

Integrative Self-Knowledge and the Harmony of Purpose Model in Iranian Autoimmune Patients

Nima Ghorbani

Department of Psychology
University of Tehran in Iran

Ashrafe Mousavi

Department of Psychology
University of Tehran in Iran

P. J. Watson

U. C. Foundation Professor
University of Tennessee, Chattanooga, USA.

Zhuo Chen

Adjunct Professor of Psychology
University of Tennessee, Chattanooga, USA.

Abstract

According to the Harmony of Purpose model, teleological coherence is a unifying principle of immunological, neurological, and psychological functioning. The specific assumption is that these systems work together promote the “telos,” goals, or ends of the individual by differentiating between self and non-self. An Integrative Self-Knowledge Scale served as a plausible psychological measure of teleological coherence in Iranian Autoimmune, Non-Autoimmune, and Healthy Student groups ($N = 264$). Participants also responded to measures of perceived stress and to the Levels of Self-Criticism Scales, Hopkins Symptom Checklist, and Inventory of Interpersonal Problems. Autoimmune patients displayed the lowest Integrative Self-Knowledge, highest perceived stress, and greatest evidence of psychological disharmony. Integrative Self-Knowledge correlated negatively with perceived stress and psychological disturbances and partially mediated the relationship of perceived stress with interpersonal problems. Integrative Self-Knowledge may usefully clarify the psychosomatic dynamics of autoimmune patients.

Introduction

Research increasingly demonstrates linkages between stress, psychological variables, and immunological functioning (Segerstrom & Miller, 2004). Examples of such connections range from the well-known placebo effect, through changes in immunological activity as a function of perceived stress, to the remarkable observation that individuals with dissociative identity disorder can exhibit allergies in one personality but not in another (Booth & Ashbridge, 1993). Such phenomena reveal a need “to look beyond a purely biological or physical construction of the immune system and to link its self-generative characteristics and capacity for distinguishing self from non-self to psychological,

social, and cultural processes” (Booth & Pennebaker, 2000, p. 567).

Booth and Ashbridge (1992, 1993) proposed “teleological coherence” as a unifying principle of immunological, neurological, and psychological functioning. Relationships among these systems theoretically reflect a “harmony of purpose” within processes of self/non-self differentiation. The more specific assumption is that “relationships between psychoneural and immune systems arise as a consequence of their shared goal: that of establishment and continuous maintenance of a self-identity” (Booth & Ashbridge, 1992, p. 753). By definition, therefore, teleological coherence requires that the past of an organism be related to its present in attempts to move toward a future *telos*, or end. Within this context, the ability of the immune system to discriminate between self and non-self structures arises less as an attempt to defend the body from invasion by foreign substances and more as the fulfillment of an organismic imperative for self-determination across time. As Booth and Ashbridge (1992) emphasize, “In essence, both the immunological and psychoneural concepts of self/non-self determination are expanded to become explicit manifestations of a congruent whole being intent” (p. 754).

The Integrative Self-Knowledge Scale plausibly measures psychological attempts to achieve teleological coherence through an integration of self-experience across time (Ghorbani, Watson, & Hargis, 2008). Items record efforts (1) to understand past experience, (2) to maintain awareness of the self in the present, and (3) to move toward desired goals in the future. This 12-item measure is also relevant to Muslim claims that self-knowledge serves as an

Islamic ideal (e.g., Shimamoto, 2008). Integrative Self-Knowledge, therefore, is a “capacity for distinguishing self from non-self” that is relevant to the “psychological, social, and cultural processes” (Booth & Pennebaker, 2000, p. 567) of Iran, where this instrument in fact predicts more adjusted psychological (Ghorbani et al., 2008, Tahmasb, Ghorbani, & Watson, 2008) and religious (Ghorbani, Watson, Shamohammadi, & Cunningham, 2010) functioning.

This investigation used the Integrative Self-Knowledge Scale to test the Harmony of Purpose Model. This model essentially assumes that teleological coherence as a dimension of psychological functioning should work harmoniously with neurological and immunology systems to cope effectively with life stressors. A first suggestion, therefore, is that individuals displaying greater teleological coherence at a psychological level should cope better with stress. In other words, Integrative Self-Knowledge should correlate negatively with Perceived Stress (Cohen, Kamarack, & Mermelstein, 1983).

