



Research paper

Extreme sensory processing patterns show a complex association with depression, and impulsivity, alexithymia, and hopelessness



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ABSTRACT

Introduction: The involvement of extreme sensory processing patterns, impulsivity, alexithymia, and hopelessness was hypothesized to contribute to the complex pathophysiology of major depression and bipolar disorder. However, the nature of the relation between these variables has not been thoroughly investigated.

Aims: This study aimed to explore the association between extreme sensory processing patterns, impulsivity, alexithymia, depression, and hopelessness.

Methods: We recruited 281 euthymic participants (mean age=47.4 ± 12.1) of which 62.3% with unipolar major depression and 37.7% with bipolar disorder. All participants completed the Adolescent/Adult Sensory Profile (AASP), Toronto Alexithymia Scale (TAS-20), second version of the Beck Depression Inventory (BDI-II), Barratt Impulsivity Scale (BIS), and Beck Hopelessness Scale (BHS).

Results: Lower registration of sensory input showed a significant correlation with depression, impulsivity, attentional/motor impulsivity, and alexithymia. It was significantly more frequent among participants with elevated hopelessness, and accounted for 22% of the variance in depression severity, 15% in greater impulsivity, 36% in alexithymia, and 3% in hopelessness. Elevated sensory seeking correlated with enhanced motor impulsivity and decreased non-planning impulsivity. Higher sensory sensitivity and sensory avoiding correlated with depression, impulsivity, and alexithymia.

Limitations: The study was limited by the relatively small sample size and cross-sectional nature of the study. Furthermore, only self-report measures that may be potentially biased by social desirability were used.

Conclusion: Extreme sensory processing patterns, impulsivity, alexithymia, depression, and hopelessness may show a characteristic pattern in patients with major affective disorders. The careful assessment of sensory profiles may help in developing targeted interventions and improve functional/adaptive strategies.

1. Introduction

Major affective disorders are worldwide associated with long-term disability, psychosocial impairment, and poor intervention outcomes including suicidal behavior (Pompili et al., 2011, 2012). The involvement of deficits in emotional processes and sensory processing has been hypothesized in the pathophysiology of major affective disorders (Van Rhenen and Rossell, 2013; Leitman et al., 2010). Sensory processing refers to the ability to register and modulate sensory information and organize this sensory input to respond to situational

demands (Humphry, 2002; Miller et al., 2007). Extreme sensory processing patterns include hyper- or hyposensitivity to non-aversive stimuli (Miller et al., 2007).

Existing studies on sensory processing disorders (SPD) generally refer to individuals with hypersensitivity suggesting that they often perceive daily sensory events as noxious (Bundy et al., 2002), or express exaggerated behavioral reactions of "fight or flight" to harmless sensory input (Hanft et al., 2000; Engel-Yeger & Dunn, 2011a, 2011b). SPD are supposed to have a genetic basis (Dunn, 1997, 2001) as well as developmental origin as they are frequently reported

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among children with developmental disabilities such as Attention-Deficit/Hyperactivity Disorder (ADHD), learning disabilities and clumsiness (Talay-Ongan and Wood, 2000). SPD are likely to become more apparent in transferring stages (Miller et al., 2007, 2012) and, although they are mostly reported in children, they may persist into adulthood with related social and emotional difficulties (Kinnealey et al., 2011).

In the present study we refer to the model of sensory processing which was suggested by Dunn (1997). This model describes the relationship between the person's neurological thresholds and behavioral self-regulation strategy (Brown et al., 2002, Dunn, 1997). Individuals with hypersensitivity have lower neurological threshold while those with hyposensitivity have higher neurological threshold. However, individuals who utilize a passive behavioral strategy allow stimuli to occur in accordance with their threshold, whereas individuals who use an active behavioral strategy counteract their threshold and control the amount/type of sensory input they receive (Dunn, 1997 and 2001). Dunn's model yielded four patterns of sensory processing. The first two refer to hyposensitivity: (1) individuals with low registration who fail to detect sensation and do not actively seek for sensory input that are usually depicted as inattentive, withdrawn, and unmotivated; (2) individuals who are sensory seekers and enjoy rich sensory environments/activities. Sensation seekers may show impulsivity, appear as disinhibited, lack future planning, and engage in risk-taking behaviors. The other two patterns refer to a low neurological threshold (hypersensitivity): (3) individuals who are sensory sensitive and feel discomfort with regular sensations but they do not actively limit their exposure to the uncomfortable stimuli; (4) individuals who are sensation avoiders and are usually described as introspective or reclusive since they actively limit exposure to sensory information. When sensory processing does not interfere with daily life activities, it is considered as a part of our unique characteristics, as a trait (Dunn, 2001). However, when sensory processing patterns are extreme and interfere with function and participation in daily life, they may be considered as sensory processing disorders (SPD) (Miller et al., 2007; Dunn, 2001) (see Fig. 1).

