

## 疾病親和的パーソナリティ特性評価のための自記式質問票「ストレス調査票」の信頼性と妥当性

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<https://hdl.handle.net/2324/15513>

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出版情報：健康支援. 3 (2), pp.107-119, 2001-09-01. 日本健康支援学会

バージョン：

権利関係：

## **Validity and reliability of the Stress Inventory: self-administered questionnaire to assess disease-prone personalities**

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### **Abstract**

The etiological roles of psychosocial factors in cancer and coronary heart disease (CHD) have received much attention in psychosomatic research, and recent epidemiological studies have added scientific evidence concerning this issue. Grossarth-Maticek and colleagues have shown, through a series of prospective studies, a strong relationship between certain personalities (reactions to stress) and diseases such as cancer, apoplexy, and CHD. Based on the Grossarth-Maticek theory, we developed a self-administered questionnaire, the Stress Inventory (SI), to assess potentially disease-prone personalities in the Japanese population. This study examined the psychometric properties of the SI. The Short Interpersonal Reactions Inventory (SIRI) developed by Grossarth-Maticek and the Maudsley Personality Inventory (MPI) were administered, along with the SI, to 601 men and women, most of whom were 40 to 69 years of age, who visited a clinic for a health checkup (Sample 1). The first 164 subjects in Sample 1 took the SI again after a 2-4 week interval. A total of 208 outpatients at a psychosomatic clinic (Sample 2: mean age 43.5 years) completed the Stress Coping Inventory (SCI), the Tokyo University Egogram (TEG), the State-Trait Anxiety Inventory (STAI), the Japanese version of the Center for Epidemiologic Studies Depression Scale (CES-D), the Anger Scales (AS), the Social Support Questionnaire (SSQ), and the SI. Based on factor analysis of sample 1, the SI was shortened from 75 to 45 items, and 12 scales were constructed and named as follows: "low sense of control", "object dependence of loss", "object dependence of happiness", "object dependence of anger", "annoying barrier", "object dependence of ambivalence", "disclosure of negative experiences", "unfulfilled needs for acceptance", "altruism", "egoism", "emotional suppression", and "lacking emotional experiences". Cronbach alphas and test-retest reliability coefficients ranged from 0.60 to 0.90 and from 0.66 to 0.82 respectively. A correlation analysis between the 12 SI scales and the MPI, SCI, TEG, STAI, CES-D (Japanese-language version), AS, and SSQ scales showed that the constructs of the SI scales generally agreed with the original hypotheses. The SI was shown to have internal consistency, test-retest reliability, factorial validity, and construct validity.

**Key words:** questionnaire, disease-proneness, personality, stress, reliability, validity, Grossarth-Maticek

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## Introduction

The roles of psychosocial factors in the onset and progression of cancer and coronary heart disease (CHD) have received much attention in psychosomatic research, and recent epidemiological studies have added scientific evidence concerning this issue<sup>1,2</sup>. The series of prospective studies conducted by Grossarth-Maticek and colleagues is among those of particular note<sup>3,4</sup>. Grossarth-Maticek showed that diseases such as cancer and coronary heart disease were prevalent among specific personality types, that there was an interaction between personality and lifestyle factors such as smoking and alcohol drinking, and that a behavioral therapy intervention could lower subsequent disease risks. Recently, replication studies have been undertaken in Europe<sup>5-7</sup> and in Japan<sup>8-11</sup>. Asaeda et al. have found in an industrial cohort an association between cancer and personality which agreed with the findings by Grossarth-Maticek and colleagues<sup>8</sup>.

The Grossarth-Maticek theory typically proposes three primary models for disease-prone personalities. It has been described in detail elsewhere<sup>12</sup>, and here is summarized briefly. The first model is personality typology with 6 types: "Type 1" personality through "Type 6" personality<sup>3,13</sup>. Type 1 is characterized by dependence on an idealized object and feelings of hopelessness, and is prone to cancer (similar to "Type C"). Type 2 is characterized by fixation on a persecuting object and by aggression and hostility, and is prone to CHD (similar to "Type A"). Type 3 is an ambivalent object-dependent type characterized by a combination of those typical of Types 1 and 2, and Type 4 is an autonomous type with low object dependence. Type 5 reacts to frustration in an excessively rational way and by suppressing emotional behaviors, and is a disease-prone type. Type 6 is characterized by antisocial tendencies, and is non-prone to diseases such as cancer and CHD.

The second model posits a theory of personality traits<sup>14-18</sup>. This theory, which recognizes the seven personality traits of "chronic sense of hopelessness", "chronic anger", "rationality and anti-emotionality", "suppressing personal needs", "disregarding symptoms", "lacking social supports", and "lacking anxiety", corresponds closely to the typology. Chronic sense of hopelessness, chronic anger, and rationality and anti-emotionality are core constructs of Type 1, Type 2, and Type 5 respectively, and show particularly strong relationships to diseases. The third model involves "self-regulation"<sup>4</sup> which constitutes the core construct of "healthy personality", and largely overlaps with Type 4.

Personality assessment methods have been prepared for each of these three models (questionnaire surveys augmented by interviews), but there are considerable overlaps or similarities among the items of these instruments<sup>19</sup>. In addition, the instruments include some questions that seem to be difficult to answer<sup>18</sup>. We reorganized the questions in these three models, and used those questions as the basis for developing a self-administered questionnaire, the "Stress Inventory", to assess disease-prone personalities in Japanese<sup>12</sup>. The aim of the present study was to examine the validity and reliability of the Stress Inventory, while at the same time constructing a multifaceted scale that contained as few items as possible.

