Journal of Consulting and Clinical Psychology
1996, Vol. 64, No. 1, 147-152

0022-006X/96/$3.00

Body Consciousness, Illness-Related Impairment, and Patient Adherence in Hemodialysis

Alan J. Christensen, John S. Wiebe, Dawn L. Edwards, John D. Michels, and William J. Lawton
The University of Iowa

Recent theory and evidence suggests that bodily self-focusing tendencies (e.g., private body consciousness) may be associated with medical regimen adherence among chronically ill patients. The present study examined the joint effects of private body consciousness and degree of illness-related physical impairment on treatment regimen adherence in a sample of 52 hemodialysis patients. It was predicted that the effect of PBC on adherence would vary as a function of patients' level of illness-related physical impairment. For patients experiencing more severe impairment, higher PBC scores were associated with poorer adherence to the prescribed medication and dietary regimen. In contrast, for patients experiencing a relatively low degree of disease-related physical impairment, higher private body consciousness was associated with more favorable adherence. Results are discussed in terms of self-focused attention and behavioral self-regulation theories. Implications for future research and clinical intervention are also discussed.

The tendency to focus attention on internal stimuli has been associated with a variety of emotional and behavioral processes (Carver & Scheier, 1981; Ingram, 1990). Dispositional differences in self-focusing are most often operationalized in one of two ways. The Private Self-Consciousness (PSC) Scale provides an assessment of one's tendency to attend to inner psychological or emotional processes (Fenigstein, Scheier, & Buss, 1975). Considerable evidence exists linking tendencies defined by the PSC Scale to a range of emotional and behavioral disorders including depression, anxiety, and alcohol abuse (Ingram, 1990).

A second conceptualization of the self-focused attention construct has been proposed by Miller, Murphy, and Buss (1981). The Private Body Consciousness (PBC) Scale was designed to assess one's tendency to attend to internal, physical sensations and bodily processes. In the initial validation study of the PBC scale, high scores on the measure were associated with the more accurate detection of physical changes specific to the ingestion of caffeine. In subsequent research, higher PBC Scale scores have been associated with increased physical symptom reports in both clinical (Martin, Ahles, & Jeffery, 1991) and nonclinical populations (Ahles, Cassens, & Stalling, 1987).

The influence of dispositional body consciousness on decision-making processes has also been examined. Baradell and Klein (1993) reported that higher PBC Scale scores were associated with the use of less effective decision making strategies (i.e., "hypervigilance") for individuals experiencing a high degree of life stress. Several interpretations of this pattern were offered, including the notion that high PBC–high life stress individuals were more distracted by stress-related somatic sensations experienced during the decision-making task.

Body Consciousness and Adherence Behavior

The available evidence suggests that private body consciousness is associated with increased attention to physical sensations and may play a role in mediating decision-making effectiveness. Research involving other potential behavioral and psychological correlates of the PBC construct is limited. One behavioral process that may be particularly relevant to individual differences in body consciousness involves patient adherence to a prescribed medical regimen.

Previous theories and empirical data suggest that a number of self-regulatory mechanisms are central to the successful and sustained execution of a prescribed behavioral regimen (Leventhal, Zimmerman, & Gutmann, 1984; Wing, Epstein, Nowalk, & Lamparski, 1986). One of these important mechanisms involves the self-observation of bodily changes associated with the execution of the regimen. Self-observation facilitates the ability of an individual to evaluate the adequacy of adherence behavior and to detect bodily changes that may signal an error or discrepancy in the adherence process. From a self-regulatory perspective, individuals who exhibit more pronounced and more accurate self-observance would be expected to more readily detect regimen-related problems and to execute the necessary corrections in their behavior (Wing et al., 1986). Theoretical and empirical descriptions of the private body consciousness construct suggest that individuals scoring high on the PBC measure may fit this characterization. However, there have been no published studies to date examining the potential association between private body consciousness and medical regimen adherence.

Self-Regulation and Adherence in Hemodialysis

One chronic medical regimen that imposes considerable self-regulatory demands on patients involves the administration of renal dialysis. Over 100,000 Americans are currently undergoing chronic hemodialysis (the most common form of renal di-

Alan J. Christensen, John S. Wiebe, Dawn L. Edwards, and John D. Michels, Department of Psychology, University of Iowa; William J. Lawton, Department of Internal Medicine, University of Iowa.