Dunn (1997) suggests that there are well established relationships of sensory processing patterns with stable, trait-like or personality variants. Ben-Avi et al. (2012) found that individuals with SPD frequently express lower self-esteem, more social discomfort, more distress and less ego strength. Specifically, “sensory sensitivity”, “sensory avoidance”, and “low registration” traits correlated with

elevated anxiety, somatization, distress characteristics, interpersonal difficulties, lack of ego strength, thought distortions and poignancy. The term ‘sensory affective disorder’ has been already used by some researchers several decades ago to refer to sensory defensiveness in children (Wilbarger and Wilbarger, 1991). Extreme sensory processing patterns have been also proposed as a stable dimension which are able to characterize individuals with major affective disorders (Engel-Yeger et al., 2016a, 2016b; Serafini et al., 2016). Indeed, subjects with extreme sensory processing patterns frequently presented impairments in modulating emotional/behavioral responses. Fear, anxiety or discomfort may accompany everyday situations that involve sensory stimuli and may disrupt daily routines (Parham and Mailloux, 2001) significantly impairing the daily life functioning and restricting participation in various life situations (Engel-Yeger et al., 2013a, 2013b; Engel-Yeger and Ziv-On, 2011; Engel-Yeger, 2008).

According to behavioral and neurophysiological studies, SPD have been associated with emotional and arousal processes (Ben-Avi et al., 2012). Hyposensitivity has been predominantly associated with depression and lower levels of arousal whereas hypersensitivity has been linked with anxiety and higher levels of attention and arousal (Kinnealey and Fuiiek, 1999; Pfeiffer et al., 2005). Moreover, based on our recent study (Engel-Yeger et al., 2016a, 2016b) the hyposensitive extreme pattern of lower registration was found to be related with enhanced depressed mood whereas the hyposensitive extreme pattern of sensory seeking resulted as a resilient factor. Sensation seeking seems to be also correlated with elevated hyperthymia, which was previously reported as a protective factor against depression and suicidality (Rihmer et al., 2010). Interestingly, hypersensitivity has been associated with abnormal gating together with “over-inclusion” of not relevant stimuli in the focus of attention (Kisley et al., 2001) with subsequent difficulties of habituation (Miller et al., 2012).

Similarly to SPD, impulsivity may be considered as a quite stable behavioral trait in clinical populations although there are few studies investigating the nature of this construct and its association with SPD in patients with major affective disorders. Impulsivity may frequently occur in multiple psychiatric disorders, substance abuse, and suicidal behavior (Moeller et al., 2001). According to various proposed personality models (Lijffijt et al., 2012; Dickman, 2000; Eysenck, 1993; Humphreys and Revelle, 1984), it seems to be related to early sensory processing (Swann et al., 2013). Importantly, subjects with lower impulsivity may have a lower sensitivity to warning signals and are

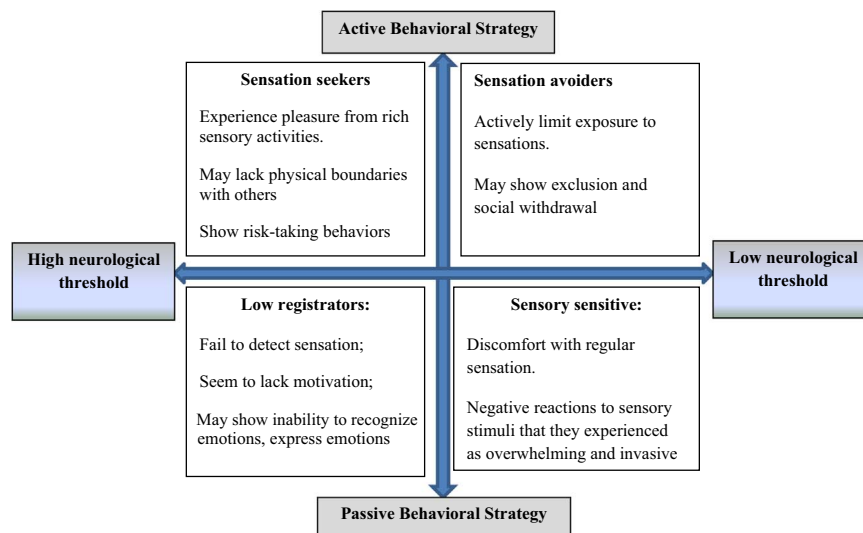


Fig. 1. This is the model referring to sensory processing which was suggested by Dunn (1997). It describes the relation between the individual's neurological thresholds and behavioral self-regulation strategy. Dunn's model mentioned four patterns of sensory processing with the first two referring to hyposensitivity (low registration and sensation seeking) and the other two patterns referring to hypersensitivity (sensory sensitivity and sensation avoidance).

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