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Sensory Processing Difficulties and Interpersonal Relationships in Adults: An Exploratory Study

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The purpose of this study was to investigate the association between sensory processing difficulties (SPD) which refers to detection, modulation and response to sensory input and interpersonal relationships. 139 students participated in the study and completed two self report questionnaires: The Adolescent/Adult Sensory Profile measuring sensory processing abilities as expressed in daily living and the Hebrew version of the MMPI-2. The results demonstrated strong associations between different patterns of SPD and a wide range of symptomathology, including anxiety, somatization, distress, and demoralization, difficulties in social interactions, family, work and therapeutic relationships. The findings of this study indicate that extreme sensory processing patterns are strongly related to distress and psychological difficulties. Therefore, it is recommended that clinical therapists relate to sensory processing as part of their dynamic conceptualization of patients' difficulties. This also emphasizes the significance of interdisciplinary treatment that takes sensory processing into consideration in order to create an intervention program that considers the person's specific sensory needs and their relationship with personality.

Keywords: Sensory Processing; MMPI-2; Interpersonal Relationships; Sensory Processing Difficulties; Demoralization

Introduction

Individual's personality interacts with the way one integrates sensory and experienced events (Bender & Schilser in Chutroo, 2007). The association between individual's sensory processing capacities and various clinical features has been examined in only few studies, focusing mainly on depression, anxiety and emotional regulation (e.g., Kinnealey & Fuiek, 1999; Liss, Timmel, Baxley, & Killingsworth, 2005). The present study aims to elaborate this association, particularly regarding interpersonal relationships in typically healthy individuals.

Sensory Processing

Sensory processing relates to the way one detects, regulates, interprets and responds to sensory stimuli (Dunn, 2001). Sensory processing includes physiological and behavioral components: The physiological aspect of the process relates to structural changes or the functioning of the nervous system (Kandel, 1991). The behavioral aspect relates to the individual's capacity to regulate reactions to stimuli adaptively to the environmental requirements (Royeen & Lane, 1991). Typical sensory processing enables adaptive and organized reactions to environmental demands, while atypical patterns of sensory processing may negatively influence the functioning of the individual in everyday life (Tal-Saban et al., 2002; Dunn, 2001). It is estimated that 15% of the typical population experiences different levels of atypical sensory processing patterns (Simeonsson et al., 2003).

Atypical sensory processing or SPD may be expressed by hypersensitivity or hyposensitivity to sensory stimuli; this depends on neurological threshold for sensory stimuli. A low neurological threshold indicates that the individual requires low intensity stimuli for the individual to react, while individuals with a high neurological threshold need high intensity stimuli or take longer to react to the same stimuli (Dunn, 2001). Wilbarger and Wilbarger (1991) defined hypersensitivity as the tendency to have a negative reaction to a sensory input that is commonly considered harmless, as for example, hypersensitivity to odors or noises in a room; tactile sensitivity to specific fabrics. On the other hand, hyposensitivity is defined as a decreased sensitivity to stimuli in the environment. A common consequence is inattention to injuries, behavior such as excessive touching and increased activity (Wilbarger & Wilbarger, 1991).

Cermak (1998) described hypersensitivity and hyposensitivity as two extremes on the same continuum and not as separate phenomena, as the contention was until then. Thus, hypersensitivity in one sensory system may coexist with hyposensitivity in another system (Royeen, 1989).

Dunn's Model for Sensory Processing

Dunn's (1997) model of sensory processing comprises two axes of sensory processing: the neurological threshold of the individual (high or low) and his/her behavioral response.

According to Dunn's (1997) model, for each of the neurological thresholds, the behavioral response strategy can be active or passive. An active behavioral response is expressed by actions that aim to cope with the neurological threshold. A passive behavioral response is characterized by a lack of effort to reduce or increase the stimulation, even if the stimulus does not match the neurological threshold.

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The interactions between the threshold and behavioral response axes form four orthogonal quadrants: 1) Sensation Avoiding—which represents low neurological thresholds and an active response strategy. This quadrant characterizes active avoidance of sensory stimuli in order to reduce uncomfortable experience. 2) Sensory Seekers-high neurological thresholds and an active response strategy. Persons in the quadrant will try to meet their neurological threshold actively seek high intensity stimuli in order to actively increase the strength of the response. 3) Sensory Sensitivity-low neurological threshold and a passive behavioral response. Individuals in this quadrant will not act actively to stop or reduce the level of sensory threshold while experiencing discomfort. 4) Low Registration-passive response and high neurological threshold, these persons will respond to sensory stimuli either slowly or not at all to. The Sensory processing patterns are likely to have an impact on the individual's psychological functioning.

