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The relationships between sensory processing sensitivity, alexithymia, autism, depression, and anxiety

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ABSTRACT

The goal of the current investigation was to better understand the relationships between the three recently-developed factors of sensory processing sensitivity (ease of excitation – EOE, low sensory threshold – LST, and aesthetic sensitivity – AES) and alexithymia, autism symptoms, anxiety, and depression. Two hundred and one college students completed the highly sensitive person scale, as well as measures of anxiety, depression, alexithymia, and autism symptoms. EOE and LST were related to autism symptoms, alexithymia, anxiety, and depression. AES was related to attention to details (a symptom of autism) and anxiety but not to depression. It was also negatively related to externally-oriented thinking (a symptom of alexithymia). Results indicate that AES is conceptually distinct from LST and EOE. Furthermore, EOE interacted with difficulty identifying feelings in predicting anxiety, indicating that being both easily excited by stimuli and unable to identify one's feelings is particularly anxiety provoking.

Individuals may process sensory information differently (Aron & Aron, 1997; Dunn, 2001). Aron and Aron hypothesized that some individuals may notice and respond to less intense or a greater number of stimuli in the environment than others. The construct of sensory processing sensitivity was most thoroughly explored in a series of studies that resulted in the development and validation of the highly sensitive person scale (HSPS; Aron & Aron, 1997). The HSPS measures sensitivity to a variety of stimulation such as pain, caffeine, hunger, violent movies, and loud noises. It also includes items that ask whether the individual feels overwhelmed or frazzled by sensory experiences. Other items tap a more artistic or emotional sensitivity such as whether the individual enjoys or is deeply moved by music or fine art and whether the individual has a complex inner life.

Although research on this construct is somewhat limited, several studies have suggested that sensory processing sensitivity is associated with negative clinical outcomes. It has been found to be related to social phobia (Neal, Edelmann, & Glachan, 2002), avoidant personality disorder (Meyer & Carver, 2000), anxiety and depression (Liss, Timmel, Baxley, & Killingsworth, 2005), perceived stress and ill-health (Benham, 2006), and agoraphobic avoidance (Hofmann & Bitran, 2007). Sensory processing sensitivity may interact with other variables to produce negative clinical outcomes. For example, Aron, Aron, and Davies (2005) showed that highly sensitive people were more prone to experience anxiety and depression but only in the context of poor parental environments. Other research has shown that low levels of parental care were related to depression among highly sensitive people in particular (Liss et al., 2005). However, sensory processing sensitivity has also been shown to produce negative clinical outcomes directly. For example, sensory processing sensitivity related to anxiety without interacting with parental variables (Liss et al., 2005). It also failed to interact with level of stress when predicting ill health, indicating that highly sensitive people are more likely to report being in poor health, whether or not they are under stress (Benham, 2006).

Although Aron and Aron (1997) conceptualized sensory processing sensitivity as one coherent construct, recent research suggests that it may encompass multiple constructs. A three-factor model of the HSPS has been explored and validated (Smolewska, McCabe, & Woody, 2006). Smolewska et al. conducted exploratory and confirmatory factor analyses and determined that the HSPS consisted of three constructs: ease of excitation (EOE), low sensory threshold (LST), and aesthetic sensitivity (AES). These constructs related differentially to behavioral activation and inhibition as well as to the Big Five. Smolewska et al. found that some negative outcomes associated with sensory processing sensitivity in previous literature may be better understood as relating to EOE and LST, rather than to AES. EOE and LST demonstrated similar patterns of correlation and were highly correlated with each other ($r = .73$). Thus, these may represent a single factor.

One construct that is likely related differentially to the factors of sensory processing sensitivity is autism symptoms. Individuals with autism are known to be overly sensitive to physical stimuli (Liss, Saulnier, Fein, & Kinsbourne, 2006; Watling, Deitz, & White, 2001), but they are not emotionally sensitive or attuned to

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subtleties (especially interpersonal subtleties) in the environment. Symptoms of autism are now seen as existing in a broader phenotype in the general population (Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001), and it has been suggested that autistic traits represent a personality dimension that is independent of the Big Five (Austin, 2005; Wakabayashi, Baron-Cohen, & Wheelwright, 2006). The Autism Spectrum Quotient (AQ) was designed to measure symptoms of autism in a general population (Baron-Cohen et al., 2001). Recent analyses indicate that the AQ captures three distinct factors: poor social skills, attention to details, and poor communication (Austin, 2005; Hurst, Mitchell, Kimbrel, Kwapil, & Nelson-Gray, 2007). Although sensitivity to sensory stimuli has long been noted as an associated feature of the diagnosis of autism (e.g., Freeman, Ritvo, & Schroth, 1984; Grandin, 1996), the relationship between autism symptoms and sensory processing sensitivity has not been examined in a general population.

Another construct that may be relevant to sensory processing sensitivity is alexithymia, the inability to identify, describe, and interpret emotional states. Alexithymia has been consistently related to depression (Zackheim, 2007) and appears to play a role in social anxiety (Evren & Evren, 2007). Physiologically, people high in alexithymia are hypersensitive to touch and pain (Nyklicek & Vingerhoets, 2000; Sivik, 1993) and have an augmented brain response to acoustic stimuli (Schafer, Schneider, Tress, & Franz, 2007). On the other hand, individuals high in alexithymia do not necessarily self-report increased stress in response to physiological arousal (Papciak, Feuerstein, & Spiegel, 1985). Alexithymia, particularly difficulty identifying feelings, may work in interaction with sensory processing sensitivity to produce negative clinical outcomes. The combination of being easily excited by sensory information or having a low threshold and not having the ability to identify those feelings appropriately may put an individual at risk for anxiety or depression.

