & Ziller, 1981), as well as the degree of physical pain and psychological distress felt by the patient (Nagyova et al., 2005). Self-esteem has also been shown to influence reported frequency of symptoms (e.g. focal seizures in adolescents with epilepsy; Westbrook, Bauman, & Shinnar, 1992). Adams and Weaver (1986) found that, among adolescents with chronic illness,

positive self-esteem predicted fewer functional complaints. In a related study, 25 percent of young adults with chronic illness who reported low self-esteem also reported more psychological symptoms (Ireys, Gross, Werthamer-Larsson, & Kolodner, 1994). These findings imply that self-esteem has a relationship with perceived symptom severity and frequency, although based primarily on global reports. In addition to perceived or actual symptom severity, the number of restrictions and interferences from day to day determine a patient's functional status. Research on patients with chronic illness has demonstrated that self-esteem is related to the reported level of physical restrictions and functional status (Blake, 1991; Walsh & Walsh, 1989). Also, chronically ill adolescents, compared to healthy populations, who reported feeling bad and having more negative self-concepts, also reported experiencing more functional difficulties (i.e. abdominal pain, chest pain, etc.; Adams & Weaver, 1986). These findings suggest that negative self-concepts and feelings about oneself co-exist with higher restrictions/interferences and more overall functional difficulties. These physical intrusions are important to consider in chronic illness because their continual presence imposes limitations on other domains of patients' lives (i.e. social interactions, work).

### Study goals and hypotheses

This study aims to provide further insight into the relationship between self-esteem with these psychosocial and physiological attributes of daily life. Specifically, we used EMA to examine the relationship of self-esteem to typical levels of affect, stress, social interactions, and symptom severity in patients with chronic illness in the natural environment. To our knowledge, this is the first investigation of the relation of self-esteem to naturalistic daily experiences in persons with chronic illness. Lower self-esteem is hypothesized to predict:

1. Worse daily mood, as indicated by higher negative affect and lower positive affect.
2. More frequent stressful thoughts and higher severity ratings for stressors.
3. Fewer social interactions and less perceived pleasantness in social interactions.
4. Greater disease-specific symptom severity (defined by reported symptom restriction and interference and disease-specific symptoms).

## Methods

### Sample and data collection

The study sample consisted of a community sample of 128 adult volunteers with a diagnosis of asthma ($n$ = 97) or rheumatoid arthritis (RA, $n$ = 31), who were part of a larger, longitudinal study (the data presented are all from the baseline interval of the parent study). Participants with asthma included 72 percent females, were mostly Caucasian (85%), African-American (8%), and other ethnicities (7%), ranging in age from 18–78. Participants with RA included 74 percent females, were 87 percent Caucasian, 10 percent African-American, and 3 percent other ethnicities, ranging in age from 26–80. (Sample age mean = 44.2, SD = 14.2).

The study was approved by both university and hospital institutional review boards for human research. Participants were recruited via medical offices, newspaper, radio, and television advertisements, as well as flyers and brochures. Interested participants called for a detailed description of the larger project and were screened for potential participation in the study by a trained staff member. Qualifications included: (1) older than 18 years; (2) a clinical diagnosis with either asthma or RA; (3) no emergency treatment for either illness in the past three months; (4) no current eating disorders or drug or alcohol abuse; (5) no psychiatric disorders that might interfere with participation; (6) females could not be

pregnant. If all requirements were met, participants were asked to attend a training session in the study's laboratory.

During this initial visit, participants provided informed consent, received the first health evaluation, completed a questionnaire packet, and were provided with a personal palmtop computer after proper usage and care training. Subjective health evaluation measures consisted of disease activity questionnaires (e.g. health habits) that were part of a larger packet of questionnaires. Objective health evaluation measures included spirometry assessments for participants with asthma and a rheumatologist assessment for participants with RA. The questionnaire packets also assessed a number of other psychological and social constructs that were not utilized in this report.