The Sensory Processing Patterns and Interpersonal Relationships among Adults Dunn's Model for Sensory Processing

Sensory Seeking Pattern: High Neurological Threshold and Active Behavioral Response

This behavior can lead to social rejection due to the lack of the physical boundaries and a dangerous behavior that is considered by others as irresponsible, impatient and lacking respect for others.

According to Miller, Anzalone, Lane, Cermak, and Osten (2007), people with a "sensory seeking" profile demonstrate activities meant to increase sensory experience, such as an increased motor behavior, forming contact with objects and people (like bumping into objects) and seeking strong stimuli such as spicy food, strong noises and stimulating visual. In social context, these behaviors represent over affection and an attempt to initiate interpersonal contact in a non-informative way, seeking to boost their sensory experiences so that the sensory input crosses their reaction threshold This behavior may result in social rejection due to lack of physical boundaries and dangerous behavior that may be considered by others as irresponsible, impatient and disrespectful.

MMPI-2 is one of the most commonly used personality tests in mental health to assist in assessing psychopathology and personality structure and is composed of a large number of scales providing a comprehensive description of the person. Correlations between sensation seeking and several MMPI-2 scales have already been reported. A positive correlation was found, for both men and women, between sensation seeking and scale 9 (Ma), which is associated with impulsivity and hyperactivity (McKinley & Hathaway, 1944; Zuckerman & Bone, 1972; Zuckerman & Link, 1968). This correlation was explained by the high activity level and the need for varied and intense stimuli (Zuckerman & Link, 1968).

Other studies found an association between sensation seeking and low scores on scale 0 (Si, Social extroversion-Introversion) low scores measures behavior characteristic of extroversion (Dunn, 2001; Eysenck, 1967; Sutker, Archer, & Allain, 1978; Zuckerman & Bone, 1972; Zuckerman & Link, 1968).

Low Registry Pattern: High Neurological Threshold and Passive Behavioral Response

Common characteristic of people with a "low registry" sensory processing profile is the tendency to react easily or not to react at all, to strong and even damaging stimuli. Children are described as quiet, obedient, as having a low level of arousal and as having trouble learning about their environment (Royeen & Lane, 1991). Persons characterized by this pattern are typically lacking in reaction to sensory stimuli, which may be perceived as indifference, sluggishness and lack of motivation or interest in the world in general and in initiating relationships in particular. Lack of response doesn't stem from lack of motivation but rather from an absence of sensory reaction, leading to inability to recognize possibilities for action. Common examples include lack of reaction to falls, injuries or abnormal temperature (Miller, Anzalone, Lane, Cermak, & Osten, 2007) inability to recognize and express emotions and lack of sense of humor (Dunn, 1997).

Sensory Avoidance Pattern: Low Neurological Threshold and Active Behavioral Response

Individuals who fit the "sensory avoidance" quadrant are characterized by an active attempt to avoid sensory stimuli due to intense sensory reaction to every sensory stimulus. These reactions produce tension, anxiety and nervousness, and problems in initiating relationships. These individuals are likely to have aggressive and negative reactions to intense, overwhelming and invasive sensory stimuli (Miller, Anzalone, Lane, Cermak, & Osten, 2007). The negative reactions can be expressed by seclusion, social withdrawal and avoidance of outdoor activities such as traveling by automobile or plane.

Sensory Sensitivity Pattern: Low Neurological Threshold and Passive Behavioral Response

Individuals with the "sensory sensitivity" pattern experience intense sensory reactions to every sensory stimulus, and therefore they also tend to be characterized by feelings of tension, anxiety and nervousness, and problems in initiating relationships. These individuals can have aggressive and negative reactions to sensory stimuli that they experienced as intense, overwhelming and invasive (Miller, Anzalone, Lane, Cermak, & Osten, 2007).

Sensory Processing and Psychological Characteristics

SPD are related to behavioral and adjustment problems of children, particularly those associated with emotional regulation, depression and anxiety. Sensory hypersensitivity has been found to be related to lack of sleep, hyper-emotionality, exaggerated defense mechanisms and incapacity to complete new assignments (Royeen & Lane, 1991; Wilbarger & Wilbarger, 1991).Children (or their parents) are the main population that appeals for treatment, therefore the measures for SPD was first developed for children.