This research was supported in part by National Institute of Diabetes and Digestive and Kidney Diseases Grant 1R29 DK49129-01.

Correspondence concerning this article should be addressed to Alan J. Christensen, Department of Psychology, E11 Seashore Hall, University of Iowa, Iowa City, Iowa 52242.

alysis treatment) to compensate for a life-threatening loss of kidney function (U.S. Renal Data System, 1993). Patients undergoing the three-times weekly hemodialysis sessions face strict guidelines regarding their diet, medications that must be taken, and the amount of fluid that can be safely ingested (Wolcott, Maida, Diamond, & Nissenson, 1986).

Two central aspects of the regimen are control of serum phosphorus (serum P) levels and fluid-intake restriction (Newberry, 1989; Wolcott et al., 1986). Hemodialysis patients are required to take regular doses of phosphate-binding medication as well as modify their diet because of their body's inability to excrete phosphorus. If the medication and dietary regimens are not followed, serum P will rise above normal levels. Elevations in serum P are associated with a variety of physical changes and symptoms including itching sensations and musculoskeletal pain. If these elevations are not corrected serious decreases in calcium and subsequent bone demineralization can occur (Newberry, 1989).

There are also significant limitations on the amount of fluid that hemodialysis patients can safely consume because of the intermittent nature of the fluid and waste clearance performed by the artificial kidney. Fluid overload is a potentially life-endangering condition and is also associated with a variety of physiological changes including dizziness, shortness of breath, muscle cramping, and hypertension (Newberry, 1989).

A past review of the compliance literature suggested that between 30% and 50% of dialysis patients do not adhere to diet, fluid intake, and medication regimens (Wolcott et al., 1986). More recently published studies have reported similarly poor adherence in this population (Bame, Petersen, & Wray, 1993; Christensen et al., 1992; Christensen, Benotsch, Wiebe, & Lawton, 1995; Schneider, Friend, Whitaker, & Wadhwa, 1991).

Despite the prevalance and clinical importance of patient adherence, research seeking to identify individual difference correlates of adherence outcomes in this population is limited. Individual characteristics previously demonstrated to be associated with adherence to the hemodialysis treatment regimen have included patient coping strategies, internal control expectancies, self-efficacy expectations, perceived barriers to adherence, and preference for active involvement in one's health care delivery (Christensen, Smith, Turner, Holman, & Gregory, 1990; Christensen et al., 1995; Poll & Kaplan De-Nour, 1980; Rosenbaum & Ben-Ari Smira, 1986; Schneider et al., 1991; Weed-Collins & Hogan, 1989). No published studies to date have examined the potential association of self-focusing tendencies to adherence in this population.

Illness-Related Impairment, Body Consciousness, and Adherence

Self-regulatory theory suggests that greater bodily self-focus may be associated with more favorable regimen adherence. However, the influence of body consciousness on adherence behavior is unlikely to be favorable under all circumstances. Previous theory and research involving self-focused attention and other behavioral outcomes suggests that contextual factors such as level of stress or severity of illness may moderate an association between body consciousness and adherence behavior.

There is considerable evidence to suggest that self-focusing tendencies act as a cognitive diathesis for the onset of emotional and behavioral dysfunction after stressful experiences (see review by Ingram, 1990). For example, highly self-focused individuals receiving stress-inducing, negative feedback about their performance on a laboratory task have been shown to respond with more pronounced emotional distress and greater dysfunctional thinking (Ingram, Johnson, Bernet, Dombeck, & Rowe, 1992). Moreover, in a study of alcohol treatment relapse, highly self-focused individuals who had experienced a high degree of life stress were significantly more likely than other patients to relapse to pretreatment drinking levels (Hull, Young, & Jouriles, 1986). Thus, greater self-focusing tendencies appear to precipitate emotional and behavioral dysfunction under conditions of high stress. This raises the possibility that self-focusing tendencies may, under conditions of higher illness-related stress or impairment, predispose medically ill individuals to maladaptive adherence behavior.