Recently, researchers have noted a conceptual similarity between the clinical presentation of autism spectrum disorders and alexithymia (Fitzgerald & Bellgrove, 2006). One study found that high functioning individuals with autism had higher levels of alexithymia than did control individuals and their relatives (Hill, Berthoz, & Frith, 2004). The relationship between autistic traits and alexithymia and how these variables relate to sensory processing sensitivity merits further investigation.

The goal of the current investigation was to better understand the relationships among sensory processing sensitivity, alexithymia, autistic symptoms, and the clinical outcomes of anxiety and depression. First, we examined the factor structure of the HSPS to determine whether a three factor solution provided the best fit to the data. Second, we examined the three factors of sensory processing sensitivity to determine whether they have different relationships with autism symptoms, alexithymia, anxiety, and depression. It was hypothesized that ease of excitation and low sensory threshold would be related to alexithymia and autism as well as to negative clinical outcomes, but it was unclear whether aesthetic sensitivity would be related to these variables. Finally, we investigated whether sensory processing sensitivity (specifically, ease of excitation and low sensory threshold) interacted with alexithymia (specifically, difficulty identifying feelings) to predict anxiety and depression.

1. Method

1.1. Participants

Two hundred and one psychology students (142 women and 59 men) participated in this study. Women (71%) outnumbered men (29%) which was representative of the course enrollment. Participants were 18–25 years of age (M = 18.66, SD = 1.08). Students received course credit for their participation.

1.2. Measures

The *Highly Sensitive Person Scale* (HSPS) was used to assess sensory processing sensitivity (Aron & Aron, 1997) using the three-factor structure suggested by Smolewska et al. (2006). The first component, ease of excitation (EOE), assesses feelings of becoming mentally overwhelmed by external and internal demands (e.g., "Do you get rattled when you have a lot to do in a short amount of time?"). The second component, low sensory threshold (LST), assesses unpleasant sensory arousal, (e.g., "Are you made uncomfortable by loud noises?"). The third component, aesthetic sensitivity (AES), assesses aesthetic awareness, (e.g., "Do you have a rich, complex inner life?"). Respondents answered each question on a scale ranging from "not at all" (1) to "extremely" (7). Smolewska et al. (2006) demonstrated the reliability and validity of the HSPS. In the present study, Cronbach's alphas for the HSPS components were .76, .60, and .73 for EOE, AES, and LST, respectively.

The *Autism Spectrum Quotient* (AQ) measures traits associated with autism in adults with normal intelligence (Baron-Cohen et al., 2001). The three-component structure of poor social skills (e.g., "I am good at social chit-chat," reverse scored), attention to details (e.g., "I notice patterns in things all the time"), and poor communication was used (e.g., "People often tell me I keep going on and on about the same thing;" Austin, 2005; Hurst et al., 2007). Respondents answered each question on a scale ranging from "definitely agree" (1) to "definitely disagree" (4). The Baron-Cohen et al. (2001) collapsed scoring method was used; responses in the "autistic" direction were given a score of 1, and responses in the "non-autistic" direction were given a score of 0. The reliability and validity of the three factor structure of the AQ has been demonstrated (Austin, 2005; Hurst et al., 2007). In the present study, Cronbach's alphas for the AQ components were .73, .52, and .50 for poor social skills, attention to details, and poor communication, respectively.

The *Toronto Alexithymia Scale-Revised* (TAS-R) was designed to assess deficits in identification, communication, cognitive processing, and elaboration of affect, which are characteristic of people with alexithymia (Taylor, 1984, 1995). The TAS-R has three factors including difficulty identifying feelings (e.g., "I am often confused about what emotion I am feeling"), difficulty describing feelings (e.g., "It is difficult for me to find the right words for my feelings"), and externally-oriented thinking (e.g., "I prefer to just let things happen rather than to understand why they turned out that way"). Respondents indicated how much they agreed or disagreed with each statement using a scale ranging from "strongly disagree" (1) to "strongly agree" (5). The reliability and validity of the TAS-R have been demonstrated (e.g., Bagby, Taylor, & Parker, 1994). In the present study, Cronbach's alphas for the difficulty identifying feelings, difficulty describing feelings, and externally-oriented thinking subscales were .84, .75, and .75, respectively.

The *Beck Anxiety Inventory* (BAI) was designed to differentiate anxiety from depression (Beck & Steer, 1990). Respondents indicate how much they have been bothered by each of 21 symptoms during the past week. Symptoms include the inability to relax and trembling hands. Respondents rated each symptom on a scale ranging from "not at all" (0) to "severely" (3). The reliability and validity of the BAI, including its ability to differentiate anxiety from depression, have been demonstrated (e.g., Fydrich, Dowdall, & Chambless, 1992). In the present study, Cronbach's alpha for the BAI was .88.

The *Beck Depression Inventory II* (BDI-II) assesses cognitive-affective and somatic aspects of depression (Beck, Steer, & Brown, 1996; Beck, Steer, & Garbin, 1988). Groups of statements assess