Even though research on sensory processing has been conducted mostly on children, and we have reason to believe that Children suffer from these difficulties more than adults, who learn and adapted their life to live with the situation, there is some evidence that adults with SPD also experience higher levels of anxiety, depression and adjustment problems, (Kinnealey & Fuiek, 1999). Liss, Timmel, Baxley, and Killingsworth's (2005) found significant connections between sensory hypersensitivity and psychological distress, anxiety and depression. Considering the fact that sensory processing profiles remain constant over

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time, further research is necessary to determine the relationship between sensory processing and psychological aspects among adults as well. The current research aims to contribute to the endeavor.

Goal of Current Study

The present study aims to explore and expand our knowledge on the association between sensory sensitivity and social skills among adults. Specifically, the purpose of this study is to explore the relationships between Dunn's four sensory processing patterns and the quality of interpersonal and social relationships among typical adults. The study is unique in that it focuses on this aspect among typical healthy adults; the study uses a combination of measures which were not previously applied in this population: the MMPI-2 and the Adolescent/Adult Sensory Profile Questionnaire (AASP).The main hypothesis was that adult participants with SPD will show different symptoms related to interpersonal relationships compared to participants with typical sensory processing.

Method

Participants and Design

One-hundred thirty nine undergraduate students participated in the study for credit and were recruited by computerized experiment registration system of the department of Psychology at University of Haifa. Credit points were offered to each student willing to participate in the experiment. Thirteen participants did not match the inclusion criteria and were omitted from the statistical analysis (subjects with nervous system injuries, allergies or taking medications which affect the central nervous system). The MMPI-2 of three additional subjects was invalid (according to the MMPI-2 criteria); and were also omitted from the statistical analysis. Thus, the statistical analysis was conducted on 123 subjects: 36 men and 86 women. All subjects spoke native Hebrew, all reported general overall good health, did not report any kind of chronic disease and did not take medications that affect the nervous system. The age of the subjects ranged between 19 and 33 (M = 23.85, SD = 2.44), with a significant gender difference: the men were significantly older (M = 24.72, SD = 2.73) than the women (M = 23.48, SD = 2.05), [$t_{(121)} = 2.77$, $p < .01$].

Measures

Background and Physical Condition Questionnaire

In this brief questionnaire, subjects were asked to report their gender and age and answer several questions regarding their health.

The Adolescent/Adult Sensory Profile Questionnaire (*ASP*) is a self-report measure developed by Dunn and Brown (2002) as a trait measure of sensory processing patterns and effects on daily life behavior. The AASP consists of 60 items (on a 5-point Likert scale) regarding how he or she generally responds to different sensations. Fifteen items represent each of the four quadrants, or sensory profile types. The sensory processing categories are taste, smell, movement, sight, touch, hearing and activity level (proprioception). These categories are distributed throughout each of the 15 items included in each quadrant. The current study found adequate reliabilities. Each of the four quadrants shows high Cronbach's coefficient of internal consistency.

The questionnaire was translated to Hebrew by Parush, Engel-Yeger and Ben-Sason (2006). The current study uses the norms developed by Dunn and Brown (2002) in the United States for the same age groups, since the norms in Israel have not yet been developed.

In Dunn & Brown's normative sample, an adequate frequency of responses matched the criteria for three of the four sensory profiles: sensory sensitivity, sensory avoiding and low registry. Therefore, comparisons can be made between the personality characteristics of those respondents who had a normal or a low rate and those who had a higher than average score on each of these three sensory profiles (see **Table 1**).

The Minnesota Multiphasic Personality Inventory (*MMPI-2*) The MMPI-2 (Butcher, Dahlstrom, Graham, Tellegan, & Kaemmer, 1989) provides extensive clinical, symptomatic, personality and interpersonal evaluation of the individual's mental state. The version used here is the Hebrew translation (Almagor, 2005). The MMPI-2 has high reliability and validity (Almagor, 2005; Graham, 2005; Greene, 2010).

Procedure

The research procedure was approved by the Haifa University ethics committee for experiments on humans (Approval number 080/80).All subjects signed an informed consent that described the study, procedures to ensure anonymity and confidentiality, and provision of psychological help if requested. Subjects were told they can quit the experiment at any point.