Second, Integrative Self-Knowledge should be at least somewhat incompatible with “disharmonies” in psychological and psychosomatic functioning. This possibility was tested with the Levels of Self-Criticism Scales (Thompson & Zuroff, 2004), the Hopkins Symptom Checklist (Derogatis, Lipman, Rickels, Uhlenhuth, & Cori, 1974), and the Inventory of Interpersonal Problems (Kim, Pilkonis, & Barkham, 1997). The Comparative Self-Criticism Scale measures a disharmony in the self’s evaluation of itself relative to others, whereas the Internal Self-Criticism Scale reflects a lack of coherence in the functioning of the self relative to its own internalized standards. The Hopkins Symptom Checklist assesses both psychological (e.g., depression) and somatic (e.g., headaches) complaints of disharmony. The Inventory of Interpersonal Problems examines psychosocial disharmonies involving Interpersonal Sensitivity, Interpersonal Ambiguity, Aggression, Lack of Sociability, and Need for Social Approval.

Third, the Harmony of Purpose Model suggests that autoimmune patients should display especially poor teleological coherence. Autoimmune diseases occur when the immune system attacks tissues of an individual’s own body. In other words, such diseases reflect a basic disharmony of purpose in a failure to accurately differentiate between self and non-self at the physiological level. Other types of patients would also have their purposes disrupted at psychological and somatic levels, but their difficulties would not rest so fundamentally upon a dispositional teleological incoherence. Such patients instead should be characterized by immunological processes

that seek to reestablish a missing harmony at all levels of functioning. Finally, healthy non-patients should display the most generally harmonious functioning. In other words, in comparison to a Healthy Student Group, an Autoimmune Patient Group should score higher on Perceived Stress, lower on Integrative Self-Knowledge, and higher on measures of psychological and psychosomatic disharmony. Non-Autoimmune Patients should fall at intermediate levels between these two other groups.

Finally, the Harmony of Purpose Model implies that teleological coherence should influence the effects of stress on personal functioning. Integrative Self-Knowledge should, therefore, reduce or eliminate the linkage of Perceived Stress with disharmony. In other words, Integrative Self-Knowledge should at least partially mediate the relationship between Perceived Stress and evidence of disharmony.

Method

Sample

Participants included autoimmune patients (105 women, 26 men, $M_{age} = 29.6$ years, $SD_{age} = 8.6$), non-autoimmune patients (66 women, 22 men, $M_{age} = 26.8$ years, $SD_{age} = 10.2$), and students from the University of Tehran (93 women, 58 men, $M_{age} = 20.2$ years, $SD_{age} = 3.4$). Within the Autoimmune Patient Group, 51.6% were married; and educational levels included up through high school, 70.1%; undergraduate studies, 26.7%; and postgraduate studies, 2.3% with the remainder failing to respond. Of the Non-Autoimmune Patients, 46.6% were married; and educational levels included up through high school, 81.8%; undergraduate studies, 15.9%; and postgraduate studies, 2.2%. All but one of the university students was an undergraduate, and 7.3% were married.

Recruitment of Autoimmune Patients occurred through the Iran Multiple Sclerosis Association and the Rheumatology Division of Shari’ati Hospital in Tehran. Diagnoses of this sample included multiple sclerosis, 56.1%; Crohn’s disease, 0.8%; rheumatoid arthritis, 7.6%; systemic lupus erythematosus, 13.6%; scleroderma, 4.5%; polyarteritis nodosa, 0.8%; polymyositis, 2.3%; autoimmune hepatitis, 0.8%; myasthenia gravis, 0.8%; Takayasu’s arteritis, 0.8%; Behçet’s disease, 10.6%; and psoriasis, 0.8%.

Non-autoimmune Patient Group participants came from the polyclinic of Shari’ati Hospital in Tehran. For these patients, no definitive evidence suggested the possibility of autoimmune disease. They were diagnosed with thyroid, 21.7%; non-autoimmune hepatitis, 8.4%; hypertension, 1.2%; anemia 2.4%; epilepsy, 6.0%; myotomy of colon, 1.2%; migraine, 2.4%; cardiac diseases, 1.2%; tic, 1.2%; weakness of the muscles, 2.4%; Parkinson’s, 1.2%; and internal

diseases associated with such systems as, for example, stomach, kidney, liver, and bile, 50.4%.