The Present Study

The purpose of the present study was to examine the joint effects of private body consciousness and illness-related stress on treatment regimen adherence among hemodialysis patients. A commonly considered marker of stress for medically ill individuals is the degree of illness-related impairment they experience (e.g., Burish & Bradley, 1983). We predicted that the effect of private body consciousness on adherence would vary as a function of patients' level of illness-related physical impairment. For patients experiencing the higher degree of stress inherent in more severe impairment, higher private body consciousness was predicted to be associated with poorer adherence. In contrast, for patients experiencing a relatively low degree of disease-related physical impairment, higher private body consciousness was expected to be associated with more favorable medical regimen adherence.

Considerable evidence suggests that trait measures of negative emotion may be related to both attentional focus and symptom perception (Watson & Pennebaker, 1989). In light of this evidence, we also considered the potential mediating effect of patients' level of neuroticism on the association between private body consciousness, level of physical impairment, and adherence.

Method

Sample

Participants were recruited from three hemodialysis centers affiliated with the University of Iowa. The participating centers were located in Dubuque, Clinton, and Mount Pleasant, Iowa. Patient participation was solicited either by one of the experimenters (John S. Wiebe or John D. Michels) or by a dialysis unit nurse. The only exclusionary criteria used in participant recruitment were patient age (all participants were over 18 years old), severe cognitive decline, and inability to speak English. Of the 87 adult hemodialysis patients approached regarding participation in the study, 52 completed survey materials and consented to a review of their medical records (60% response rate). Three patients were excluded because of missing questionnaire data. Data regarding fluid-intake adherence were not available for one patient. A summary of demographic and clinical characteristics of the sample is reported in Table 1.

Measures

Private Body Consciousness Scale (PBC). The PBC Scale (Miller et al., 1981) was used to measure individual differences in the tendency

to focus on internal, physical sensations and bodily processes. The PBC is composed of five Likert-scaled items and has demonstrated reliability (Miller et al., 1981). Representative items include "I am sensitive to internal bodily tensions," and "I am quick to sense the hunger contractions of my stomach."

In the present sample, adequate internal consistency was obtained (α = .64). The PBC has been found to correlate moderately with private self-consciousness (r = .37 to .45) but to be essentially uncorrelated with several measures of negative affect (r = .10 to .24; Miller et al., 1981). Additional information regarding the construct validity of the PBC was discussed earlier.

Sickness Impact Profile (SIP). The degree of illness-related physical impairment was assessed through use of the physical dimension of the SIP (Bergner, Bobbitt, Carter, & Gilson, 1981). The measure has been successfully used in several previous tests of diathesis-stress models in chronic illness populations (e.g., Christensen, Turner, Slaughter, & Holman, 1989; Littlefield, Rodin, Murray, & Craven, 1990). The physical dimension consists of three subscales: Ambulation, Body Care and Movement, and Mobility. Higher scores are indicative of a greater degree of impairment. Representative items from each of the subscales include; "I get dressed only with someones help" (body care and movement), "I stay lying down most of the time" (ambulation), and "I stay away from home only for brief periods of time" (mobility).

The three physical dimension subscales have been found to exhibit high correlations (r = .66 to .84) with objective, clinical measures of patients' physical health status across a variety of disease categories (Bergner et al., 1981). Normative information previously reported for the SIP physical dimension subscales has indicated mean scores ranging from 2.7 to 3.1 for nonclinical, general population samples (Follick, Smith, & Ahern, 1985). Previous clinical samples have included patients with rheumatoid arthritis (M = 14.0), chronic low back pain (M = 17.7), and renal transplantation (M = 6.5; Christensen, Holman, Turner, & Slaughter, 1989; Follick et al., 1985). A mean of 16.61 (SD = 15.41) was obtained for the present sample of hemodialysis patients.

An alpha coefficient of .85 was obtained for the physical dimension of the SIP in the present sample. Other evidence regarding the validity and reliability of the measure has been previously reported (Bergner et al., 1981; Follick et al., 1985).

Adherence assessment. Serum P and interdialytic weight gain (IWG) were used to provide an assessment of adherence to the treatment regimen. Both of these measures are routinely used as clinical markers of patient adherence and are important for treatment success (Wolcott et al., 1986).

Hemodialysis patients are required to take regular doses of phosphate-binding medication as well as modify their diet because of their bodies' inability to excrete phosphorous. Higher serum P is typically interpreted as reflecting poorer adherence to the dietary and medication regimen. Values above 6.0 mg/dl are considered indicative of problematic adherence (Wolcott et al., 1986). Serum P levels are obtained monthly for hemodialysis patients. In the present study, the mean of two serum P levels most proximal to the time when participants completed the questionnaire was used as an indicator of adherence. In the present sample, a mean serum P of 6.30 (SD = 1.46) was obtained.