## Ecological Momentary Assessment (EMA)

Participants used the palmtop computers received during training to report their momentary experiences, prompted by beep signals (predetermined by a random assessment schedule). Signals informed participants to complete various surveys five times a day for one week. The signals were semi-randomly distributed between 8:00am and 9:00pm to ensure adequate sampling across the day; thus, approximately every two-and-a-half hours. The semi-random distribution refers to the manner in which the palmtop computers alerted the participants to complete an EMA survey. This approach divides the time interval of the day to be sampled (in this case, 8am to 9pm) by the number of signals (or 'beeps', five per day in this study) to generate equal intervals across the day to ensure adequate sampling across the day. Each beep, for each day, is assigned a random time within these stratified blocks so that participants cannot exactly anticipate the time of the beep (and thus attempts to minimize reactive anticipation effects). So, for example, if the first interval were between 9:00am and 10:45am, the first beep of each day would fall at a random time within that time block (and so forth for each subsequent beep). This strategy, and the rationale behind it, is also described more fully in Smyth and Stone (2003). When alerted by the beep, participants were prompted to report their stress, symptom severity, Peak Expiratory Flow Ratings (asthma patients only), mood, activities, location, social interaction, and use of medication, caffeine, alcohol, or tobacco. Our study focused only on measures of stress, self-reported symptom complaints, mood, and social interaction.

Stress was rated by the following questions: 'Since the last beep, has anything stressful occurred?' (yes/no answer format) and 'How stressful was it?' (Likert scale: 0 = not at all, 6 = extremely); 'What was your most stressful thought?' (e.g. 'Difficulties involving occupation') and 'How stressful was it?' (Likert scale: 0 = not at all, 6 = extremely). Although participants could select from a fixed list of 11 stressful thought categories, the low frequency of these reports in any one specific thought category influenced us to code reported stressful thoughts as binary (yes/no), representing the presence or absence of recent stressful thoughts.

Symptom severity was determined by participant ratings on seven-point Likert scales (0 = not at all, 6 = extremely). Both patient groups reported on the following two questions: (1) 'How much did your asthma/arthritis interfere with your daily routine since the last beep?'; (2) 'How much did your asthma/arthritis force you to restrict your activities since the last beep?' Additionally, each patient group answered disease-specific symptom severity questions (on the same scale): asthma = 'How bad was your coughing/wheezing since the last beep?'; RA = 'How bad was your stiffness since the last beep?'; 'How bad was your pain since the last beep?'; 'How bad was your swelling since the last beep?'

Participants reported their momentary affect by rating each of the following nine adjectives (derived from the Positive and Negative Affect Scale; PANAS) on a seven-point Likert scale

(0 = not at all, 6 = extremely): happy, depressed, joyful, unhappy, enjoyment, angry, frustrated, pleased, and worried.

Social interaction and its perceived pleasantness were assessed by participant reports on the following questions: 'Are you with others?' (yes/no answer format); 'How pleasant was this company?' (Likert scale, 0 = not at all, 6 = extremely).

### Baseline measures

**Rosenberg Self-Esteem Scale—**The level of self-esteem was measured at baseline using the Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965). Participants reported their agreement, on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree) on 10 statements concerning self-perceived aspects of self-esteem (e.g. 'I feel that I have a number of good qualities'). Total scores range from 10–40, with high scores reflecting higher self-esteem. Internal consistency reliability using Cronbach's alpha was 0.88 (asthma = 0.88, RA = 0.90).

A number of other measures were included in baseline assessments, but were not a focus of our study. These included the: Positive and Negative Affect Scale (PANAS; Clark, Tellegen, & Watson, 1988); Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983); Social Support Appraisal Scale (SS-A; Vaux et al., 1986); COPE-Subscales and Emotional Processing (Carver, Scheier, & Weintraub, 1989); Coping with Health Injuries and Problems Scale (CHIP; Endler & Parker, 2000); Health Locus of Control (HLC; Wallston, Kaplan, & Maides, 1976); and Center for Epidemiological Studies-Depression Scale (CES-D; Radloff, 1977).

