



# Sensory-processing sensitivity moderates the association between childhood experiences and adult life satisfaction



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## ARTICLE INFO

### Article history:

Received 23 April 2015

Received in revised form 13 July 2015

Accepted 14 July 2015

Available online xxxx

### Keywords:

Personality

Stress and coping

Life satisfaction

Differential susceptibility

Sensory processing sensitivity

## ABSTRACT

There are few studies testing the differential susceptibility hypothesis (DSH: hypothesizing that some individuals are more responsive to both positive and negative experiences) with adult personality traits. The current study examined the DSH by investigating the moderating effect of sensory-processing sensitivity (SPS) on childhood experiences and life satisfaction. A total of 185 adults completed measures of SPS, positive/negative childhood experiences and life satisfaction. SPS did moderate the association between childhood experiences and life satisfaction. Simple slopes analysis compared those reporting high and low SPS ( $\pm 1$  SD) and revealed that the difference was observed only for those who reported negative childhood experiences; with the high SPS group reporting lower life satisfaction. There was no difference observed in those reporting positive childhood experiences, which supported a diathesis-stress model rather than the DSH.

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## 1. Introduction

The quest to identify the precursors and predictors of adult mental wellbeing is an important one. In the most general terms, life events – positive and negative – as well as inherited factors are likely to play an influential role in determining and modifying mental wellbeing throughout the lifespan. It is no surprise then that gene-by-environment ( $G \times E$ ) research designs are commonly used to investigate research questions in this field (Bakermans-Kranenburg & van IJzendoorn, 2014). While genes and life events can jointly, as well as independently affect mental wellbeing, a growing body of research is emerging that shows that these effects may also be observed in trait-by-environment ( $T \times E$ ) designs (Aron, Aron, & Jagiellowicz, 2012). In other words, individual differences in personality traits can influence the impact of different life events on a person's wellbeing.

Evidence from evolutionary biology suggests that a fundamental personality trait that occurs across nonhuman and human species involves individual differences in responsiveness, reactivity, flexibility and sensitivity to the environment (Wolf, Van Doorn, & Weissing, 2008). There is a growing consensus among personality researchers that “a fundamental factor structuring [animal] personality differences is the degree to which individual behaviour is guided by environmental stimuli” (p. 15,835). Aron and colleagues have conceptualized this trait

in humans as relating to *sensory-processing sensitivity* (SPS: Aron & Aron, 1997; Aron et al., 2012), which they see as being a reflection of one of two strategies that has evolved in many species: a strategy of either responding more to the environment or responding less. High SPS has been compared to the personality trait *introversion* (Eysenck, 1981) and the *behavioural inhibition system* (Gray, 1981). The responsive strategy, or high SPS, is characterized by a tendency to “pause to check” in novel situations, greater sensitivity to subtle stimuli, and the engagement of deeper cognitive processing strategies for employing coping actions, all of which is driven by heightened emotional reactivity, both positive and negative (Aron & Aron, 1997; 2012). Thus, some individuals are simply more responsive and reactive to stimulation from the environment than others.

This assumption relates to the *differential susceptibility hypothesis* (DSH: Belsky, 1997), which states that there are some inherent characteristics which make individuals more responsive to their environment, be that positive or negative. In combination with negative stressful experiences, individuals who possess these characteristics are likely to become overwhelmed and display poor outcomes, whereas these same individuals are likely to flourish under positive and enriching experiences. While the non-responsive characteristics may be beneficial to buffer against the effects of negative environmental stress – the responsive characteristics may provide an advantage in positive environments. Belsky and Pluess (2009) argue that many of these responsive characteristics have been misrepresented in the literature as risk alleles, or diathesis-stress models (Zuckerman, 1999) – predisposing individuals to mental disorders – because previous research has failed to assess the interaction between individual differences and

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positive environments, which is a direction for future research. If certain characteristics are able to show both a disadvantage in combination with negative experiences and an advantage in combination with positive experiences, then they should be considered a plasticity factor – rather than a risk.

There has been some evidence to suggest that SPS is a plasticity factor. Using their measure of SPS – the Highly Sensitive Person Scale (HSPS) (Aron & Aron, 1997) – Aron, Aron, and Davies (2005) were able to show that high SPS university students reported a greater increase in negative affectivity after a difficult scholastic test, whereas they also showed a greater reduction in negative affectivity after an easy test – compared to their low SPS colleagues. In another study, high SPS children – as measured by the HSPS for children (Pleuss & Boniwell, 2015) – showed advantageous outcomes in terms of reduced depression symptoms, while their low SPS counterparts showed no improvement (Pleuss & Boniwell, 2015). This finding was stable at 6 and 12 month follow-up assessments. The authors suggested that a possible reason for this advantage was due to the nature of high SPS, which is characterized by a sensitive nervous system and the processing of information more deeply, which may have led to greater internalization of the intervention. This is supported by studies which find that SPS is related to cognitive advantages, such as greater detection of subtle changes in visual scenes (Jagiellowicz et al., 2011) and faster reaction times and fewer errors in a visual detection task (Gerstenberg, 2012).