An individual's psychosocial stress level is thought to be determined by the interaction between stressors and the individual's responding style to the stressors. In this article we define "personality" as the pattern of cognitive-behavioral response to stressors.

## Subjects and methods

### *Subjects and data collection*

Sample 1: Persons receiving a checkup at Institution F were asked to complete the Stress Inventory, the Maudsley Personality Inventory (MPI)<sup>20</sup>, and a Japanese version of the Short Interpersonal Reactions Inventory (SIRI) (see below)<sup>21</sup>, and 601 persons responded (response rate 82.4%). Diligent attempts were made to obtain a uniform balance between men and women, and between subjects in their 40s, 50s, and 60s. However, as Table 1 shows, men somewhat outnumbered women, and participation was relatively low among subjects in their 60s. In order to examine the reproducibility of the Stress Inventory, we asked the first 164 testees to retake the Stress Inventory 2-4 weeks after the first test.

Sample 2: The Stress Inventory, SIRI, Tokyo University Egogram New Version (TEG)<sup>22</sup>, Stress Coping Inventory (SCI)<sup>23</sup>, Stait-trait Anxiety Inventory (STAI)<sup>24</sup>, Center for Epidemiologic Studies Depression Scale (CES-D)<sup>25</sup>, Anger Scales<sup>26</sup>, and Social Support Questionnaire<sup>27</sup> were administered to a series of outpatients at the Psychosomatic Medicine Clinic of Hospital K, and responses were obtained from 208 patients (65 men and 143 women, response rate 72.0%). Mean age was 43.3 years in men and 43.4 years in women.

The SIRI<sup>13</sup> is a self-administered questionnaire for the assessment of the Grossarth-Maticek personality types (Type 1 through Type 6). Subjects answer 70 questions with a dichotomous choice of "Yes" or "No". The Japanese version developed by the authors can be used, in addition to the type scales, the "factor scales" that were reconstructed based on factor analysis<sup>21</sup>. The factor scales consists of 9 scales: "lack of control", "repression of emotion", "ambivalence", "having annoyance", "rational coping", "antisocial tendency", "autonomy", "egoism", and "impatience".

The MPI developed by Eysenck<sup>20</sup> is made up of three scales: extroversion (E), neuroticism (N), and lie (L) scale. The questionnaire is self-administered, and consists of 80 questions that can each be answered by "Yes", "No", or "?". The TEG<sup>22</sup> is a questionnaire developed to assess five ego states based on transactional analysis theory: "CP (critical parent)", "NP (nurturing parent)", "A (rational adult)", "FC (free child)", and "AC (adapted child)". There are 55 questions, and the person completing the questionnaire can choose from the three responses of "Yes", "No", and "Neither". The SCI is a questionnaire designed to assess stress coping styles based on Lazarus' theory<sup>23</sup>. In addition to the eight coping styles, "planning", "confrontive coping", "seeking instrumental social support", "accepting responsibility", "self-control", "escape", "avoidance", and "positive reappraisal", the questionnaire also assesses the two orientations of "cognitive strategies" and "emotion-focused strategies". The subject is asked to describe a recent

experience in which he/she “felt highly stressed”, and then to answer 64 questions regarding coping behavior, using 1 of 3 responses of “true”, “somewhat true” and “false”. The STAI assesses “state anxiety” and “trait anxiety” based on Spielberger's theory<sup>24</sup>, of which we used 20 items for the trait anxiety. Respondents select one of four responses: “almost never”, “sometimes”, “often”, and “almost always”. The CES-D was developed to assess depression or depressive states<sup>25</sup>. Respondents select one of four responses to the 20 questions: “almost never”, “a little of the time”, “a moderate amount of the time”, and “most of the time”. The Anger Scales is a questionnaire developed by Suzuki and colleagues for the purpose of measuring anger in Japanese, using for reference the State-Trait Anger Expression Inventory (STAXI) by Spielberger and colleagues<sup>26</sup>. It consists of five sub-scales: “state anger”, “trait anger”, “anger in”, “anger out”, and “anger cognitive coping”. Here we used 22 question items from four scales, with the exclusion of state anger. Respondents select one of four answers: “completely false”, “false”, “true”, and “very true”. The Social Support Questionnaire<sup>27</sup> is included in the General Health Questionnaire, developed primarily by the National Center of Neurology, and is used to assess the presence or absence of social support. The questionnaire contains six sub-scales: “family and society”, “crisis”, “information”, “neighborhood”, “daily activities”, and “margin”. Of these, the three scales of family and society, crisis, and neighborhood, which were shown to have relatively high internal consistency, were selected for use in our questionnaire. Respondents selected “Yes” or “No” to answer the 13 questions in this questionnaire.

#### *The Stress Inventory*

We prepared a number of question items based on the questionnaires by Grossarth-Maticek and colleagues, and tested these questions in a variety of subjects, including patients with CHD and patients with lung cancer. Based on the subjects' comments, we revised the questions, integrating applicable suggestions and introducing new items, and the result was the 75-item Stress Inventory. Response is on a self-report basis, using six multiple choice options. This inventory measures nine constructs, which are grouped into five groups: Group 1 through Group 5, as shown in Table 2. The developmental process and theoretical background have been described elsewhere<sup>12</sup>.