Hemodialysis patients also face strict fluid intake restrictions. IWG is used both clinically and for research purposes as an indicator of fluid intake adherence behavior (Wolcott et al., 1986). IWG is determined by subtracting the postdialytic weight for the previous treatment session from the predialytic weight for the current session. The values resulting from this computation are a valid reflection of the amount of fluid that the patient ingests between dialysis sessions (Manley & Sweeney, 1986). For a more representative indicator of adherence over time, mean IWG averaged over 12 dialysis sessions (approximately 4 weeks) served as the dependent measure in this study. Higher IWG values are interpreted as reflecting poorer patient adherence, with values over 2.5 kg generally indicative of problematic adherence. In the present sample, a mean IWG of 2.89 (SD = 0.92) was obtained.

Neuroticism. Individual differences in neuroticism were assessed using the Neuroticism subscale from the NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992). The construct validity, internal consistency, and test–retest stability of the NEO-FFI have been described previously (Costa & McCrae, 1992). Briefly, internal consistency for the Neuroticism subscale was reported to be high (α = .86), and the subscale correlated highly with the Neuroticism subscale from the longer NEO Personality Inventory–Revised (r = .89). An alpha coefficient of .70 was obtained for the Neuroticism subscale of the NEO-FFI in the present sample.

Table 1
Sample Characteristics

Characteristic	n
Mean age (and SD)	59.24 (16.4)
Mean no. of years of education (and SD)	11.93 (2.0)
Sex	
n male (and %)	29 (59)
n female (and %)	20 (41)
Diabetic status	
n diabetic (and %)	22 (45)
n nondiabetic (and %)	27 (55)
Mean no. of months since first dialysis (and SD)	61.71 (60.3)

Results

Preliminary Analyses

We conducted a preliminary regression procedure to examine the association of the demographic and clinical characteristics presented in Table 1 to patient serum P and IWG levels. Using forward-entry selection, we allowed predictor variables meeting a liberal $p < .10$ criteria to enter the equation. Effect coding was used for the categorical gender and diabetic status variables. Using this criterion, none of the demographic and clinical characteristics were associated with serum P values (all ts < 1.20, $p > .20$). In regard to IWG values, the only predictor entering the model was age, $t(47) = 4.02$, $p < .01$, $\beta = -.51$. This effect indicated that older hemodialysis patients display more favorable fluid intake adherence than younger patients. Effects for all other predictors were quite small (all ts < 1.30, $p > .20$). As a result of these findings age was included as a predictor in the primary regression analysis of IWG values.

Primary Analyses

To test the predictions involving private body consciousness, illness-related impairment, and adherence, hierarchical we conducted multiple regression analyses using mean serum P values and mean IWG levels as dependent variables.

Serum P. In the regression analysis involving serum P values, scores from the PBC Scale and from the physical dimension of the SIP were entered on the first step of the regression equation. Values reflecting the PBC Scale × SIP two-way interaction term were entered on the second step of the equation. To test the hypothesized interaction, we examined the statistical significance of the unique increment in R^2 associated with the interaction term (Pedhazur, 1982).

Results of the regression analysis involving serum P are sum-

marized in Table 2. As predicted, the PBC Scale × SIP interaction explained a significant amount of variance in serum P values; change in $R^2 = .082$, $F(1, 47) = 4.12$, $p < .05$, $\beta = .29$. The regression lines and predicted values illustrating this significant interaction were constructed from the unstandardized regression coefficients and are depicted in Figure 1. Values 1 standard deviation above and below the mean were used to represent typical high and low scores for the continuously measured predictor variables.

As shown in Figure 1, the pattern of the obtained interaction was consistent with prediction. Among patients experiencing a high degree of illness-related physical impairment, higher private body consciousness was associated with poorer adherence ($Y = 6.9$ mg/dl) relative to lower private body consciousness ($Y = 5.6$ mg/dl). In contrast, among patients experiencing a low degree of illness-related physical impairment, higher private body consciousness was associated with more favorable adherence ($Y = 6.1$ mg/dl) relative to lower private body consciousness ($Y = 6.6$ mg/dl).