## Results

### Analytic approach

The structure of this study's data consists of momentary experience reports nested (contained) within individuals. Both the individuals we assessed and their unique momentary experience reports are treated as random samples of a population. This means that we expect individuals to have different mean levels of self-esteem at baseline, and that their reported momentary experiences will show different mean levels of affect, stress, social interaction, and symptoms. Our analytic strategy utilizes a random intercept model because it allows us to assess the predicted relationship that self-esteem may have on momentary experiences, taking into account the varying means at both levels (i.e. individual and momentary reports; Snijders & Bosker, 1999).

Theoretically, we have no reason to believe that the relationship between mean levels of (baseline) self-esteem and average momentary reports varies across individuals. However, significant variance in the intercept could be tested for and would suggest that the average momentary reports (e.g. mean level of affect) varied across individuals in our sample. To explain the variance (across individuals) we could use a random slope model to account for the influence of mediating variables (e.g. duration of the disease, other health conditions). This design would provide a more in-depth understanding of the underlying mechanisms behind self-esteem's effect on our dependent variables, requiring more complex analyses to present distinct contributing factors responsible for the illness-related outcomes (e.g. social interaction); however, this goes beyond the scope of the current study because we did not make predictions for these factors. Instead, we presume self-esteem to have the same effect on the outcome variables no matter what mean level of self-esteem an individual has at baseline. This allows us to narrow our focus on the global, overall effects that self-esteem

may have on affect, stress, social interaction, and symptoms in order to evaluate the general role of self-esteem in chronic illness.

All analyses were conducted using SAS with maximum likelihood (ML) estimation. To test our hypotheses, we used person-level (continuous) self-esteem to predict the level of the EMA dependent variable (e.g. mood) over all momentary assessments across the week. Although self-esteem was considered a continuous predictor, for descriptive purposes, we utilized median splits to present clear differences between high and low levels of self-esteem. When the dependent variable was frequency of being with others, reported stressful experiences, or reported stressful thoughts, the models were adjusted to accommodate the binary nature of those responses by using a logit link function to fit the continuous predictor to the binary outcome in a general linear model. For those variables, we estimated multilevel random-intercept models that assumed a binomial distribution (rather than normal). Thus, regression weights for the binomial models represent logit transformations. The regression weights for all other dependent variables may be interpreted as direct, linear expressions (i.e. one unit change in self-esteem yields the specified change in the dependent variable).

### Self-esteem assessment

Prior to analyzing the relationship between the baseline measure of self-esteem and the momentary data obtained via EMA, we first examined the validity of our self-esteem measure. Our central concern was that the function of self-esteem in our sample, patients with chronic disease, may be dissimilar to other studies and samples. We examined this issue, albeit in a limited fashion, by correlating baseline self-esteem with other self-reported measures at baseline. In general, self-esteem was related to other self-reported baseline measures in ways consistent with previously published studies (thus increasing our confidence in our measurement of self-esteem). By way of example, higher self-esteem was related to less reported negative affect ($r = -.52$), less reported depression ($r = -.35$), less perceived stress (over the last month; $r = -.56$), and more reported positive affect ($r = .49$).

### Self-esteem and affect

As presented above, higher self-esteem among patients predicted more positive affect and less negative affect at baseline. Similar relationships were found among PANAS assessments during the EMA momentary reports. Results indicated that high self-esteem predicted more positive affect and less negative affect during momentary assessments (see Table 1 for statistical significance test results and Table 2 for the summary of descriptive statistics).

### Self-esteem and stress

We then examined whether self-esteem predicted the reported frequency of stress or the subsequent stress severity ratings. Self-esteem did not predict the frequency of reported stressful experiences or reported stressful thoughts. However, patients with lower self-esteem reported greater stress severity related to stressful experiences and stressful thoughts than patients with higher self-esteem (see Table 1 for significance test results and Table 2 for descriptive statistics).

