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Personality and Individual Differences 40 (2006) 1433–1440

PERSONALITY AND
INDIVIDUAL DIFFERENCES

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The Highly Sensitive Person: Stress and physical symptom reports

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Received 9 August 2005; received in revised form 21 November 2005; accepted 21 November 2005
Available online 7 February 2006

Abstract

The Highly Sensitive Person (HSP) scale is a measure of sensory-processing sensitivity, which is conceptualized as involving both high levels of sensitivity to subtle stimuli and being easily overaroused by external stimuli. The current study examines the relationship between an individual's sensory-processing sensitivity, self-perceived stress, and physical symptom reports. Results indicated that sensory-processing sensitivity is positively correlated with levels of stress and symptoms of ill-health. After controlling for self-perceived stress and gender, the HSP scale added significantly to a hierarchical regression model predicting self-reported health. The inclusion of an interaction term in the model proved to be non-significant, suggesting that the relationship between stress, sensory-processing sensitivity and health is best explained by an additive model. Future research examining personality factors in health and illness may benefit from the inclusion of the HSP measure.

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Keywords: Personality; Sensitivity; Stress; Health; Physical symptoms; Highly sensitive person; Sensory defensiveness; Sensory-processing sensitivity

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1. Introduction

The Highly Sensitive Person scale was developed as part of a series of studies on sensory-processing sensitivity by Aron and Aron (1997). The 27-item HSP scale includes a broad range of items related to sensitivity, including “Are you easily overwhelmed by strong sensory input?”, “Do you have a rich, complex inner life?”, “Are you deeply moved by the arts or music?” and “Do you tend to be more sensitive to pain?”. In spite of the variety of types of sensitivity measured, the concept is best understood as a unidimensional core variable of high sensory-processing sensitivity. The HSP scale has been demonstrated to have adequate reliability and content, convergent, and discriminant validity.

Aron and Aron’s (1997) research has shown that while sensitivity is related to introversion (Eysenck & Eysenck, 1968) it is not the same construct, nor can it be considered simply a measure of emotionality or neuroticism. Although other scales have been developed to measure similar constructs of “sensory defensiveness” (Adult Sensory Questionnaire; Kinnealey, Oliver, & Wilbarger, 1995) and sensory sensitivity (Adult Sensory Profile; Brown, Tollefson, Dunn, Cromwell, & Filion, 2001), adult versions of these scales were based on earlier constructs and measures developed for use with children (Ayres, 1964; Dunn, 1997). The HSP measure was developed as a result of extensive interviews with adults and subsequent scale development based on data from a number of student and community samples.

Recently, the Arons (Aron, Aron, & Davies, 2005) have shown that highly sensitive people are more prone to negative affectivity and shyness when exposed to a negative childhood environment. Other than this report, there has been little additional research on the construct of sensory-processing sensitivity, though the concept seems to resonate with many individuals’ own self-perceptions. Aron’s book on the topic “The Highly Sensitive Person” (Aron, 1996) has sold over 300,000 copies in 35 printings, including a number of foreign translations. Internet discussion groups now exist for the community of self-identified “HSPs”.

Given that many HSPs report needing to escape from their environment to “recharge” and often seem overwhelmed by bombardment to the senses, the aim of the present study was to examine whether sensory-processing sensitivity is associated with self-perceived stress levels and physical health complaints. Additionally, given that research has demonstrated an interaction between stress and “reactivity” (a construct arguably related to sensory processing sensitivity; Aron et al., 2005) in predicting illness (Boyce et al., 1995; Gannon, Banks, Shelton, & Luchetta, 1989), it is possible that highly sensitive individuals only demonstrate increased illness when under high levels of stress and are as healthy as non-HSPs in conditions of low stress. Thus we further examine whether the interaction between stress and sensory-processing sensitivity may be a better predictor of illness.

2. Method

2.1. Participants

Participants were 383 undergraduate students from the University of Texas—Pan American. The mean age of the sample was 22.96 (SD = 6.12), 91% of the participants were Hispanic,

and 75% were female. Students were recruited via in-class announcements in Psychology classes and attended one of a number of available scheduled sessions to fill out the scales. All students were provided with extra credit for participation. The Institutional Review Board for the Protection of Human Subjects at the University of Texas—Pan American approved the study, and all students read and signed an informed consent document prior to participation, which was collected and stored separately from the scales themselves.