IWG. In the regression analysis involving IWG values, patient age was entered on the first step of the equation. PBC Scale and SIP scores were entered on the second step of the regression. Finally, values reflecting the PBC Scale × SIP two-way interaction term were entered on the third step of the equation.

Results of the regression analysis involving IWG are summarized in Table 3. Age was significantly associated with IWG values; change in $R^2 = .26$, $F(1, 46) = 16.22$, $p < .001$, $\beta = -.49$. This effect indicated that older hemodialysis patients displayed more favorable fluid intake adherence than younger patients. However, the predicted PBC Scale × SIP interaction failed to explain a significant amount of variance in IWG values; change in $R^2 = .02$, $F(1, 46) = 1.29$, $p > .10$, $\beta = .15$.

Secondary Analysis

We conducted a secondary regression analysis determine whether the interactive effect of the PBC Scale and SIP scores on medication and dietary adherence (i.e., serum P values) is mediated by individual differences in neuroticism. In this analysis, Neuroticism scores were entered on the first step of the regression equation before entering the PBC Scale × SIP interaction term. Results revealed a trivial increase in the size of the predicted PBC Scale × SIP interaction effect; change in $R^2 = .084$, $F(1, 47) = 4.16$, $p < .05$, $\beta = .29$. Neuroticism scores were not related to serum P values; change in $R^2 = .002$, $F(1, 46) < 1.00$, $p > .40$, $\beta = .06$.

Table 2
Summary of Hierarchical Regression Analysis of Serum Phosphorus Values

Variable	β	R^2 change	Test of significance[a]
Step 1		.026	$F(2, 46) < 1.00$, *ns*
Private body consciousness	.14		
Physical impairment	−.01		
Step 2		.082	$F(1, 47) = 4.12$*
Private Body Consciousness × Impairment	.29*		

Note. The beta reported is the standardized regression coefficient from the final equation. R^2 change is the increment in variance accounted for at each step of the analysis.
[a] Test of the statistical significance of the increment in variance accounted for at each step of the analysis.
* $p < .05$.

Table 3
Summary of Hierarchical Regression Analysis of Interdialytic Weight Gain Values

Variable	β	R^2 change	Test of significance[a]
Step 1		.260	$F(1, 46) = 16.22$**
Age	−.49**		
Step 2		.003	$F(2, 45) < 1.00$, *ns*
Private body consciousness	.03		
Physical impairment	−.03		
Step 3		.020	$F(1, 46) = 1.29$, *ns*
Private Body Consciousness × Impairment	.15		

Note. The beta reported is the standardized regression coefficient for the final equation. R^2 change is the increment in variance accounted for at each step of the analysis.
[a] Test of the statistical significance of the increment in variance accounted for at each step of the analysis.
** $p < .01$.

Discussion

The present results suggest that individual differences in private body consciousness play a role in moderating medical regimen adherence. Consistent with prediction the effect of private body consciousness on adherence varied as a function of the degree of illness-related physical impairment patients were ex-

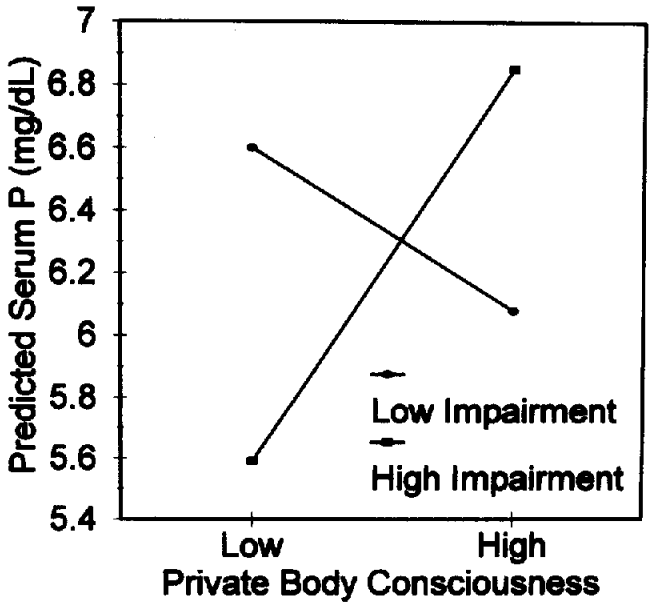

Figure 1. Effects of private body consciousness and illness-related physical impairment on patient adherence. Serum P = serum phosphorus.

periencing. Among patients experiencing a relatively high degree of physical impairment, higher private body consciousness was associated with markedly poorer adherence. This finding extends previous evidence that self-focused attention acts as a diathesis for emotional and behavioral dysfunction for individuals under a high degree of stress (Ingram, 1990).