### Self-esteem and social interaction

Next, we examined whether self-esteem would predict the frequency and perceived pleasantness of social interactions. Contrary to our predictions, patients with lower self-esteem were more likely to spend time with others during momentary assessment periods (although not statistically significant). However, self-esteem did not relate to the perceived pleasantness of social interactions (see Table 1).

### Self-esteem and symptom severity

Finally, we examined if self-esteem predicted greater general and disease-specific symptom severity. Self-esteem was related to levels of symptom report. Across disease categories, lower self-esteem predicted more symptom interference and reported activity restrictions (see Table 1).

Specifically among arthritis patients, lower self-esteem predicted more reported swelling (B = −.15, SE = .04, $t(1015) = -3.44$ ($p = .0006$)) at momentary assessments. Reported pain (B = −.09, SE = .05, $t(1015) = -1.85$ ($p = .06$)) and reported stiffness (B = −.08, SE = .04, $t(1015) = -1.94$ ($p = .05$)) showed statistically marginal relationships with self-esteem in the expected direction, such that low self-esteem predicted more reported pain and stiffness. Among asthma patients, lower self-esteem predicted more reports of coughing/wheezing (B = −.06, SE = .02, $t(2477) = -2.84$ ($p = .005$)).

## Discussion

These data suggest that chronically ill patients' self-esteem has a significant impact on their daily experiences. To our knowledge, this is the first demonstration that self-esteem predicts naturalistic daily experiences in persons with chronic illness. We used Ecological Momentary Assessment to collect ambulatory data on the lives of asthma and rheumatoid arthritis patients for one week, finding that low self-esteem predicted more negative affect, less positive affect, higher severity ratings for stressors, and greater symptom severity. Although not statistically significant and contrary to our expectations, low self-esteem seemed to predict more social interaction experiences. On the other hand, self-esteem did not predict the reported frequency of stress or the perceived pleasantness of social interactions. This pattern of results might be explained in light of the previous empirical work in social and clinical psychology.

### Self-esteem and affect

The term 'vulnerability factor' is associated with self-esteem because of its tendency to worsen a patient's general mood (e.g. Nagyova et al., 2005). This effect has been demonstrated fairly consistently in earlier work using more global reports (e.g. Walsh & Walsh, 1989; Weaver & Narsavage, 1992) and our study extends this finding of low self-esteem predicting worse affect to a naturalistic setting. Even among healthy populations, individuals with low self-esteem have an increased risk of developing depression after an environmental stressor presents itself (Brown, Andrews, Harris, Adler, & Bridge, 1986). Thus, affect is interdependent with an individual's perception of his/her skills, abilities, and general characteristics, including self-esteem. For patients with chronic illness, the outcome of this interaction is likely to carry over into other life domains by influencing other appraisal processes, and may result in patients with chronic illness feeling unable to meet the demands necessary to control and adapt to their disease. This may foster a continuous cycle of negative, sometimes depressed, affect that in turn negatively impacts appraisals of illness, self-care, and so on.

### Self-esteem and stress

Self-esteem predicted only the reported stressor severity, not the reported frequency of stress (see also Adams & Weaver, 1986). In a broad sense, the reported frequency of stress is tied more closely with primary appraisal (i.e. did a potential stressor get labeled as stressful). In contrast, the severity ratings are conceptually representative of secondary appraisal (how stressful is the stressor, or to what degree does this stressor exceed your capacity to respond). Thus, our results suggest that (in patients' day to day lives) self-esteem does not influence primary appraisal, but does influence secondary appraisal (which is determined by

the perceived resources). Self-esteem thus appears to serve to magnify the perception of available resources, their perceived effectiveness or potency, or itself functions as a resource during secondary appraisal. As coping resources determine the extent of the influence of stress (Schneiderman et al., 2005), it is critical that patients lacking in such resources receive the proper attention to prevent or reduce stressors from posing damaging health threats.