#### *Analysis*

Using Sample 1, factor analysis (principal component solution) was applied to each of the 5 groups to determine if factors that were consistent with the hypothesis could be identified. When two or more factors were identified, we applied Promax rotation and interpreted the findings. Referring to these findings we constructed scales, where the criterion for adopting an item was that the relevant factor loading was  $\geq 0.5$  and the other factor loadings were  $< 0.3$ . Where there were many relevant items, generally the number of items for each scale was limited to the top four in terms of factor loading, under the condition that internal consistency (Cronbach alpha) was ensured. Next, we used the retest data from Sample 1 to examine reproducibility for each scale.

For both Sample 1 and Sample 2, we examined the association between the above constructed scales and other questionnaires' scales that were hypothetically considered to be relevant, by calculating inter-scale

correlation coefficients. A correlation coefficient of less than 0.3 was interpreted as weak correlation, a coefficient of 0.3 to 0.6 as moderate correlation, and 0.6 or above as strong correlation. The SAS software was used for statistical analysis<sup>28</sup>.

## Results and Discussion

### *Factor analysis, scale construction, and reliability*

**Group 1:** In factor analysis, Factor 1 accounted for 49.3% of variance, and a second or subsequent factor gained an eigenvalue of less than 1. Group 1 included items regarding two different types of the sense of control, i.e., experiences of loss and experiences of anger. However, since we were unable to identify factors that distinguished between these two experiences, we decided that it would be appropriate to create a single scale from this group. We used the top four items in terms of factor loading (Table 3), and designated this category as “low sense of control”. Coefficient  $\alpha$  for this scale was 0.74, and the test-retest reliability coefficient was 0.82, both of which were adequately high (see Appendix).

**Group 2:** If we assume a major “autonomy—object dependence axis” corresponding to a principle concept of the Grossarth-Maticek personality theory, all of the constructs relevant to Group 2 were sub-constructs of object dependence. These sub-constructs include the core constructs of Type 1, Type 2, and Type 3 personalities. Thus, the factors being identified for Group 2 were assumed to be quite interrelated, and we searched for an oblique solution using Promax rotation. Results identified seven factors that were in agreement with our hypothesis<sup>12</sup> (Table 3). Factors 1 and 3 indicated the presence of an anger experience or a persecuting object, and factors 4 and 5 indicated the presence of a loss experience/object. Factors 1 and 4 applied to past experiences/objects, and factors 3 and 5 applied to current experiences/objects. We intended the Stress Inventory to assess not stressors, but the cognitive-behavioral response patterns to those stressors, so we decided to configure the scale so that it would focus on whether an event elicited a response pattern of anger or of loss, regardless of whether the event is of the past or of the present. We provided 2 items each for factor 4 and factor 5 signifying the presence of an idealized object (person) that causes persistent hopelessness, and 2 items each for factor 1 and factor 3 signifying the presence of a persecuting object (person). Coefficients  $\alpha$  for these two 4-item clusters were 0.62 and 0.78, respectively, which were quite favorable. The former factor was termed “object dependence of loss”, and the latter was termed “object dependence of anger” (see Appendix).

Factor 6 was also related to anger, but while the above four factors designated persons as the object, the items for factor 6 were expressed more vaguely as “conditions and circumstances”. Coefficient  $\alpha$  was relatively high (0.71) for these items, so we made a scale that was separate from object dependence of anger and designated it as “annoying barrier”. Factor 7 only loaded high on two items of b11 and b12, and could be interpreted as to indicate the necessity of a specific object for individual happiness, or in other words the happiness depending on a specific object. Coefficient  $\alpha$  for these two items was fairly high (0.68). We

termed this scale “object dependence of happiness”. Factor 2 signified extreme ambivalence or emotional instability in interpersonal relationships. This was the only factor that applied to Grossarth-Maticek Type 3 personality. The top four items in terms of factor loading were selected, for which coefficient  $\alpha$  was 0.74, and designated to form the “object dependence of ambivalence” scale. The test-retest reliability coefficients for object dependence of loss, object dependence of anger, annoying barrier, object dependence of happiness, and object dependence of ambivalence were 0.77, 0.76, 0.65, 0.66, and 0.70, respectively.

**Group 3:** Factor analysis identified three factors (Table 3). Factor 2 applied to disclosure of negative experiences in Table 2, and Factors 1 and 3 applied to unfulfilled needs for acceptance. The combination of the latter two, i.e., the four items obtained by selecting the top two factor loading items each, showed a high level of internal consistency ( $\alpha = 0.82$ ), so we decided to use these four items to form a single scale, and renamed it “unfulfilled needs for acceptance”. For Factor 1, the top four factor loading items were selected to form the “disclosure of negative experiences” scale; the resulting coefficient  $\alpha$  was high (0.90). The test-retest reliability coefficients for disclosure of negative experiences and unfulfilled needs for acceptance were 0.80 and 0.81, respectively.

**Group 4:** Factor analysis consistently identified a factor corresponding to rationality and anti-emotionality under different numbers of factors assumed. While it was not so straightforward to obtain a clear solution for the other factors, analysis ended up with the final model of a four-factor structure. However, combinations of items loaded by Factor 4 did not reach a high  $\alpha$  value, therefore we could only obtain three scales corresponding to Factors 1, 2 and 3. Based on the contents of those items, these scales were designated as “rationalizing conflicts and frustrations” (corresponding to Factor 1, top five factor loading items), “altruism” (Factor 2, four items), and “egoism” (Factor 3, four items). The respective coefficients  $\alpha$  were 0.78, 0.65, and 0.65, and the respective test-retest reliability coefficients were 0.80, 0.77, and 0.63.