Materials

Persian versions of all scales appeared in a questionnaire booklet containing, in sequence, the Integrative Self-Knowledge (Ghorbani et al., 2008), Levels of Self-Criticism (Thompson & Zuroff, 2004), Perceived Stress (Cohen et al., 1983), Hopkins Symptom Checklist (Derogatis et al., 1974), and Inventory of Interpersonal Problems (Kim et al., 1997) measures. The Integrative Self-Knowledge Scale was developed in Persian. Except for the Levels of Self-Criticism Scales, translation of all other scales occurred in preparation for previous projects, which also documented the validity of these instruments in Iran (Ghorbani et al., 2008, 2009; Tahmasb, 2008). In all translation procedures, one individual translated the English expression of a scale into Persian, and then another translated it back into English. Meaningful discrepancies between initial and back-translated statements were rare and easily resolved.

Reactions to the Integrative Self-Knowledge Scale and to the Inventory of Interpersonal Problems occurred along a 0 (*largely untrue*) to 4 (*largely true*) Likert scale. Level of Self-Criticism measures used response options ranging from 0 (*not at all*) to 6 (*very well*). Perceived Stress employed a 0 (*never*) to 4 (*very often*) format. The Hopkins Symptom Checklist had respondents rate various complaints from 0 (*none*) to 4 (*extreme*).

Integrative Self-Knowledge displayed a Cronbach's α of .76 (M response per item = 2.35, SD = 0.70). Comparative Self-Criticism contained 12 items (α = .58, M = 2.40, SD = 0.85) and Internalized Self-Criticism included 10 (α = .83, M = 3.40, SD = 1.27). As with previous Iranian and American data, removal of one Perceived Stress item improved internal reliability of the scale, leaving a total of 13 (α = .82, M = 1.86, SD = 0.65).

The widely used Hopkins Symptom Checklist recorded five categories of symptoms: Somatization, 12 items (α = .89, M = 1.39, SD = 0.82); Anxiety (7 items, α = .83, M = 1.30, SD = 0.85); Depression (11 items, α = .85, M = 1.78, SD = 0.82); Interpersonal Sensitivity (7 items, α = .80, M = 1.68, SD = 0.82); and Obsession Compulsion (8 items, α = .76, M = 1.70, SD = 0.73).

Five subscales of the Inventory of Interpersonal Problems included Interpersonal Sensitivity, 11 items, α = .71, M = 1.80, SD = 0.65; Interpersonal Ambivalence, 10 items, α = .73, M = 1.58, SD = 0.68; Aggression, 7 items, α = .84, M = 1.41, SD = 0.91; Need for Social Approval, 9 items, α = .72, M = 2.08, SD = 0.70; and Lack of Sociability, 10 items, α = .81, M = 1.43, SD = 0.78.

Procedure

Participation in this project was voluntary and was preceded by written informed consent. All procedures were in full conformity with an institutional review of ethical guidelines for conducting research. In groups of 30 to 50, university students responded to the questionnaire booklet in a classroom setting. Autoimmune and Non-Autoimmune Patients responded to the questionnaire booklet individually.

All instruments were scored by averaging responses for constituent items. Statistical procedures examined relationships among psychological scales in partial correlations controlling for the background characteristics of age, sex, marital status, and educational level. Control of these background variables also occurred in tests of hypotheses about group differences. In line with the conceptual framework of this project, Perceived Stress as the independent variable in the hypothesis about mediation was analyzed separately using an Analysis of Covariance (ANCOVA). An ANCOVA then examined group differences in the hypothesized mediator, Integrative Self-Knowledge. All other variables served as dependent variables in a Multivariate Analysis of Covariance (MANCOVA). Tests of mediation followed the recommendations of Baron and Kenny (1986). Prior to these procedures, a factor analysis examined the possibility of organizing the dependent variables into a smaller number of conceptually meaningful groupings. Mediation analyses also controlled for the background characteristics of age, sex, marital status, and educational level.