Students were told that the experiment deals with personality structure and sensory experiences in everyday life, and that it involves only filling questionnaires.

The questionnaires were administered in a balanced order: Half completed the computerized MMPI-2 first, and then filled out the sensory profile questionnaire. The other half completed the experiment in the reverse order. In order to control for order of administration, MANOVA procedures were employed were conducted using Hotelling's Trace criterion. No significant differences were found between the two groups. The administration was done in groups. Each group included 8 - 15 participants. The entire experiment lasted for an hour and a half.

Results

In order to control for the gender effect, two MANOVA procedures were employed using Hotelling's Trace criterion. No significant differences were found between men and women in the weighted variable of the sensory profile scores [$F_{(4, 118)} = .66$, n.s]. However, there were significant differences between men and women for the weighted MMPI-2 scales variable [$F_{(36, 86)} = 4.45$, $p < .001$].Therefore, gender was controlled during data analyses. There was no significant between gender and each one

Table 1.
Frequency of respondents by intensity of sensory profile type (N = 123).

Intensity	Sensory sensitivity	Sensory avoiding	Sensory seeking	Low registry
Low	5	6	18	9
Normal	88	87	95	84
High	30	30	10	30

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of the sensory types for weighted MMPI-2 scale scores. In order to control for the age effect, Pearson correlations between the subjects' age and the scores in the MMPI-2 scales and the sensory profile scales were computed. No significant correlations were found; therefore it can be assumed that age was not an intervening variable in this study.

Pearson correlation coefficients between scores on the four sensory processing scales (representing the different sensory processing patterns) and scores on all the MMPI-2 scales were computed.

Due to the multiplicity of the correlations that were computed for the 35 scales of the MMPI-2, a Bonferroni correction was conducted to minimize Type I error due to the multiple comparisons (0.05/35 = .0015). Consequently, Pearson correlations where p < .0014 were considered significant. **Table 2** depicts the computed Pearson correlations, indicating those found to be significant.

Table 2.
Pearson correlations between sensory profile scale scores and scale scores on the MMPI-2 (N = 123).

Scale code	Scale description	Low registry	Sensory seeking	Sensory sensitivity	Sensory avoidance
	Clinical scales and sub-scales:				
HS-1	Somatization	**.38***	–.25	**.47***	**.37***
D-2	Depression	**.32***	–.29	**.36***	.22
WSD	Distress	**.44***	–.21	**.45***	**.36***
HY-3	Hysteria	.18	–.12	.15	.07
PD-4	Perversion	**.35***	–.08	**.37***	**.31***
PA-6	Suspicion	.25	.02	.21	.15
PA2	Poignancy	**.31***	–.04	**.29***	**.60***
PT-7	Anxiety	**.46***	–.16	**.51***	**.43***
SC-8	Thinking Disorders	**.44***	–.10	**.44***	**.46***
DIS	Distress	**.46***	–.17	**.47***	**.39***
BIM	Bizarre mentation	.24	.12	.24	**.35***
MA-9	Hypomanic symptoms	.12	**.39***	.00	.10
SI-0	Social introversion	**.41***	**–.51***	**.49***	**.44***
Si1	Shyness	**.37***	**–.44***	**.40***	**.35***
Si2	Social alienation	.28	**–.33***	.24	**.34***
Si3	Alienation–self and other	.34*	–.07	**.45***	**.40***
	Self-Report Scales				
ANX	Anxiety	**.39***	–.14	**.45***	**.40***
FRS	Fears	.20	–.19	**.35***	.17
OBS	Obsessiveness	**.41***	–.16	**.47***	**.36***
DEP	Depression	**.40***	–.11	**.40***	**.38***
HEA	Health concerns	**.34***	–.27	**.41***	**.33***
ANG	Anger	.22	–.01	**.41***	**.39***
CYN	Cynicism	.22	.04	.27	**.36***
ASP	Anti-social personality	.20	.06	.20	.21
TPA	Type A	.18	–.02	**.44***	**.40***
LSE	Low self-esteem	**.45***	–.20	**.55***	**.47***
SOD	Social discomfort	**.39***	**–.42***	**.36***	**.43***
FAM	Family problems	**.29***	–.14	**.44***	**.40***
WRK	Work problems	**.40***	–.13	**.52***	**.43***
TRT	Problems in therapy	**.46***	–.12	**.49***	**.44***
	Additional scales:				
A	Distress	**.46***	–.13	**.52***	**.44***
ES	Ego strength	**–.44***	.18	**–.44***	**–.39***
MDS	Marital problems	**.39***	–.16	**.43***	**.38***
MACR	Alcoholism	–.02	**.36***	–.10	–.09
APS	Alcoholism potential	.27	.08	**.34***	.20

*p < .0014.