2.2. Measures

The Highly Sensitive Person scale (HSP; Aron & Aron, 1997) is a Likert-type scale that includes a broad range of items related to sensitivity, including “Are you easily overwhelmed by strong sensory input?”, and “Do you have a rich, complex inner life?” Response options range from (1) “Not at All” to (5) “Extremely”. The measure has been demonstrated to have discriminant and convergent validity and Cronbach’s alphas reported in previous studies range from .85 to .87. In the present study, Cronbach’s alpha was .86. The final score ranges from 1 to 5 and is calculated as the average of the 27 ratings.

The Perceived Stress Scale (PSS; Cohen & Williamson, 1988) is a 10-item Likert-type scale that asks respondents “In the last month, how often have you . . .” and includes items such as “felt nervous and stressed?”, “felt that you were unable to control the important things in your life?” Response choices range from (0) “Never” to (4) “Very Often”. The 10-item version of the scale is a revision of the originally published 14-item version, has been shown to provide a slight gain in psychometric quality over the longer version, and is recommended over the 14-item version by the scale’s authors. The PSS has been shown to be a better predictor of psychological symptoms, physical symptoms, and health service utilization than life-event scales (Cohen, 1986; Cohen, Kamarck, & Mermelstein, 1983). Two-day test–retest reliability for the 14-item version has been previously reported as .85. Cronbach’s alpha for the 10-item version PSS has been previously reported as .78, and was .72 in the present study. Scores range from 0 to 40 and are calculated by summing up the 10 item ratings (after reverse scoring specific items).

The Cohen–Hoberman Inventory of Physical Symptoms (CHIPS; Cohen & Hoberman, 1983) is a 33-item Likert-type scale that asks respondents to rate how much a particular symptom has bothered or distressed them during the last two weeks, and includes items such as “Back pain” and “Diarrhea”. Responses range from (0) “not been bothered by the problem” to (4) “the problem has been an extreme bother”. Previously reported Cronbach’s alpha for this scale is .88. In the present study, Cronbach’s alpha was .93. The final score ranges from 0 to 4 and is calculated as the average of the 33 item ratings.

The Pennebaker Inventory of Limbic Languidness (PILL; Pennebaker, 1982) is a 54-item scale that assesses the frequency of occurrence of 54 common physical symptoms and sensations such as racing heart, heartburn, and sore throat. The response options range from “Never or almost never” to “More than once every week”. The final PILL score ranges from 0 to 54 and is calculated by summing up the total number of items on which individuals rate the symptom as occurring once or more per month. Previously reported Cronbach’s alphas range from .88 to .91 and 2-month test–retest reliability scores range from .79 to .83. The Cronbach’s alpha for the present study was .93.

2.3. Procedure

During the course of two years, 383 participants were administered the HSP. A subset of these students ($N = 340$) was also administered the PSS and CHIPS, and a further subset ($N = 194$) was also administered the PILL. Subsets were a result of the addition of the specific scales as the investigation proceeded.

3. Results

Scores on the HSP were normally distributed. Descriptive statistics, Cronbach's alpha, and correlations between all measures are shown in Table 1. The two measures of health/illness were highly correlated ($r = .633$, $p < .001$). The HSP was significantly correlated with self-perceived stress ($r = .482$, $p < .001$) and with both measures of health/illness (CHIPS, $r = .445$, $p < .001$; PILL, $r = .364$, $p < .001$).

3.1. Examination of the influence of gender on obtained scores

Females scored significantly higher than males on the measure of sensory-processing sensitivity ($t(362) = 3.59$, $p < .001$), perceived stress ($t(324) = 2.73$, $p = .007$), and health/illness as assessed by the CHIPS ($t(325) = 3.22$, $p = .001$). A similar trend was demonstrated for health/illness as assessed by the PILL, but the difference was not statistically significant ($t(176) = 1.39$, $p = .167$). Differences between males and females are shown in Table 2.

3.2. Relative contribution of stress and sensory-processing sensitivity in predicting health

Given that stress and sensory-processing sensitivity share some variance ($R^2 = .23$), hierarchical regression analyses were performed to examine which of the two variables was the better predictor of self-perceived health. Two regression analyses were performed for each of the health measures (CHIPS and PILL). To control for the observed differences between males and females, participant gender was entered at the first step of each model. In the first regression analysis, stress scores (PSS) were entered at the second step, followed by sensory-processing sensitivity scores (HSP) at

Table 1

Means, standard deviations, Cronbach's alphas, and correlations between measures of sensory-processing sensitivity, stress, and physical symptoms reports

	<i>M</i>	<i>SD</i>	Cronbach's alpha	HSP	PSS	CHIPS
HSP	3.11	.54	.86	1		
PSS	20.94	5.73	.72	.482 ($N = 339$)	1	
CHIPS	1.13	.72	.93	.445 ($N = 340$)	.386 ($N = 339$)	1
PILL	17.82	9.20	.93	.364 ($N = 194$)	.276 ($N = 156$)	.633 ($N = 157$)

Note. Bolded values represent correlation coefficient, all correlations significant at the $p < .01$ level. HSP, Highly Sensitive Person scale; CHIPS, the Cohen–Hoberman Inventory of Physical Symptoms; PSS, The Perceived Stress Scale; PILL, the Pennebaker Inventory of Limbic Languidness.