Results

Table 1 presents the partial correlations among all measures. Perceived Stress correlated negatively with Integrative Self-Knowledge and positively with Internal and Comparative Self-Criticism. It also displayed direct relationships with all of the Symptom Checklist and Interpersonal Problem measures. Integrative Self-Knowledge correlated negatively with Internal and Comparative Self-Criticism, which in turn exhibited a positive connection with each other. Hopkins and Interpersonal Problem variables all correlated negatively with Integrative Self-Knowledge and positively with the two Self-Criticism scales. Significant positive relationships also appeared among all of the Symptom Checklist and Interpersonal Problem variables.

Significant group differences appeared in the ANCOVA examining the hypothesized independent variable of the mediation analysis, Perceived Stress (see Table 2). Autoimmune Patients reported higher Perceived Stress than Non-Autoimmune Patients and

Table 1

Partial Correlations^a among Perceived Stress, Integrative Self-Knowledge (ISK), and Measures of Psychological and Interpersonal Functioning

Variables	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Perceived Stress	-.44	.33	.38	.40	.53	.61	.60	.54	.54	.28	.42	.41	.39
2. ISK	-	-.44	-.35	-.26	-.34	-.40	-.45	-.40	-.44	-.41	-.38	-.43	-.38
3. Internal Self-Criticism		-	.40	.25	.30	.38	.41	.36	.45	.40	.27	.40	.38
4. Comparative Self-Criticism			-	.12*	.29	.38	.41	.31	.42	.30	.28	.34	.43
5. Somatization				-	.75	.62	.56	.55	.39	.22	.40	.33	.30
6. Anxiety					-	.68	.65	.60	.51	.28	.42	.41	.45
7. Depression						-	.75	.67	.59	.35	.45	.53	.48
8. Interpersonal Sensitivity							-	.68	.63	.36	.64	.52	.51
9. Obsession-Compulsion								-	.58	.43	.49	.48	.46
10. Interpersonal Insensitivity									-	.55	.54	.66	.59
11. Interpersonal Ambivalence										-	.42	.44	.52
12. Aggression											-	.41	.36
13. Need for Social Approval												-	.58
14. Lack of Sociability													-

Note. ^a – all correlations significant at $p < .001$, except * $p < .05$

Table 2

Comparison ($M \pm S.E.M.$) of Independent, Mediating, and Dependent Variables of Autoimmune, Non-Autoimmune, and Student Groups after Controlling for Covariates¹

Variables	Mean and Standard Error of Mean			
	Autoimmune	Non-Autoimmune	Student	F
<i>Independent Variable</i>				
Perceived Stress	2.03±0.64 ^a	1.80±0.69 ^b	1.76±0.67 ^b	4.73**
<i>Mediating Variable</i>				
Integrative Self-Knowledge	2.00±0.65 ^a	2.32±0.71 ^b	2.69±0.68 ^c	22.56***
<i>Dependent Variables</i>				
Internal Self-Criticism	3.68±.126 ^a	3.48±.137 ^a	3.04±.128 ^b	5.61**
Comparative Self-Criticism	2.56±.087 ^a	2.45±.095 ^{a,b}	2.21±.089 ^b	3.41**
Somatization	1.67±.077 ^a	1.49±.084 ^a	1.10±.079 ^b	11.26***
Anxiety	1.55±.084 ^a	1.36±.092 ^a	1.03±.086 ^b	7.53**
Depression	2.07±.082 ^a	1.79±.090 ^b	1.49±.084 ^c	9.86***
Interpersonal Sensitivity	2.02±.080 ^a	1.69±.087 ^b	1.38±.082 ^c	13.07***
Obsession-Compulsion	1.90±.075 ^a	1.78±.082 ^a	1.47±.077 ^b	6.76**
Interpersonal Insensitivity	1.91±.066 ^a	1.83±.072 ^{a,b}	1.67±.068 ^b	2.69
Interpersonal Ambivalence	1.66±.071	1.58±.078	1.51±.073	0.96
Aggression	1.73±.090 ^a	1.46±.086 ^b	1.13±.092 ^c	8.73***
Need for Social Approval	2.31±.072 ^a	2.05±.078 ^{b,c}	1.91±.073 ^c	6.73**
Lack of Sociability	1.53±.080	1.48±.087	1.30±.083	1.87

Note. * $p < .05$ ** $p < .01$ *** $p < .001$

¹ Different letter superscripts indicate statistically significant contrasts.