**Group 5:** In factor analysis, Factor 1 accounted for 41.9% of total variance. A two-factor model found the eigenvalue of Factor 2 to be 1.20, but a scree test showed the one-factor model was more suitable. A single scale with the top four factor loading items was designated as “lack of emotional experiences”, for which coefficient  $\alpha$  was 0.60 and the test-retest reliability coefficient was 0.73. Interestingly, although the items relating to positive emotions like joy and pleasure were intermixed with those items for negative emotions, such as anxiety, sorrow and anger, Factor 1 positively loaded on all of these items. Thus, this factor was thought to represent a lack of strong emotional experiences, regardless of whether they are negative or positive.

The above procedures revised the Stress Inventory to be a 45-item and 12 scale questionnaire (see Appendix).

#### *Examining the association between the Stress Inventory and other inventories*

**Group 1:** Low sense of control had a moderate positive correlation with trait anxiety (STAI), depression (CES-D), trait anger (the Anger Scales), and neuroticism (MPI) (Table 4). These correlations were clearly

in agreement with this scale's concept: a low sense of control when experiencing negative emotions. This scale weakly and negatively correlated with both cognitive strategies and emotion-focused strategies of stress coping (SCI). This finding can be considered to be valid if we assume that it is difficult to cope with stress, regardless of the coping mechanism, when one extremely lack a sense of control over stressful situations.

Low sense of control showed a distinctive contrast in association with Grossarth-Maticek personalities, i.e., moderate or higher positive correlations with Types 1 and 2 while a negative correlation with Type 4 (Table 5). This scale also showed a high correlation to the lack of control scale of the SIRI factor scales<sup>21</sup> and a moderate, negative correlation to the autonomy scale. These results were in agreement with our hypothesis<sup>12</sup>.

**Group 2:** With regard to correlations with depression (CES-D) and trait anger (the Anger Scales), there was a somewhat higher correlation between depression and object dependence (OD) of loss than between depression and OD of anger, and the opposite tendency for correlation to trait anger (Table 4). OD of happiness only weakly correlated with depression and trait anger. The correlations of annoying barrier with depression and anger showed a similar pattern to those of OD of anger. The correlation between OD of ambivalence and depression was at a similar level to the case of OD of loss, and the correlation between OD of ambivalence and anger was at a similar level to the case of OD of anger. Regarding correlations with trait anxiety (STAI) and neuroticism (MPI), all Group 2 scales but OD of happiness moderately, positively correlated with trait anxiety and neuroticism. OD of ambivalence, however, showed a stronger correlation to neuroticism than was seen with the other scales, suggesting this scale's strong relationship to emotional instability. These findings suggested that while the Group 2 scales other than OD of happiness share a major axis of proneness to negative emotions, the quality of negative emotions correlated are slightly different from each other, and were in agreement with our hypothesis<sup>12</sup>. The construct of OD of happiness should only include a weak affinity to negative emotions, if any.

As for correlations with the SIRI typology and factor scales, both of OD of loss and OD of anger had a moderate negative correlation with Type 4 (Table 5). Correlation with Type 1 was stronger for OD of loss than for OD of anger, while the converse tended to be true with Type 2. Both of these two scales had a weak negative correlation with autonomy, and a moderate positive correlation with lack of control. OD of anger and OD of loss positively correlated with having annoyance, and the correlation was stronger for the former. The two scales of annoying barrier and OD of ambivalence showed correlations to Type 1, Type 2, Type 4, autonomy, lack of control, and having annoyance that were generally similar to the correlations seen for OD of loss and OD of anger. However, the correlations of OD of ambivalence with Type 3 and ambivalence were clearly stronger than those of OD of loss and those of OD of anger. These findings suggested that these four scales in Group 2 strongly correlate with low autonomy and with high OD, although there are slight differences in the quality of OD, differences which were in agreement with our hypothesis<sup>12</sup>. On the other hand, with the exception of a weak negative correlation to autonomy, OD of happiness showed very weak, if any, correlations with the SIRI typology and factor scales. In this regard, this scale should be considered to have a unique property.

**Group 3:** While disclosure of negative experiences (DNE) had a moderate positive correlation with the SCI scale of seeking instrumental social support, there was no correlation for unfulfilled needs for acceptance (UNA) (Table 4). DNE showed a positive correlation or no correlation with the scales of the Social Support Questionnaire, but there were weak to moderate, negative correlations for UNA. DNE had a weak positive correlation with the MPI extroversion, but UNA had a negative correlation with it. UNA showed moderate to weak, positive correlations with trait anxiety, depression, trait anger, and the MPI neuroticism, while DNE did no correlation to any of these traits. As for the SIRI type scales (Table 5), UNA had a moderate positive correlation with Type 1 and Type 2, and a negative correlation with Type 4, whereas DNE was unrelated to any of these scales. For the SIRI factor scales, while UNA positively correlated with lack of control and repression of emotion, DNE was unrelated to lack of control and had a weak negative correlation with repression of emotion. These findings suggest that whereas DNE simply indicates that one opens their negative emotional experience to others and may seek for social support, UNA involves mixed elements of proneness to negative emotional experiences, difficulty in seeking for social support by freely expressing those negative experiences, and proneness to a lowered sense of control. The results were thus in agreement with our hypothesis<sup>12</sup>.