Table 2
Sex differences on measures of sensory-processing sensitivity, stress, and physical symptoms

	HSP	PSS	CHIPS	PILL
Males				
<i>M</i>	2.94 ^a	19.70 ^b	.94 ^c	16.40
SD	.46	5.49	.75	9.62
Females				
<i>M</i>	3.17 ^a	21.59 ^b	1.22 ^c	18.65
SD	.55	5.64	.71	9.02

Note. Superscript letters represent significant differences between males and females (^a $p < .001$; ^b $p = .007$; ^c $p < .001$); HSP, Highly Sensitive Person scale; PSS, the Perceived Stress Scale; CHIPS, the Cohen–Hoberman Inventory of Physical Symptoms; PILL, the Pennebaker Inventory of Limbic Languidness.

the third step, thus examining how much of the variance in health is explained by sensory-processing sensitivity when controlling for stress. In the second regression analysis sensory-processing sensitivity scores were entered at the second step, followed by stress scores at the third step, thus examining how much of the variance in health is explained by stress when controlling for sensory-processing sensitivity. Results of these analyses are presented in Table 3.

Results indicated that, when controlling for gender, perceived stress accounted for 9% of the variance in PILL scores and 14% of the variance in CHIPS scores, with sensory-processing

Table 3
Results of hierarchical regression analysis examining self-reported stress and sensory-processing sensitivity as predictors of self-rated health, after controlling for gender

	<i>R</i>	<i>R</i> ²	ΔR^2	<i>F</i>	df	<i>B</i>	β weight
PILL model 1							
Step 1: Gender	.10	.01	.01	1.32	1,143		
Step 2: PSS	.31	.10	.09*	13.51	1,142		
Step 3: HSP	.42	.18	.08*	14.25	1,141		
PILL model 2							
Step 1: Gender	.10	.01	.01	1.32	1,143	.38	.02
Step 2: HSP	.41	.17	.16*	26.62	1,142	5.90*	.34*
Step 3: PSS	.42	.18	.01	2.18	1,141	.18	.13
CHIPS model 1							
Step 1: Gender	.18	.04	.04*	11.52	1,322		
Step 2: PSS	.41	.17	.14*	52.38	1,321		
Step 3: HSP	.50	.25	.08*	31.70	1,320		
CHIPS model 2							
Step 1: Gender	.19	.04	.04*	11.52	1,322	.14	.09
Step 2: HSP	.46	.21	.18*	71.56	1,321	.43*	.32*
Step 3: PSS	.50	.25	.03*	14.52	1,320	.03*	.22*

Note. * Denotes significant at $p < .001$; β represents beta for each variable in final model with all three variables entered; HSP, Highly Sensitive Person scale; PSS, the Perceived Stress Scale; PILL, the Pennebaker Inventory of Limbic Languidness; CHIPS, the Cohen–Hoberman Inventory of Physical Symptoms.

sensitivity explaining an additional 8% of the variance for both measures. When the order of entry was reversed, sensory-processing sensitivity accounted for 16% of the variance in PILL scores and 18% of the CHIPS score, with stress explaining an additional 1% (non-significant) and 3% of the variance, respectively. All models were significant at $p < .001$. In the final model for PILL, perceived stress was not a significant predictor, but sensory-processing sensitivity was significant at $p < .001$, with the model explaining 18% of the variance in PILL scores. In a final model for CHIPS, both stress and sensory-processing sensitivity were significant predictors at $p < .001$, with the model explaining 25% of the variance in CHIPS scores.