Despite this evidence suggesting that SPS may be a plasticity factor, a number of studies have documented negative associations with SPS (Ahadi & Basharpour, 2010; Liss, Timmel, Baxley, & Killingsworth, 2005). In a cross-sectional study assessing parental bonding an interaction was found between parental care and SPS; as high SPS individuals reported more depression symptoms than low SPS individuals when care was low, but the two groups did not differ in depression symptoms when care was high, supporting a diathesis-stress model (Liss et al., 2005). This finding suggests that SPS is a risk factor, especially since a correlation was found between SPS and depression ( $r = .22, p < .001$ ). However, the authors failed to assess any positive outcomes that could have differentiated high and low SPS individuals under positive experiences. This is a major flaw in the literature, which has not provided a balanced view of positive and negative outcomes and biases certain traits as being risk factors rather than potential plasticity factors (Belsky & Pleuss, 2009; Manuck, 2010).

Another potential reason that SPS has been associated with negative outcomes is that the HSPS may be primarily measuring negative reactivity in response to overstimulation (Aron et al., 2012). The 27-item scale is replete with items concerning being “overwhelmed... bothered... made uncomfortable... annoyed” by different types of stimulation. A psychometric evaluation of the scale has found a clear three-factor structure (Smolewska, McCabe, & Woody, 2006) consisting of *i*) *Ease of Excitation* (EOE: e.g. “do you find it unpleasant to have a lot going on at once?”), *ii*) *Low Sensory Threshold* (LST: e.g. “are you made uncomfortable by loud noises?”), and *iii*) *Aesthetic Sensitivity* (AES: e.g. “do you seem to be aware of the subtleties in your environment?”). The former two were found to correlate highly with *Neuroticism*, while the latter was found to correlate most with *Openness to Experience* (NEO-FFI; Costa and MacCrae, 1992), which is the personality dimension most associated with aesthetic sensitivity, attentiveness to inner feelings and intellectual curiosity. Despite finding evidence for a three-factor structure of the HSPS, it was concluded that high intercorrelations between factors and the overall scale suggested that it was an adequate measure of the higher-order trait of SPS (Smolewska et al., 2006). As yet, there has not been a research study to investigate possible plasticity effects for these factors individually, despite different results being shown between the factors, such as the correlations with different personality traits (Smolewska et al., 2006) and performance on a cognitive task (Gerstenberg, 2012).

The aims of the current study were threefold – *i*) to assess a continuous predictor and outcome variable that would be able to differentiate

positive and negative extremes, which would correct for previous studies that failed to do so (Belsky & Pleuss, 2009; Liss et al., 2005), *ii*) to assess possible plasticity effects for the three factors within SPS (Smolewska et al., 2006), and *iii*) to use a heterogeneous adult community sample (Aron et al., 2005). In this study, we investigated whether SPS would moderate the association between childhood experiences (positive & negative) and current life satisfaction. We hypothesized that high SPS individuals would show both the best and worst outcomes relative to their childhood experiences. We had no clear hypotheses for whether the three factors would interact differently with childhood experiences.

## 2. Method

### 2.1. Participants & procedure

A total of 185 participants (67% female) responded to the study through a website that had been advertised at the University of Essex and the University of Oxford. Participants were fairly heterogeneous with regard to age, which ranged from 16–68 ( $M = 31, SD = 10.91$ ). Participants were all volunteers and were not paid for participation. Participants who responded to the advertisement were directed to a website that displayed a participant information sheet, which explained the nature of the study, including the time it would take and information about their confidentiality and right to withdraw at any time. Participants agreed to take part by clicking ‘next’, which directed them to the Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985), followed by the HSPS (Aron & Aron, 1997) and finally the Risky Families Questionnaires (RF-Q; Taylor et al., 2006). After completing all of the questionnaires, a debriefing page was shown, which explained the nature of the study and provided contact information.

### 2.2. Measures

#### 2.2.1. The Satisfaction with Life Scale

The SWLS (Diener et al., 1985) was the first questionnaire shown to participants completing the online study. It was shown first in order to reduce the risk of the outcome variable being affected by demand characteristics or priming effects from the other measures. The SWLS is a 5-item measure of global life satisfaction, which asks respondents to rate how much they agree with each statement using a 7-point scale from 1 (*strongly disagree*) to 7 (*strongly agree*). High numbers reflect high levels of life satisfaction. Examples of the statements include “In most ways my life is close to ideal” and “I am satisfied with my life”. It does not assess separate domains of life satisfaction, but allows respondents to give weight to these as they choose. The SWLS is unidimensional and shows good concurrent validity, as well as good reliability, as it has a two-month test-retest correlation of .87 (Diener et al., 1985).

#### 2.2.2. The Highly Sensitive Person Scale

The HSPS (Aron & Aron, 1997) was the second measure shown to participants. It is a 27-item questionnaire, with questions such as, “Are you made uncomfortable by loud noises?” and “Do other people’s moods affect you?” Participants are asked to rate each statement using a 7-point scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Aron and Aron (1997) developed the scale over a series of qualitative and quantitative investigations and found good internal consistency (alphas) for the final modified version of between .87 and .85. They also found that the HSPS was unidimensional, however more recently different authors found a three-factor structure consisting of *Ease of Excitation* (EOE), *Low Sensory Threshold* (LST) and *Aesthetic Sensitivity* (AES), yet they concluded that the HSPS was an adequate overall measure of the higher-order construct SPS (Smolewska et al., 2006).<sup>1</sup>

<sup>1</sup> Our principal component analysis also supported this three-factor structure, which can be seen in Appendix A.

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