**Group 4:** In associations with stress coping behavior, rationalizing conflicts and frustrations (RCF) had a moderate positive correlation with the SCI self-control type scale (Table 4). This correlation was to be expected, because the self-control type is a style of coping that suppresses emotion and behavior in order to avoid offending others' feelings<sup>23</sup>. Altruism had a strong positive correlation with the AC scale of egogram (TEG), and in contrast had a weak negative correlation with the FC scale. Egoism positively, though weakly, correlated with the CP and A scales, respectively. AC indicates a tendency toward conformity rather than self-assertion, and FC is a tendency to act egoistic and in an egocentric manner<sup>22</sup>, so these results can be considered consistent with the construct of altruism, which gives priority to others' needs over the needs of one's own. RCF positively correlated with "anger cognitive coping" and "anger in" of the Anger Scales, and negatively correlated to "anger out". Thus, these results agreed to our hypothesis in that RCF construct includes a tendency to control anger rationally and to turn it inwards rather than expressing it. RCF had a moderate positive correlation with the MPI L scale. This was also an expected finding, because the L scale is considered not only to detect fallacious responses to questions, but also to reflect the extent of "social desirability" and "commitment to the ideal self"<sup>29</sup>.

Altruism, egoism, and RCF have been developed as one of a core of constructs respectively for Type 1, Type 3, and Type 5. In this regard, these scales' correlation with the SIRI typology and factor scales should be of special attention. Indeed, we found moderate or higher, positive correlations of altruism with the Type 1 and repression of emotion scales, egoism with the Type 3 and egoism scales, and RCF with the Type 5 and repression of emotion scales (Table 5). All of these findings were in agreement with our hypothesis<sup>12</sup>. Altruism was found to be moderately, positively correlated with Type 2, suggesting that this scale is related to hostility and anger at a persecuting object. Altruism also showed a moderate positive correlation with

annoying barrier of the SIRI factor scales. This scale may imply not only simple altruism, but also frustrating feelings towards one's own altruistic behaviors.

**Group 5:** Lacking emotional experiences showed no or only a very weak correlation to trait anxiety, depression, trait anger, or neuroticism (Table 4). These findings indicate that this scale is independent of conventional measures of negative emotions, and they may indirectly support the validity of this scale. The present study did not examine the relationships with the positive emotional traits such as joy and pleasure, or with alexithymia; which should be studied in the future.

Although weak, there also was a positive correlation between lacking emotional experiences and the repression of emotion scale of the SIRI factor scales (Table 5). This may indicate that this scale's construct include, besides lacking emotional experiences, to some extent a tendency to emotional suppression.

## Conclusions

The present study showed the Stress Inventory's properties as follows: 1) factor analysis identified factors that do not contradict the hypothesis from the perspective of the configured constructs, 2) scales were configured in accordance with the hypothesis, with reference to the results from factor analysis, 3) each scale was prepared to provide adequate internal consistency and test-retest reliability, 4) relationships with conventional tests were generally in agreement with the constructs configured for each scale, and 5) relationships with the Grossarth-Maticek theory showed no contradiction with the hypothesis regarding the configured constructs. However, because each of the Stress Inventory scales only offer a limited perspective on human behavior, it may be better to use more than one of the scales in order to assess personality, or responding style to stressors. For example, a "healthy" person like Type 4 personality may be described as a low level of low sense of control (Group 1), object dependent tendencies (Group 2), unfulfilled needs for acceptance (Group 3), and altruism (Group 4). The present findings warrant further studies addressing if combinations of the Stress Inventory scales could represent the Grossarth-Maticek personality types and self-regulation.

## Acknowledgments

We are indebted to Tetsuya Morita and the staff of Fukuoka Institute of Occupational Health, Suminori Kono and the staff of the Department of Preventative Medicine, Kyushu University Graduate School of Medical Sciences, and Hiroshi Hayakawa and other doctors and staff of the Department of Psychosomatic Medicine, Kyushu University Hospital, for their corporation in data collection. This research was supported in part by the MOA Health Science Foundation.

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Table 1. Distribution of Sample 1 for gender and age class

Gender	Age class			Total
	< 50y <sup>a</sup>	50-59y	60+y <sup>b</sup>	
Male	115	119	88	322
Female	105	102	72	279
Total	220	221	160	601

<sup>a</sup>Mostly in the 40s, <sup>b</sup>Mostly in the 60s.

Table 2. The constructs to be measured by the Stress Inventory

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Group 1

- A. Low sense of control: the sense of having difficulties in controlling over stressful situations. (6 items)

Group 2

- B. Object dependence of loss: the tendency to regard a specific object as indispensable and to remain fixated on that object for an extended time, even while experiencing repeated disappointments. (12 items)
- C. Object dependence of anger: the tendency to regard a specific object as persecuting and to remain fixated on that object for an extended time without changing attitude toward the object. (12 items)
- D. Object dependence of ambivalence: the tendency to continue to alternate in major ways between such two opposite dependency attitudes as at some times one regards a specific object as indispensable to his/her happiness, and with some trivial incident he/she views the same object as a cause of personal unhappiness. (6 items)

Group 3

- E. Disclosure of negative experiences: the extent of openness of negative emotional experiences. (4 items)
- F. Unfulfilled needs for acceptance: the situation where one holds needs for acceptance by others and such needs are unfulfilled. (8 items)

Group 4

- G. Suppressing needs and emotions: the tendency to repress one's own needs and to conform to others. (17 items)
- H. Rational and anti-emotional behavior: the personality trait that extremely avoids being emotional in interpersonal relationships and that represses emotion and strives to deal with conflicts solely on the basis of rationality. (5 items)

Group 5

- I. Lacking emotional experiences: lack of strong emotional experiences. (5 items)
-