### Self-esteem and social interaction

Self-esteem seemed to have a positive relationship with frequency, but not perceived pleasantness, of social interactions. Unexpectedly, patients with low self-esteem spent more time with others than patients with high self-esteem. One possible explanation is that an increased need for qualitative support in coping with stressful circumstances (in this case, chronic illness; Goodenow et al., 1990) motivates patients to seek out social interactions. Social relationships may be a crucial element in mitigating the impact of health complications (Goodenow et al., 1990), and perhaps the lack of personal resources available to patients with low self-esteem forces them to depend on social support for coping with their illness. Indeed, loss of self-esteem has been reported to accompany elevated dependency on others (Nicolson & Anderson, 2003). Surprisingly, patients with low self-esteem reported the same perceived pleasantness in social interactions as patients with high self-esteem. It may be that by directing their focus on domains other than themselves and their physical condition, patients are able to enjoy social activities regardless of their level of self-esteem.

### Self-esteem and symptom severity

Self-esteem was related to reported symptom severity during daily life among both asthma and RA patients. The reported illness-related restrictions, interference, and symptoms were higher among patients with low self-esteem, which is consistent with relationships that have been found between self-esteem and overall functional status (e.g. Blake, 1991; Stone et al., 1984; Walsh & Walsh, 2001; Weaver & Narsavage, 1992). The relationships between low self-esteem and increased reports of coughing/wheezing in asthma patients and swelling, pain, and stiffness among RA patients are of importance for several reasons. It may be the case that low self-esteem produces a greater symptom reporting style (perhaps mediated through its effect on momentary affect). It may also be that the worse mood and/or greater stress severity reported by patients produces a greater likelihood of symptom expression and/or flares (perhaps mediated via physiological changes, with affect again perhaps relevant, such as glucocorticoid activity). In either case, these symptom reports relate to diminished quality of life. More restrictions, interferences, and perceived symptom severity may also lead to more physician visits (Ireys et al., 1994), indicating that targeting this psychosocial element of chronic illness for intervention may reduce costs and burdens on the healthcare system and the patient. Additional work should also more carefully examine the relationship of self-esteem to more objective disease parameters in daily life (although such outcomes are currently technologically difficult to obtain, with the exception of a subset of cardiopulmonary measures).

### Strengths and limitations of the study

The use of ecological momentary assessment in our study enabled us to avoid several limitations faced by retrospective and/or laboratory designs. The collection of ambulatory data in the natural environment provided more detailed and accurate depictions of ‘real life’ experiences faced by our study sample, but still relied on, and was therefore limited by, the use of self-reports. Although our study examined self-esteem in two disease groups, our results may not be generalizable to other chronic diseases that substantively differ in scope and magnitude (e.g. cancer or HIV/AIDS). Also, we did not collect information on the length of time each diagnostic group has endured either disease. It may be the case that

asthma patients have endured the disease for longer intervals than rheumatoid arthritis patients, as asthma generally has an earlier onset than rheumatoid arthritis, which could account for some of the between-disease variance. Nor did we explore differences between the two diagnostic categories as a possible source for the variance in the intercepts because our hypotheses did not focus on diagnosis-specific occurrences. Our findings were intended to generalize across disease groups, with only a few specific disease-related symptoms that needed to be isolated. Finally, it would be desirable to obtain data from a healthy control group, using identical methodology, for comparison. Nonetheless, these data provide compelling evidence that, for patients with chronic illness, self-esteem has strong 'real-world' consequences on their day to day experiences.

### Implications for future research

Our results hint at, but did not directly explore, a causal relationship between self-esteem and the examined variables. Baumeister, Campbell, Krueger and Vohs (2003) discuss the inconsistent findings on the bi-directional relationship between self-esteem and various outcomes (e.g. interpersonal relations, delinquency, aggression, violence, happiness, coping, and depression). They conclude that the importance of self-esteem is questionable since the literature's evidence indicating clear causal effects between self-esteem and these variables is lacking. The use of EMA to investigate these suggestions further could help to resolve this ambiguity. In this case, our assessment of self-esteem occurred prior to the EMA assessment, thus momentary reports cannot be influencing self-esteem report (although it remains a possibility that trait-like characteristics of our EMA assessments reflective of stable environmental characteristics are a predictor of self-esteem).