Pearson correlation coefficients between scores on the four sensory processing scales (representing the different sensory processing patterns) and scores on all the MMPI-2 scales were computed. Due to the multiplicity of the correlations that were computed for the 35 scales of the MMPI-2, a Bonferroni correction was conducted to minimize Type I error due to the multiple comparisons (0.05/35 = .0015). Consequently, Pearson correlations where p < .0014 were considered significant. **Table 2** depicts the computed Pearson correlations, indicating those found to be significant.

Table 2 suggests that all the sensory processing types are correlated with several clinical scales, although in different directions. The likelihood of introversion and social discomfort is higher as the tendency of the subject for sensory sensitivity, sensory avoidance or low registry processing increases. However, the likelihood of these features is lower when the tendency for sensory seeking increases. The following analyses were conducted for each type separately.

Sensory Sensitivity Profile: Low Neurological Threshold and Active Behavioral Response

A significant effect was found for the intensity of sensory sensitivity on the weighted MMPI-2 scale scores [$F_{(35, 85)} = 1.87$, $P < .01$, $\eta 2 = .44$]. **Table 3** presents the results relevant to the present study.

The findings depicted in **Table 3** indicate that individuals with an increased tendency for sensory sensitivity suffer from higher levels of stress (A) , are more socially introverted (Si) , suffer more from a sense of alienation from themselves and others (Si3), have lower self-esteem (LSE), and social discomfort due to problems at work (WRK) and in therapeutic relationships (TRT). They also suffer from a higher general level of distress (DIS) and less ego strength (ES).

Sensory Avoidance Profile: Low Neurological Threshold and Active Behavioral Response

A significant effect was found for the intensity of the tendency for sensory sensitivity on the weighted MMPI-2 scale scores [$F_{(35, 85)} = 1.61$, $P < .05$, $\eta 2 = .40$]. **Table 4** presents the results relevant to the present study.

Low Registry Profile: High Neurological Threshold and Passive Behavioral Response

A significant effect was found for the intensity of the tendency for low registry on the weighted dependent variable of the MMPI-2 [$F_{(35, 85)} = 1.90$, $P < .01$, $\eta^2 = .44$]. **Table 5** presents the results relevant to the present study.

The findings presented in **Table 5** indicate that individuals with an increased tendency for low registry suffer from higher levels of stress (A), lower self-esteem (LSE), distress (WSD), and difficulties at work (WRK).

Discussion

The aim of the current research was to explore the relationships between Dunn's model of sensory processing patterns and the personality and symptomatic characteristics among normal adults.

The findings indicate that in terms of psychological profiles, there is a lot in common in the three patterns of sensory proc essing

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Table 3.
Partial results of the MANCOVA: Means and standard deviations of the scores on the MMPI-2 scales depending on the tendency for sensory sensitivity.

Scale code	Scale description	Participants with an increased tendency for sensory sensitivity (N = 30)		Participants with a normal/decreased tendency for sensory sensitivity (N = 93)		F	η^2
		M	SD	M	SD		
From the clinical scales:							
DIS	Distress	7.23	.70	4.53	.34	12.05*	.09
Si-0	Social introversion	35.04	1.86	27.55	.91	13.08*	.10
Si3	Alienation	7.38	.64	4.89	.31	12.09*	.09
From the content scales:							
LSE	Low self-esteem	10.35	.71	4.92	.35	47.10*	.28
WRK	Problems at work	13.94	1.05	8.25	.51	23.72*	.17
TRT	Problems in therapy	7.46	.71	4.11	.34	18.25*	.13
Additional scales:							
A	Level of distress	20.17	1.55	12.51	.75	19.80*	.14
ES	Ego strength	32.52	1.14	37.26	.56	13.86*	.10

*p < .0014.

Table 4.
Partial results of the MANCOVA: Means and standard deviations of the scores on the MMPI-2 scales depending on the tendency for sensory avoidance.