Among hemodialysis patients experiencing a relatively low degree of illness-related impairment, higher private body consciousness was associated with more favorable adherence to the phosphorus-control regimen. This finding provides some support for previous theorizing and empirical evidence that more pronounced self-observation facilitates the patient's ability to self-regulate a prescribed regimen (e.g., Wing et al., 1986).

The processes underlying the role self-focused attention appears to play in the onset of psychological dysfunction have not been clearly established. One prominent theory suggests that heightened self-focusing triggers maladaptive cognitive schemas in response to stressful events that then precipitate dysfunctional behavior (Ingram, 1990). For severely ill patients, greater bodily self-focus may enhance the salience of a patient's deteriorating physical condition leading to a diminished sense of personal control. This, in turn, may trigger dysfunctional cognitive schemas (e.g., helplessness, hopelessness) resulting in a less adherent pattern of behavior.

The present findings might also be interpreted in the context of theory regarding self-focus, outcome expectancies, and self-regulation (Carver & Scheier, 1983). Carver and Scheier (1983) have proposed that greater self-focus is likely to be associated with a more pronounced tendency to conform one's behavior to a given standard (e.g., a prescribed behavioral regimen) only if the individual holds the expectancy that the indicated behavioral effort will produce a desired outcome. However, if the individual is doubtful that a behavioral change will be associated with favorable consequences (e.g., a favorable health outcome), more pronounced self-focus is likely to prompt behavioral withdrawal or disengagement (Carver & Scheier, 1983). From this perspective, hemodialysis patients experiencing more serious illness-related impairment (an unfavorable health outcome) who engaged in a high degree of self-focus may have withdrawn or disengaged their efforts to meet the demands of a prescribed behavioral regimen.

In contrast to the findings for adherence to the phosphorus reduction regimen, body consciousness and illness-related impairment were not found to be associated with adherence to fluid intake restrictions. Previous reports involving chronic illness populations have suggested that the degree of adherence to different aspects of a medical regimen are not closely related and may have distinct individual difference correlates (Orne & Binik, 1989; Turk & Meichenbaum, 1989). Several mechanisms may have contributed to the absence of a significant effect on fluid intake adherence. For example, the symptoms associated with excessive fluid intake may be particularly salient to all patients (Newberry, 1989). Thus, individual differences in bodily focus may be a less central determinant of symptom recognition in the case of excessive fluid intake. There is also evidence that success in adhering to fluid intake restrictions is more a function of differences in self-control skills (e.g., ability to delay gratification and tolerate frustration) than other self-regulatory processes or health-related cognitions (Rosenbaum & Ben-Ari Smira, 1986). Finally, the considerable degree of variance in fluid intake values explained by patient age may have obscured the effects of other predictors.

Limitations and Conclusions

Interpretation of the present findings is limited by several factors. First, given the reliance on correlational methodology we cannot draw firm conclusions regarding the causal influence of body consciousness and illness impairment on patient adherence. An attempt was made to control for likely "third variables" that may have influenced the body consciousness and adherence relationship (i.e., neuroticism, demographic characteristics). Nevertheless, we cannot rule out the possibility that our findings are the result of some unidentified factor.

Another important interpretative limitation involves the absence of any objective criteria to determine whether a higher degree of private bodily consciousness is actually associated with more accurate perception of bodily states. Previous work has suggested that individuals higher in self-focused attention are not necessarily more accurate at perceiving physical symptoms (Pennebaker, 1984). On the other hand, there is modest evidence that among individuals following a chronic medical regimen, greater attention to bodily states is associated with the more accurate evaluation of physical processes that are relevant to a patient's condition or treatment regimen (e.g., Cox et al., 1985; Wiebe, Alderfer, Palmer, Lindsay, & Jarrett, 1994). Future research could address this issue by including an assessment of the accuracy of patient perceptions along with assessments of dispositional bodily focus and adherence.