**Table 3. The factor structure of the Stress Inventory**

## Group 1

Item code	F1
a1	.77
a2	.71
a3	.63
a4	.70
a5	.69
a6	.70

## Group 2

Item code	F1	F2	F3	F4	F5	F6	F7
b1	-.25	-.01	-.10	.87	-.04	.05	.09
b2	.20	-.01	.14	.54	.04	.00	.00
b3	.14	-.01	-.05	.67	.06	.07	-.11
b4	.25	.00	.04	.59	.04	.04	.00
b5	.12	.04	.02	.53	.12	.05	.09
b6	-.02	.17	.04	.10	.55	.01	-.02
b7	.07	-.02	.26	-.01	.54	-.09	.05
b8	.09	-.12	.10	.12	.79	-.06	.01
b9	.08	.03	-.10	-.08	.63	.18	.15
b10	-.06	.07	-.09	-.04	.46	.48	.05
b11	.05	-.04	-.04	-.03	.17	.00	.79
b12	.01	.08	.08	.09	-.03	-.16	.86
c1	.90	-.05	-.09	-.07	.05	.07	-.02
c2	.83	.04	.12	-.06	-.04	.00	.07
c3	.94	.02	-.09	-.02	-.02	-.01	.00
c4	.82	.00	.00	.14	-.05	.00	.02
c5	-.03	.19	.62	.00	-.02	-.01	.04
c6	.06	-.14	.72	-.06	-.01	.27	.09
c7	.01	-.02	.74	-.09	-.03	.24	.08
c8	.03	.04	.62	.12	.04	.01	-.06
c9	-.15	.05	.70	-.04	.15	-.03	-.08
c10	.01	-.05	.20	.01	.17	.55	-.09
c11	.03	.11	.13	.09	-.04	.68	-.07
c12	.07	-.02	.11	.13	-.09	.69	-.08
d1	-.03	.78	-.09	.00	-.12	.26	.09
d2	-.04	.74	-.15	-.08	.15	.19	.03
d3	-.10	.71	.10	.07	-.14	-.05	.11
d4	.07	.59	.13	-.02	.20	-.07	-.23
d5	.10	.53	.32	.01	-.05	-.06	.05
d6	.14	.64	.07	.01	.10	-.18	-.10

## Group 3

Item code	F1	F2	F3
e1	-.07	.85	.00
e2	.05	.91	-.04
e3	-.04	.83	.02
e4	-.04	.86	.03

Cont'd

Item code	F1	F2	F3
f1	.81	.00	.10
f2	.88	-.03	-.01
f3	.76	-.13	.04
f4	.73	-.06	.07
f5	.88	-.03	-.01
f6	.91	.06	-.06
f7	.09	-.04	.82
f8	.00	.05	.92

Group 4

Item code	F1	F2	F3	F4
g1	.07	-.18	.60	-.06
g2	.02	-.11	.77	.11
g3	-.01	-.03	.78	.08
g4	.13	.63	-.20	-.06
g5	.02	.46	-.32	-.06
g6	.13	.69	-.04	-.06
g7	.32	.30	.02	.29
g8	.06	.19	.28	-.59
g9	-.03	.19	.36	-.48
g10	.08	.21	.18	.49
g11	-.01	-.05	.08	.68
g12	.03	.17	.06	.49
g13	-.09	.59	-.03	-.05
g14	-.07	.35	-.25	.35
g15	-.05	.23	.50	-.16
g16	.04	.63	.12	.16
g17	-.24	.56	.18	.11
h1	.57	.10	-.04	.06
h2	.75	-.02	.07	.07
h3	.81	-.06	-.01	-.02
h4	.77	-.03	-.04	-.05
h5	.70	-.03	.05	-.03

Group 5

Item code	F1
i1	.63
i2	.61
i3	.49
i4	.68
i5	.71

Gothic figures: loadings of 0.5+ by corresponding factor and less than 0.3 by other factors. Items selected for scales are indicated as in a box. See ref.12 for items indicated by item codes.

Table 4. The association of the Stress Inventory with stress coping style, social support, egogram, trait-anxiety, depression, anger traits, and personality traits