Scale code	Scale description	Participants with an increased tendency for sensory avoidance (N = 30)		Participants with a normal/decreased tendency for sensory avoidance (N = 93)		F	η^2
		M	SD	M	SD		
From the clinical scales:							
Si2	Social aleination	4.01	.42	2.42	.22	11.33*	.09
From the content scales:							
LSE	Low self-esteem	8.57	.76	5.32	.39	14.50*	.11
SOD	Social discomfort	9.96	.92	6.49	.48	11.29*	.09
Additional scales:							
A	Level of distress	18.82	1.54	12.85	.80	11.83*	.09
ES	Ego strength	32.73	1.13	37.14	.58	12.10*	.09
MDS	Marital distress	5.66	.51	3.82	.26	1.29*	.08

*p < .0014.

Table 5.
Partial results of the MANCOVA: means and standard deviations of the scores on the MMPI-2 scales depending on the tendency for low registry.

Scale code	Scale description	Participants with an increased tendency for low registry (N = 30)		Participants with a normal/decreased tendency for low registry (N = 93)		F	η^2
		M	SD	M	SD		
From the clinical scales:							
WSD	Distress	10.75	1.10	6.67	.53	11.22*	.09
From the content scales:							
LSE	Low self-esteem	8.69	.78	5.29	.38	15.27*	.11
WRK	Problems at work	12.90	1.07	8.45	.52	13.92*	.11
Additional scales:							
A	Level of distress	18.92	1.61	12.83	.78	11.59*	.09

*p < .0014.

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"sensory sensitivity", "sensory avoidance" and "low registration". The stronger the tendency of the subject for one or more of this patterns, the higher is the likelihood they will report more anxiety, somatization, distress characteristics, interpersonal difficulties, lack of ego strength, thought distortions and poignancy.

The only variables that had significant correlations with all sensory profiles were scales measuring aspects of Introversion; Social Introversion (SI), Shyness (SI1, a subscale of SI), and Social Discomfort (SOD). These three variables correlated positively with Sensory Sensitivity, Sensory Avoidance, and Low Registration Sensory types, but negatively with Sensory Seeking type.

The current study indicates that compared to individuals with a normal neurological threshold, individuals with atypical sensory pattern demonstrated lower self-esteem, more social discomfort, more distress and less ego strength.

Furthermore, it was found that those with a low neurological threshold and a passive behavioral response report more social introversion, distress and problems at work. In contrast, participants with a low neurological threshold and an active behavioral response showed a higher score on the alienation from self and other scale and more problems in the family.

The finding of the current study that individuals with sensory sensitivity are characterized by a higher level of social introversion, shyness, and social discomfort supports earlier studies which found similar associations (Aron & Aron, 1997; Aron, Aron, & Davies, 2005).

Sensory Sensitivity Profile: Low Neurological Threshold and Active Behavioral Response

Since high scorers on Sensory Sensitivity experience intense sensory reactions to sensory stimuli, they are likely to control their physical environment by accommodating it to their special tendencies and needs. As opposed to the physical environment, the social environment is more difficult, sometimes even impossible to control. This may explain their feelings of tension, anxiety and nervousness, and their problems in initiating social relationships.

Sensory Avoidance Profile: Low Neurological Threshold and Active Behavioral Response

The findings of the current study suggest interpersonal difficulties characterizing individuals with a Sensory Avoidance type as opposed to those with a Sensory Sensitivity type. These variables include social alienation, social isolation, interpersonal difficulties and family problems and crises.

High Neurological Threshold

The findings of the current study indicate that a high neurological threshold may be related to either a tendency for introversion or extroversion, depending on the response strategy (active or passive). Previous studies found a relationship between sensory hypersensitivity and social introversion and shyness (Aron & Aron, 1997; Aron, Aron, & Davies, 2005). The current study suggests that social introversion is strongly related to sensory processing, when. high levels of sensory processing are related to high levels of introversion or extroversion. These findings have a theoretical significance given the little research on the subject of high neurological thresholds.

Low Registry Type: High Neurological Threshold and Passive Behavioral Response

Individuals with low registry are characterized by a lack of response to sensory stimuli, and they may appear as indifferent and lacking interest in the world. There is very little empirical research on this type of processing.

The tendency for social introversion that includes social withdrawal, shyness and lack of self esteem in social situations increased as the tendency for low registry processing increased.