Students, who in turn did not differ. All three groups differed in their levels of the hypothesized mediator, Integrative Self-Knowledge. Autoimmune Patients exhibited the lowest scores, followed by Non-Autoimmune Patients, and then by Students. Finally, the MANCOVA revealed significant group differences in the dependent variables, Wilks' Lambda = .86, $F(24, 602) = 2.16$, $p < .01$. As Table 2 makes clear, Autoimmune Patients scored highest, followed by Non-Autoimmune Patients, and then by Students on the Depression, Hopkins Interpersonal Sensitivity, and Aggression variables. The two patient groups displayed higher values than Students on Internal Self-Criticism, Somatization, Anxiety, and Obsession Compulsion. Autoimmune Patients also scored higher than Students but not Non-Autoimmune Patients on Comparative Self-Criticism and on the Interpersonal Sensitivity and Need for Social Approval measures from the Inventory of Interpersonal Problems.

Prior to tests of mediation, all dependent variables were submitted to a principal axis factor analysis with a varimax rotation. Two factors appeared. The first, with an eigenvalue of 6.22, explained 51.8% of the variance. Somatization (.84), Anxiety (.83),

Depression (.73), Hopkins Interpersonal Sensitivity (.69), Obsession Compulsion (.63), and Aggression (.47) measures loaded maximally on this factor. The second factor had an eigenvalue of 1.38, explained 11.5% of the variance, and was associated with maximal loadings by Internal (.54) and Comparative (.57) Self-Criticism and by the Interpersonal Sensitivity (.75), Interpersonal Ambiguity (.65), Need for Social Approval (.64), and Lack of Sociability (.69) scales from the Inventory of Interpersonal Problem. Maximal loadings suggested that the first dimensions largely described a Symptoms factor with the second primarily defining an Interpersonal Problems factor. Regression factor scores were computed for each of these dimensions and used in the mediation analyses.

Again, procedures examining mediation included an initial step in all regression analyses controlling for age, sex, marital status, and educational level. As defined by Baron and Kenny (1986), mediation first requires that the independent variable significantly predict the mediating variable. A significant effect did appear in the second step of a regression analysis when Perceived Stress predicted Integrative Self-Knowledge, $\beta = -.43$, $p < .001$.

Mediation also requires that the independent variable display a significant association with the dependent variable and that the mediator then increase the variance explained in a final step while reducing or eliminating the connection of the independent with the dependent variable. Perceived Stress did predict Symptoms, $\beta = .51, p < .001$, but Integrative Self-Knowledge did not increase the variance explained on the next step, $\Delta F(1, 312) = 2.36, p > .10$. A significant association also appeared between Perceived Stress and Interpersonal Problems, $\beta = .46, p < .001$, and Integrative Self-Knowledge did increase the variance explained, $\Delta F(1, 312) = 53.47, p < .001$. In this final step, the β for Perceived Stress was lower, but still remained significant at $.30, p < .001$. The β for Integrative Self-Knowledge, was $-.38, p < .001$. A Sobel test uncovered a significant effect, $Z = 5.62, p < .001$. In short, Integrative Self-Knowledge did not mediate the association of Perceived Stress with Symptoms, but did partially mediate the association of Perceived Stress with Interpersonal Problems (see Figure 1).

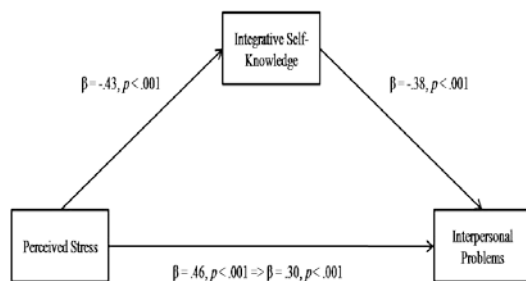


Figure 1. Partial mediation of the Perceived Stress relationship with Interpersonal Problems by Integrative Self-Knowledge.