	Group 1		Group 2			Group 3		Group 4			Group 5	
	Low sense of control	OD/ loss	OD/ happiness	OD/ anger	Annoy-ing barrier	OD/ ambivalence	Dis- closure of NE	Unful-filled N/A	Altru-ism	Ego-ism	RCF	Lack of EE
<b>Stress coping style<sup>a</sup></b>												
Planning	-.22	-.02	.01	-.09	-.10	.05	.08	-.09	-.09	.15	.06	-.18
Confrontive coping	-.07	.18	.05	.10	.13	.27	.16	.04	.03	.19	-.02	-.15
Seeking instrumental social support	-.01	.14	.12	.07	.08	.06	.35 -.06		.07	.06	-.04	-.24
Accepting responsibility	-.19	.09	.13	-.04	-.07	.15	.02	.02	.09	-.04	.18	-.04
Self control	-.25	.07	-.01	-.15	-.15	.03	-.13	.04	-.00 -.02 .31			.03
Escape	.04	.26	.18	.13	.14	.32	.09	.06	.14	.22	-.03	-.09
Avoidance	-.29	-.03	.01	-.13	-.17	-.07	.04	-.11	-.16	.18	.08	-.18
Positive appraisal	-.33	-.04	.06	-.17	-.10	-.03	.07	-.05	-.07	.12	.16	-.11
Cognitive strategies	-.21		.06	.05	-.06	-.05	.10	.13	-.06	-.03	.09	.12
Emotion-focused strategies	-.20		.13	.11	-.03	-.03	.12	.09	-.00	.02	.19	.11
<b>Social support<sup>b</sup></b>												
Family and society	-.17	-.31	.01	-.23	-.22	-.13	.08 -.16		-.19	.01	-.04	-.07
Crisis	-.20	-.10	.09	-.15	-.02	-.22	.36 -.31		-.17	-.06	-.03	-.22
Neighborhood	-.25	-.18	.04	-.17	-.08	-.22	.14 -.25		-.28	-.03	.02	-.20
<b>Egogram<sup>c</sup></b>												
AC	.43	.36	.12	.24	.29	.27	-.04	.27	.64 -.18 .08			.11
CP	-.02	.03	.08	.08	.04	.12	.12	-.06	-.16 .22 -.15			-.12
FC	-.31	-.14	.06	-.13	-.18	-.13	.19	-.24	-.29 .06 .01			-.22
NP	-.17	-.01	-.02	-.16	-.10	-.27	.15	-.09	-.07 -.20 .29			-.17
A	-.04	.02	.05	.04	.03	-.04	.09	-.09	-.10 .22 .02			-.19
<b>Trait-anxiety<sup>d</sup></b>												
Depression <sup>e</sup>	.55	.43	.07	.42	.41	.38	-.07 .34		.57	-.13	.02	.18
Anger traits	.48	.45	.14	.38	.42	.44	-.05 .33		.54	-.07	.07	.15
Trait anger	.41		.21	.22	.43	.34	.44	.05 .16		.26 .24 -.45		
Anger in	-.01	.12	-.12	-.10	-.09	-.09	-.15 .10		.23	-.19	.54	.20
Anger out	.28	.18	.11	.28	.24	.40	.06 .14		.22	.13	-.41	-.13
Anger cognitive coping	-.13	.07	-.00	-.07	-.08	-.03	.03 -.05		-.06	-.07	.34	-.12
<b>Personality traits<sup>f</sup></b>												
Extroversion	-.35	-.02	.10	-.06	-.13	-.09	.23 -.29		-.22	-.02	.05	-.21
Neuroticism	.44		.39	.05	.39	.43	.55	-.05 .41		.37	.10	-.14
L-scale	-.16	-.20	-.13	-.24	-.22	-.20	.01 -.12		-.11	-.14	.34	.13

Abbreviations used for scale names: OD/: object dependence of; NE: negative experiences; N/A: needs for acceptance; RCF: rationalizing conflicts and frustrations; EE: emotional experiences. Values in boxes are correlation coefficients of special interest based on the study hypothesis and are discussed in text. <sup>a</sup>Stress Coping Inventory, <sup>b</sup>Social Support Questionnaire, <sup>c</sup>Tokyo University Egogram New Version, <sup>d</sup>State-trait Anxiety Inventory New Version, <sup>e</sup>Center for Epidemiologic Studies Depression (CES-D) Scale, <sup>f</sup>Maudsley Personality Inventory.

Table 5. The association of the Stress Inventory with a Japanese version of the Short Interpersonal Reactions Inventory

	Group 1		Group 2			Group 3		Group 4		Group 5		
	Low sense of control	OD/ loss	OD/ happi- ness	OD/ anger	Annoy- ing barrier	OD/ ambiva- lence	Dis- closure of NE	Unful- filled N/A	Altru- ism	Ego- ism	RCF	Lack of EE
<b>SIRI type scale</b>												
Type 1	.35	.31	.02	.15	.25	.27	-.13	.37	.65	-.27	.28	.13
Type 2	.56	.48	.15	.56	.56	.45	-.02	.30	.56	-.05	-.09	.03
Type 3	.15	.15	.13	.23	.17	.43	.15	-.01	.05	.44	-.17	-.09
Type 4	-.59	-.43	-.17	-.47	-.46	-.31	.06	-.36	-.54	.15	.13	-.14
Type 5	-.13	-.07	-.27	-.19	-.16	-.24	-.15	.04	-.03	-.06	.56	.10
Type 6	.25	.20	.19	.34	.28	.52	-.10	.24	.29	.16	-.14	.12
<b>SIRI factor scale</b>												
Lack of control	.61	.43	.15	.47	.44	.39	-.07	.36	.58	-.10	-.03	.10
Repression of emotion	.19	.19	-.08	.03	.14	.09	-.22	.37	.52	-.28	.42	.20
Ambivalence	.25	.31	.19	.38	.28	.68	-.08	.26	.30	.09	-.13	.07
Having annoyance	.46	.42	.14	.54	.53	.34	.10	.21	.40	.00	-.09	-.04
Rational coping	-.22	-.09	-.16	-.10	-.15	-.07	-.00	-.07	-.19	.15	.25	-.16
Antisocial tendency	.24	.16	.13	.22	.14	.32	-.05	.15	.24	.15	-.07	.16
Autonomy	-.35	-.22	-.24	-.28	-.30	-.19	-.10	-.18	-.26	.02	.24	.05
Egoism	-.13	-.12	-.04	-.04	-.05	-.01	.06	-.16	-.22	.64	-.12	-.20
Impatience	.18	.05	.09	.12	.13	.15	.39	-.16	.03	.11	-.21	-.11

See Table 4 for abbreviations used for scale names. Values in boxes are correlation coefficients of special interest based on the study hypothesis and are discussed in text.