Finally, the present data do not provide a firm basis for determining the processes underlying the obtained interactive pattern. We have proposed several behavioral and cognitive mechanisms that may have mediated the present findings. However, the potential role of these processes was not empirically confirmed. Further study is necessary to clarify the processes underlying the association between private body consciousness and adherence.

The aforementioned qualifications notwithstanding our data provide the first demonstration of an association between dispositional body consciousness and medical regimen adherence. Our findings also suggest a number of hypotheses regarding the effect of clinical interventions on patient adherence. For example, the present data suggest that, for patients who are more severely ill, the use of techniques designed to distract attention from bodily changes (i.e., decrease self-focusing tendencies) might be most desirable. For patients who are less physically impaired, the use of techniques to promote greater somatic focus might be preferred. Additional research is called for to address these possibilities as well as to clarify and extend the present findings.

References

Ahles, T. A., Cassens, H. L., & Stalling, R. B. (1987). Private body consciousness, anxiety, and the perception of pain. *Journal of Behavior Therapy and Experimental Psychiatry, 18,* 215–222.

Bame, S. I., Petersen, N., & Wray, N. P. (1993). Variation in hemodialysis patient compliance according to demographic characteristics. *Social Science in Medicine, 37,* 1035–1043.

Baradell, J. G., & Klein, K. (1993). Relationship of life stress and body

consciousness to hypervigilant decision making. *Journal of Personality and Social Psychology, 64,* 267–273.

Bergner, M., Bobbitt, R. A., Carter, W. B., & Gilson, B. S. (1981). The Sickness Impact Profile: Development and final revisions of a health status measure. *Medical Care, 191,* 787–805.

Burish, T. G., & Bradley, L. A. (1983). *Coping with chronic disease.* New York: Academic Press.

Carver, C. S., & Scheier, M. F. (1981). *Attention and self-regulation: A control theory approach to human behavior.* New York: Springer-Verlag.

Carver, C. S., & Scheier, M. F. (1983). A control-theory approach to human behavior, and implications for problems in self-management. In P. C. Kendall (Ed.), *Advances in cognitive–behavioral therapy* (Vol. 2, pp. 127–194). New York: Academic Press.

Christensen, A. J., Benotsch, E., Wiebe, J., & Lawton, W. J. (1995). Coping with illness-related stress: Effects on adherence among hemodialysis patients. *Journal of Consulting and Clinical Psychology, 63,* 454–459.

Christensen, A. J., Holman, J. M., Turner, C. W., & Slaughter, J. R. (1989). Quality of life in end-stage renal disease: Influence of renal transplantation. *Clinical Transplantation, 3,* 46–53.

Christensen, A. J., Smith, T. W., Turner, C. W., Holman, J. M., & Gregory, M. C. (1990). Type of hemodialysis and preference for behavioral involvement: Interactive effects on adherence in end-stage renal disease. *Health Psychology, 9,* 225–236.

Christensen, A. J., Smith, T. W., Turner, C. W., Holman, J. M., Gregory, M. C., & Rich, M. A. (1992). Social support and adherence in hemodialysis: An examination of main and buffering effects. *Journal of Behavioral Medicine, 15,* 313–325.

Christensen, A. J., Turner, C. W., Slaughter, J. M., & Holman, J. M. (1989). Perceived family support as a moderator of psychological well-being in end-stage renal disease. *Journal of Behavioral Medicine, 12,* 249–265.

Costa, P. T., Jr., & McCrae, R. R. (1992). *The NEO Personality Inventory-R: Professional manual.* Odessa, FL: Psychological Assessment Resources.

Cox, D. J., Clarke, W. L., Gonder-Frederick, L., Pohl, S., Hoover, C., Snyder, A., Zimbelman, L., Carter, W. R., Bobbitt, S., & Pennebaker, J. (1985). Accuracy of perceiving blood glucose in IDDM. *Diabetes Care, 8,* 529–536.

Fenigstein, A., Scheier, M. F., & Buss, A. H. (1975). Public and private self-consciousness: Assessment and theory. *Journal of Consulting and Clinical Psychology, 43,* 522–527.

Follick, M. J., Smith, T. W., & Ahern, D. K. (1985). The Sickness Impact Profile: A global measure of disability in chronic low back pain. *Pain, 21,* 67–76.

Hull, J. G., Young, R. D., & Jouriles, E. (1986). Applications of the self-awareness model of alcohol consumption: Predicting patterns of use and abuse. *Journal of Personality and Social Psychology, 44,* 1097–1109.