Discussion

The Harmony of Purpose Model argues that teleological coherence underlies healthy immunological and psycho-neural responses to stress. This project supported that model by using the Integrative Self-Knowledge Scale to measure teleological coherence. Most important was confirmation of the hypothesis that Autoimmune Patients would display the lowest Integrative Self-Knowledge. The Non-Autoimmune Patient Group had its purposes disrupted by medical difficulties, but presumably for reasons less associated with dispositional deficits in teleological coherence. Their intermediate position between the Autoimmune and Healthy Student groups, therefore, made sense in terms of the model. The higher Perceived Stress of Autoimmune Patients in comparison to both other groups also pointed toward a relative inability to

harmoniously cope with stress. Autoimmune Patients also scored highest with Students lowest and Non-Autoimmune Patients in between on measures of Depression, Hopkins Interpersonal Sensitivity, and Aggression. These disharmonies may, therefore, deserve special scrutiny in future efforts to understand the psychosomatic dynamics of autoimmune disease.

Autoimmune Patients, alone and in combination with Non-Autoimmune Patients, displayed higher levels of dysfunction than Students across a large number of additional disharmonies. In the absence of differences between the two patient groups, such contrasts suggested that these dysfunctions may be relatively less important in efforts to understand the specific “disharmonies” of autoimmune disease.

Also as predicted, Integrative Self-Knowledge correlated negatively with Perceived Stress and with all measures from the Levels of Self-Criticism Scales, the Hopkins Symptom Checklist, and the Inventory of Interpersonal Problems. These findings further confirmed the validity of the Integrative Self-Knowledge Scale. This scale also partially mediated the relationship between Perceived Stress and Interpersonal Problems. In combination with contrasts observed for Autoimmune Patients, this partial mediation effect further supported the Harmony of Purpose model by suggesting a teleological coherence among stress, psychological, and immunological factors.

Future studies may need to explore why Integrative Self-Knowledge did not mediate the Perceived Stress relationship with Symptoms and only partially mediated its linkage with Interpersonal Problems. Such results perhaps demonstrated that harmony of purpose has only limited relevance to stress-related dysfunctions. On the other hand, the Integrative Self-Knowledge Scale was not formally designed to operationalize teleological coherence, but rather to assess efforts to achieve unity in self-experience across past, present, and future. Each item focuses only on one time frame, whereas a more ideal Teleological Coherence Scale might include all three within each single item. A better expression of teleological coherence might state, for example, “I regularly try to understand how my present can serve as a bridge between my past and my future.” Development of a more explicit measure of teleological coherence may, therefore, deserve future research consideration.

Self-knowledge is an important Islamic ideal (Shimamoto, 2008), and in this Iranian sample, the apparent ability of Integrative Self-Knowledge to measure teleological coherence supported that claim. At the same time, however, self-knowledge is an ideal across cultures and in many contemporary

theories of psychology and psychotherapy. Integrative Self-Knowledge also predicts psychological adjustment in American samples (Ghorbani et al. 2008), and the Harmony of Purpose Model makes assumptions that are not limited to Islamic culture. Integrative Self-Knowledge should, therefore, serve as a useful measure of teleological coherence in other societies as well.

Limitations of the Present Study

University students served as the healthy comparison group. Statistical procedures attempted to control for the obvious background differences that appeared between these students and the other two groups. An ideal research design would have examined a healthy comparison group that was more like the Autoimmune and Non-Autoimmune Patients in age, marital status, and educational achievement. This concern, should, nevertheless, not diminish the centrally important contrasts that appeared between Autoimmune and Non-Autoimmune Patients, who were more similar to each other in these background characteristics. At the same time, however, the two patient groups undoubtedly differed in several other ways. Future research will need to explore whether duration of illnesses, degree of discomfort, contrasts in treatment modalities, and a myriad other factors perhaps contributed to the psychological differences observed between the Autoimmune and the Non-Autoimmune groups.

This project examined a Harmony of Purpose model that presumed the existence of causal processes between the independent, dependent, and mediating variables. The present data were nevertheless correlational in nature; so, caution is clearly warranted with regard to any attempt to make inferences about causal processes. Further efforts to explore the relevant causal processes will need to explore the potentials of other methodologies including perhaps longitudinal designs and experimental efforts to therapeutically enhance Integrative Self-Knowledge and the more general teleological coherence of autoimmune patients.