**Appendix. The scales and items of the Stress Inventory (45-item version)**

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**Group 1**

Low sense of control ( $\alpha = .74$ ,  $r = .82$ )<sup>\*</sup>

- a1. Do you find it difficult to forget about things that were extremely tough on you?
- a2. Do you find it rather difficult to emotionally recover after experiencing something very disappointing?
- a4. Do you find it difficult to altogether forget about things that have made you very angry?
- a6. When you are put into a position where you become very angry, do you often think that you cannot change the situation?

**Group 2**

Object dependence of loss ( $\alpha = .62$ ,  $r = .77$ )

- b1. Do you have a certain person who, among those you are separated from or who have passed away, you could not forget about?
- b2. Do you often feel heartbroken when remembering a certain person?
- b6. Do you have a certain person with whom you cannot seem to develop a good relationship and who has caused you sadness and loneliness?
- b8. Do you have a certain person with whom you know you may never establish a good relationship, but you cannot stop trying?

Object dependence of happiness ( $\alpha = .68$ ,  $r = .66$ )

- b11. Do you have a certain person who makes you feel that you cannot be happy unless they are happy?
- b12. Do you have a certain person who makes you feel you cannot be happy without them?

Object dependence of anger ( $\alpha = .78$ ,  $r = .76$ )

- c1. Is there a certain person who, although they are a thing of the past, still so frustrates or angers you that they repeatedly come to mind?
- c2. Do you time and again get upset over a certain person when you think about them?
- c6. Is there a certain person who understands your feelings so little that you always get frustrated?
- c7. Is there a certain person who always frustrates you because they seldom change their attitude?

Annoying barrier ( $\alpha = .71$ ,  $r = .65$ )

- c11. Do you have any circumstances or conditions that you find deeply unpleasant because they cannot be changed?
- c12. Do you have any circumstances or conditions that you have been very frustrated with for a long period of time?

Object dependence of ambivalence ( $\alpha = .74$ ,  $r = .70$ )

- d1. Do you often see your feelings changing to the extremes by getting very upset with a certain person who is at other times very important to you?
- d2. Do you often have feelings that change to the extremes; such as first looking at a person with much attraction, then later with distaste?
- d3. Do you often change your attitude towards a certain person who is important to you, being kind to them and then being harsh?
- d6. Have you had many experiences in which you came suddenly to dislike a certain person, which resulted in you leaving them, even though you had previously gotten along very well with them?

**Group 3**

Disclosure of negative experiences ( $\alpha = .90$ ,  $r = .80$ )

- e1. Do you tend to talk to someone when you have something you are worried about?
- e2. Do you tend to talk to someone when you experience something difficult?
- e3. Do you tend to talk to someone when you are experiencing something unpleasant?
- e4. Do you tend to talk to someone when you experience something heartbreaking?

Unfulfilled needs for acceptance ( $\alpha = .82$ ,  $r = .81$ )

- f1. Have you frequently had the experience of being distressed and thinking that talking to somebody would lighten your mind, but in reality you could not?
- f2. Have you frequently had the experience of being angry about something and thought that talking about it to someone would make you feel fine, but in reality you found that difficult?
- f7. Have you frequently had the experience of coming across an annoying matter about which you thought you might feel fine if only you could talk about it to someone, but in reality you could not?
- f8. Have you frequently had the experience of coming across a matter that made you angry and even though you thought you might feel better if only you could talk about it to someone in reality you could not?

Group 4

Altruism ( $\alpha = .65$ ,  $r = .77$ )

- g4. Do you tend to give up your own needs so as to get along well with others?
- g6. Do you tend to give up what you really want to do in consideration of others?
- g13. Do you tend to have troublesome matters on your hands often?
- g16. Do you often feel that you cannot be yourself and behave more freely, even though you want to?

Egoism ( $\alpha = .65$ ,  $r = .63$ )

- g1. Do you tend to give priority to what you want to do even when there are many demands from people around you?
- g2. Do you tend to think of your happiness first?
- g3. Are you the kind of person who places priority on your happiness above the happiness of others?
- g15. Do you try to stay away as much as possible from relationships from which you do not gain anything?

Rationalizing conflicts/frustrations ( $\alpha = .78$ ,  $r = .80$ )

- h1. Even if someone does a terrible thing to you, are you the kind of person who cannot be emotional in front of people, even in front of family members?
- h2. Do you under all circumstances try to control your reasoning and avoid, as much as possible, being emotional?
- h3. Even if your heart is very badly hurt by someone, do you try to be calm in your thinking and try not to criticize them in an emotional manner?
- h4. Even if someone does a terrible thing to you, do you try not to become emotional and try to deal with the situation within the boundaries of commonsense?
- h5. Even towards those who behave very offensively, do you try not to confront them emotionally by trying to understand them?

Group 5

Lack of emotional experiences ( $\alpha = .60$ ,  $r = .73$ )

- i1. In your whole life, have you experienced deep sorrow about something?
- i2. In your whole life, have you experienced outrage about something?
- i4. In your whole life, have you experienced jumping for joy about something?
- i5. In your whole life, have you experienced heart thumping happiness about something?

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\* $\alpha$ : Cronbach's coefficient  $\alpha$ ; r: test-retest reliability coefficient. Item codes correspond to the Stress Inventory (75-item version): see Table 3 of this article and Appendix of reference 12.

## Amendment record

Date: 19 April 2012

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Appendix

The name of the third scale in Group 4 was corrected.

Incorrect: Rational and anti-emotional tendency

Correct: Rationalizing conflicts/frustrations