Ingram, R. E. (1990). Self-focused attention in clinical disorders: Review and a conceptual model. *Psychological Bulletin, 107,* 156–176.

Ingram, R. E., Johnson, B. R., Bernet, C. Z., Dombeck, M., & Rowe, M. K. (1992). Vulnerability to distress: Cognitive and emotional reactivity in chronically self-focused individuals. *Cognitive Therapy and Research, 16,* 451–472.

Leventhal, H., Zimmerman, R., & Gutmann, M. (1984). Compliance: A self-regulation perspective. In W. D. Gentry (Ed.), *Handbook of behavioral medicine* (pp. 369–436). New York: Guilford Press.

Littlefield, C. H., Rodin, G. M., Murray, M. A., & Craven, J. L. (1990). Influence of functional impairment and social support on depressive symptoms in persons with diabetes. *Health Psychology, 9,* 737–749.

Manley, M., & Sweeney, J. (1986). Assessment of compliance in hemodialysis adaptation. *Journal of Psychosomatic Research, 30,* 153–161.

Martin, J. B., Ahles, & Jeffery, R. (1991). The role of private body consciousness and anxiety in the report of somatic symptoms during magnetic resonance imaging. *Journal of Behavior Therapy and Experimental Psychiatry, 22,* 3–7.

Miller, L. C., Murphy, R., & Buss, A. H. (1981). Consciousness of body: Private and public. *Journal of Personality and Social Psychology, 41,* 397–406.

Newberry, M. A. (1989). *Textbook of hemodialysis for patient care personnel.* Springfield, IL: Charles C Thomas.

Orne, C. M., & Binik, Y. M. (1989). Consistency in adherence across regimen demands. *Health Psychology, 8,* 27–43.

Pedhazur, E. J. (1982). *Multiple regression in behavioral research: Explanation and prediction.* New York: Holt, Rinehart, & Winston.

Pennebaker, J. M. (1984). Accuracy of symptom perception. *Handbook of psychology and health, Vol. IV: Social psychological aspects of health* (pp. 189–218). Hillsdale, NJ: Erlbaum.

Poll, I. B., & Kaplan De-Nour, A. (1980). Locus of control and adjustment to chronic hemodialysis. *Psychological Medicine, 10,* 153–157.

Rosenbaum, M., & Ben-Ari Smira, K. (1986). Cognitive and personality factors in the delay of gratification in hemodialysis patients. *Journal of Personality and Social Psychology, 51,* 357–364.

Schneider, M. S., Friend, R., Whitaker, P., & Wadhwa, N. K. (1991). Fluid noncompliance and symptomology in end-stage renal disease: Cognitive and emotional variables. *Health Psychology, 10,* 209–215.

Turk, D. C., & Meichenbaum, D. (1989). Adherence to self-care regimens: The patient's perspective. In J. Sweet, R. Rozensky, & S. M. Tovian (Eds.), *Handbook of clinical psychology in medical settings* (pp. 249–266). New York: Plenum.

U. S. Renal Data System. (1993). *USRDS annual report.* Bethesda, MD: National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Disease.

Watson, D., & Pennebaker, J. W. (1989). Health complaints, stress, and distress: Exploring the central role of negative affectivity. *Psychological Review, 96,* 234–254.

Weed-Collins, M., & Hogan, R. (1989). Knowledge and health beliefs regarding phosphate-binding medication in predicting compliance. *ANNA Journal, 16,* 278–283.

Wiebe, D. J., Alderfer, M. A., Palmer, S. C., Lindsay, R., & Jarrett, L. (1994). Behavioral self-regulation in adolescents with Type I diabetes: Negative affectivity and blood glucose symptom perception. *Journal of Consulting and Clinical Psychology, 62,* 1204–1212.

Wing, R. R., Epstein, L. H., Nowalk, M. P., & Lamparski, D. M. (1986). Behavioral self-regulation in the treatment of patients with diabetes mellitus. *Psychological Bulletin, 99,* 78–89.

Wolcott, D. W., Maida, C. A., Diamond, R., & Nissenson, A. R. (1986). Treatment compliance in end-stage renal disease patients on dialysis. *American Journal of Nephrology, 6,* 329–338.

Received January 16, 1995
Revision received April 21, 1995
Accepted April 26, 1995 ■