Summary

The Harmony of Purpose Model suggests that teleological coherence underlies healthy immunological and psycho-neural responses to stress. The present project used the Integrative Self-Knowledge Scale to support that model. Findings for the Autoimmune Patient Group were especially important in suggesting that this scale may be useful in future research designed to explore the psychological dynamics of autoimmune disease.

References

- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social

- psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173-1182.
- Booth, R. J., & Ashbridge, K. R. (1992). Teleological coherence: Exploring the dimensions of the immune system. *Scandinavian Journal of Immunology*, 36, 751-759.
- Booth, R. J., & Ashbridge, K. R. (1993). A fresh look at the relationship between the psyche and immune system: Teleological coherence and harmony of purpose. *Journal of Mind-Body Health*, 9, 4-23.
- Booth, R. J., & Pennebaker, J. W. (2000). Emotions and immunity. In M. Lewis, & J.M. Haviland-Jones (Eds.), *The handbook of emotions* 2nd ed. New York: Guilford.
- Cohen, S., Kamarack, T., & Mermelstein, R. A. (1983). A global measure of perceived stress. *Journal of Health and Social Psychology*, 24, 355-396.
- Derogatis, L. R., Lipman, R. S., Rickels, K., Uhlenhuth, E. H., & Cori, L. (1974). The Hopkins symptom checklist (HSCL): A self-report symptom inventory. *Behavioral Science*, 19, 1-15.
- Ghorbani, N., & Agai, H. (2003). *Big five and personality disorders in Iran*. Unpublished manuscript.
- Ghorbani, N., Ghramaleki, A. F., & Watson, P. J. (2005). Philosophy, self-knowledge, and personality in Iranian high school teachers and students. *Journal of Psychology: Interdisciplinary and Applied*, 139, 81-95.
- Ghorbani, N., Watson, P. J., Bing, M. N., Davison, H. K., & Le Breton, D. (2003). Two facts of self-knowledge: cross-cultural development of measures in Iran and the United States. *Genetic, Social, General Psychology Monographs*, 129, 238-268.
- Ghorbani, N., Watson, P. J., Ghramaleki, A. F., Morris, R. J., & Hood, R. W., Jr. (2002). Muslim-Christian religious origination scale: Distinctions, correlations and cross-cultural analysis in Iran and the United States. *The International Journal for the Psychology of Religion*, 12, 69-91.
- Ghorbani, N., Watson, P. J., & Hargis, M. B. (2008). Integrative self-knowledge: Correlations and incremental validity of a cross-cultural scale developed in Iran and the United States. *The Journal of Psychology: Interdisciplinary and Applied*, 142, 395-412.
- Ghorbani, N., Watson, P. J., Shamohammadi, K., & Cunningham, C. J. L. (2009). Post-critical beliefs in Iran: Predicting religious and psychological functioning. In M. M. Leach (Guest Editor, Special issue: Islam and Mental Health). *Research in the Social Scientific Study of Religion*, 20, 151-194.

- Kim, Y., Pilkonis, P. A., & Barkham, M. (1997). Confirmatory factor analysis of the personality disorder subscales from the inventory of interpersonal problems. *Journal of Personality Assessment, 69*, 284-296.
- Segerstrom, S. C., & Miller, G. E. (2004). Psychological stress and the human immune system: A meta-analytic study of 30 years of inquiry. *Psychological Bulletin, 130*, 601-630.
- Shimamoto, T. (2008). The question of “self-knowledge” (*ma’rifat an-nafs*) in Islam: Mortazā Motahharī’s theory of the “Perfect Man” (*ensān-e kāmél*). *Journal of the Interdisciplinary Study of Monotheistic Religions, 4*, 25-45.
- Tahmasb. A. R., Ghorbani, N., & Watson, P. J. (2008). Relationships between Self- and Peer-Reported Integrative Self-Knowledge and the Big Five Factors in Iran. *Current Psychology, 27*, 169-176.
- Thompson, R., & Zuroff, D. C. (2004). The levels of self-criticism scale: Comparative self-criticism and internalized self-criticism. *Personality and Individual Differences, 36*, 419-430.

Correspondence to: P. J. Watson,
Psychology/Dept. #2803, 350 Holt Hall – 615
McCallie Avenue, University of Tennessee at
Chattanooga, Chattanooga, TN 37403, U.S.A.
Email: paul-watson@utc.edu.