Crocker and Park (2004) suggest the importance of shifting attention from the effects of levels (high or low) of self-esteem to the pursuit of self-esteem. They state that self-esteem holds certain benefits, but that other motivational stimuli provide similar consequences with less negative effects. Implementing EMA to obtain naturalistic data on individuals' aims to validate their self worth could provide missing links of the mechanisms that specifically influence self-esteem in chronic illness. As it is possible that some psychosocial resources only influence certain phases of particular chronic disease (e.g. Bisschop et al., 2004), further exploration of the underlying mechanisms could be carried out through pre- versus post-diagnosis or more dynamic approaches examining within person variability over time.

Our data also suggest that previously developed treatment interventions may benefit from explicitly including components aimed at enhancing self-esteem (e.g. Nagyova et al., 2005; Schneiderman et al., 2005). Between-disease comparisons could be made in patients with diseases varying in severity (e.g. diabetes, cancer, AIDS) in addition to healthy, non-clinical populations. This may reveal mediator or moderator roles of self-esteem; for example, self-esteem might differentially predict reported degree of stressful experiences in patient compared to healthy populations.

### Conclusions

Our study demonstrated that, among patients diagnosed with asthma or rheumatoid arthritis, individuals who had lower self-esteem reported more negative affect, less positive affect, greater stress severity, and greater symptom severity during their day to day lives than individuals with higher self-esteem. Patients with chronic disease, who already face additional medical and psychosocial burden, may benefit from interventions designed to bolster self-esteem in the ongoing context of self-care.

## Acknowledgments

This work was supported by a grant (R01HL067990) from the National Institutes of Health to JMS.

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**Table 1**

Statistical significance test results for each dependent variable for asthma and arthritis patients

| | Intercept | Self-esteem | | | |
|---|---|---|---|---|---|
| **Variable** | **Variance** | **B** | **SE** | **t** | **p** |
| Positive affect | 10.63* | .15 | .06 | 2.32 | .02 |
| Negative affect | 11.24* | −.34 | .07 | −5.17 | <.0001 |
| Stressful experiences | 3.30* | −.02 | .04 | −.54 | .59 |
| Stressful thoughts | 85.91* | −.06 | .21 | −.31 | .76 |
| Stress severity—experiences | .60* | −.07 | .02 | −3.54 | .0004 |
| Stress severity—thoughts | 1.04* | −.09 | .02 | –4.28 | <.0001 |
| Social interaction | 1.10* | −.03 | .02 | –1.58 | .12 |
| Pleasantness of social interaction | .85* | .002 | .02 | .14 | .89 |
| Interference | 1.32* | −.07 | .02 | –3.07 | .002 |
| Restrictions | 1.49* | −.08 | .02 | –3.46 | .0005 |

*Note*: All intercept variances were statistically significant

* indicates $p < .001$

**Table 2**

Descriptives by Self-esteem (Median Split): mean, standard deviation (SD), and number of participant reports (N)

| Self-esteem | | Positive affect | Negative affect | Thoughts: degree of stress | Experiences: degree of stress | Pleasantness of interaction | Interferences | Restrictions |
|---|---|---|---|---|---|---|---|---|
| Low | Mean | 10.43 | 6.79 | 2.92 | 0.83 | 2.24 | 1.74 | 1.74 |
| | SD | 3.39 | 4.20 | 1.03 | 0.57 | 1.23 | 1.24 | 1.36 |
| | N | 58 | 58 | 58 | 58 | 58 | 58 | 58 |
| High | | | | | | | | |
| | Mean | 11.44 | 3.69 | 2.10 | 0.61 | 2.01 | 1.01 | .98 |
| | SD | 3.54 | 2.77 | 1.12 | 0.50 | .98 | 1.07 | 1.14 |
| | N | 59 | 59 | 59 | 59 | 59 | 59 | 59 |