3.3. Examination of interaction effects between stress and sensory-processing sensitivity

In order to examine whether an interaction between stress and sensory-processing sensitivity might add some predictive power to the model, a fourth step was added to the original model that entered a new computed variable (stress score \times sensory-processing sensitivity score). Following the recommendations of Aiken and West (1991) and Friedrich (1982), all predictor and product variables were standardized into z -scores prior to entering them into the interaction model. The interaction was not significant for either the PILL or the CHIPS ($\Delta R^2 = .004$ and $.008$, respectively). This suggests that the relationship between sensory-processing sensitivity and health is not moderated by the level of self-reported stress (or, equally, that the adverse effects of stress on health are not amplified in highly sensitive individuals). Thus the interaction term can be dropped from the models, and the previously presented additive models retained (Friedrich, 1982).

4. Discussion

The results demonstrated that high sensory-processing sensitivity, as assessed by the HSP scale, is associated with greater perceived stress and more frequent symptoms of ill health. The hierarchical regression analyses revealed that sensory-processing sensitivity is a more powerful predictor of health than is self-perceived stress, for two distinct measures of self-reported health. Although there is some evidence from previous research that reactivity may interact with stress to influence health (e.g., Boyce et al., 1995; Gannon et al., 1989), such a model was not supported by the data from this study; the relationship between sensory-processing sensitivity and health was not conditional on the level of stress.

Previous research on sensory-processing sensitivity has suggested that the variable is best viewed as dichotomous (Aron & Aron, 1997; Aron et al., 2005), but we were unable to demonstrate the same natural split around the top 10–30%. Thus, our analyses treated all variables as continuous. There are no obvious demographic differences between the current study and earlier research that might explain differences in distribution. Our study was unusual in that over 90% of the participants identified themselves as Hispanic, but Hispanics are likely to have been relatively well represented in Aron's original study (though not reported) given that a number of the populations sampled were in southern California. Further research is needed to determine whether the notion of sensory-processing sensitivity, as assessed by the HSP, is best viewed as normally distributed or as a dichotomous trait.

It is unclear why individuals who are highly sensitive are more likely to experience symptoms of ill health. One possible explanation is that heightened sensitivity increases general physiological arousal, thus leading to a genuine chronic stress to the body with subsequent health consequences. However, it is also possible that highly sensitive people are more sensitive to (aware of) somatic symptoms, paying attention to minor physiological sensations that others may not notice. As with all studies based on correlational data, a causal relationship between measures of sensory-processing sensitivity and health cannot be established. Other factors may well be responsible for the observed correlations. For example, there is evidence that highly sensitive people also experience greater levels of anxiety. Two studies have demonstrated a relationship between sensory defensiveness and anxiety (Kinnealey & Fuiiek, 1999; Pfeiffer & Kinnealey, 2003) and the HSP scale has also been found to correlate with self-reported anxiety levels (Neal, Edelmann, & Glachan, 2002).

4.1. *Future research considerations*

In Aron and Aron's (1997) study, a differentiation was made between highly sensitive people who reported happy or unhappy childhoods. Individuals tended to be less introverted and emotional if they had experienced a happy childhood and/or scored low on the HSP scale. About a third of the highly sensitive participants reported troubled childhoods and scored high on measures of introversion and emotionality (neuroticism). Perhaps such a combination also sets up the individual for impoverished health. Certainly, research suggests that neuroticism is associated with lower self-reported global health (Williams, O'Brien, & Colder, 2004) and higher retrospective physical symptom reporting (Williams & Wiebe, 2000). Interestingly, more recent research on sensory-processing sensitivity (Aron et al., 2005) has indicated that highly sensitive individuals with negative childhood environments may be more shy than non-sensitive individuals. With this in mind, the notion that highly sensitive individuals may experience poorer health is indirectly supported by evidence of a link between shyness and ill health (e.g. Bell, Martino, & Meredith, 1993; Chung & Evans, 2000; Schmidt & Fox, 1995).

Given this, future research may benefit from including these factors, particularly the possible mediating factor of adverse childhood environment, when examining the relationship between sensory-processing sensitivity and illness. Additionally, although sensory-processing sensitivity appears to be a better predictor of health/illness than self-perceived stress, the predictive validity of the HSP has not been evaluated against other scales of sensory sensitivity, such as the Adult Sensory Profile (Brown et al., 2001) or the Adult Sensory Questionnaire (Kinnealey et al., 1995). Ultimately, additional studies using objective measures of health, such as physiological indices (e.g., blood pressure, cortisol, immune levels) and behavioral measures (e.g., doctor visits) are necessary to corroborate the present findings. Despite these limitations, the current study provides important preliminary information about the possible influence of sensory-processing sensitivity on physical health.

Acknowledgements

I wish to thank David Markland, Kristin Croyle, Mark Winkel, and James Aldridge for their guidance in regression analysis and constructive feedback on previous drafts of this manuscript.

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