The findings of the current study suggest that individuals with low registry processing demonstrate features that are similar to those of individuals with a low neurological threshold, which include higher levels of distress, somatization, preoccupation with the body, anxiety, negative self-esteem and problems at work. In addition, similarly to the correlations found regarding the low neurological threshold, as the low registry sensory processing is more profound, somatization, distress, weaker ego strength, social deviance, a tendency for poignancy, anxiety, thought disorders that stem from distress and social introversion are more likely to occur.

These findings add a new aspect to the existing theoretical knowledge and emphasize the significance of understanding the psychological difficulties that characterize individuals with low registry processing. In addition, the similarity between the features of individuals with a high neurological threshold and a passive response strategy and individuals with a low neurological threshold and a passive response strategy might suggest a mixed model of abnormal sensory processing. It seems that the primary difficulty of some individuals with abnormal sensory processing is regulating the sensory processing, so that they oscillate between low and high neurological thresholds. This results in lower social skills. A study that examined the relationship between sensory processing and disorders of the autistic spectrum, found that 60% of the individuals with autistic-spectrum disorders demonstrated higher scores on more than one sensory processing type. The authors argued that disorders on the autistic spectrum are related to abnormal sensory processing of both kinds (sensory hyposensitivity and sensory hypersensitivity), so that the sensory processing disruption stems from regulation difficulties and oscillations between high and low neurological thresholds (Crane, Goddard, & Pring, 2009). Thus, individuals with a passive behavioral response seem to be most susceptible to these regulation difficulties.

Sensory Seeking Profile: High Neurological Threshold and Active Behavioral Response

High-scorers on Sensory Seeking are characterized by low tendency for social introversion and extravagant characteristics. Moreover, the stronger the tendency for sensory seeking, there is less probability for depressive symptoms. These findings suggest that people with sensory seeking profile may not experience stress, which is consistent with previous studies on this processing type (Miller, Anzalone, Lane, Cermak, & Osten, 2007). Several studies found that there is a connection between the intention and will to take part in high-risk sports activities and the need for physiologic stimulation (Diehem & Armatas, 2004; Franques et al., 2003; Shoam, Rose, & Kahle, 1998).

Demoralization and Sensory Processing

One of the most important common factors in the MMPI-2 is

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"Demoralization" (Almagor & Koren, 2001; Tellegen et al., 2003). Demoralization is experienced as a persistent inability to cope, together with associated feelings of helplessness, hopelessness, meaninglessness, subjective incompetence and diminished self-esteem. It was found that this factor has a major contribution on vast majority of the major psychological disorders measured by the MMPI-2 (Almagor & Koren, 2001, Tellegen et al., 2003). The work of Tellegen and associates (2003, 2008) provide strong evidence for the prominence of demoralization in understanding the nature of psychological disorders. In the current study, it is clear that demoralization and introversion plays a key factor in explaining the findings.

Recent studies have found significant correlations between SPD and psychological difficulties among healthy adults. Engel-Yeger & Dunn (2011a) demonstrated how anxiety (trait anxiety and state anxiety) is related to extreme sensory processing pattern. Another study by Engel-Yeger & Dunn (2011b) revealed the connection between SPD and positive/negative Affect when negative affect correlated with Sensory Sensitivity, Sensory Avoiding and Low Registration and positive affect correlated with sensory seeking. Theses finding are consistent with the result of the current study, suggesting the important role of sensory processing in psychological and interpersonal difficulties.

Conclusion

Clinically, the current study contributes to the understanding of how sensory processing in everyday life relates to psychological experiences and behavior.

Our findings do not support Dunn's sensory processing model. The psychological and social difficulties were related to three of the sensory processing types. These findings suggest that a bipolar model of sensory processing with regard to psychological and social difficulties may be a more precise one.

Limitations the Study

In order to examine the nature of the sensory processing, the current study used a self report questionnaire that examines behaviors after an encounter with sensory stimuli. Future studies on the sensory processing and clinical features subject that will use physiological measures that evaluate directly, objectively and measurably the reaction to sensory stimuli, will be able to strengthen the validity of the findings in this study.

The current study examined the sensory processing patterns in a distinct manner. As aforesaid, it may be that in certain conditions, the sensory processing disturbance stems from regulation difficulties and therefore it is expressed by oscillations between a high neurological threshold and a low one. Future studies in the field, that will be conducted on larger samples and on more varied populations as far as age and clinical syndromes are concerned, can investigate in a more focused manner the possible oscillations in the sensory functioning.

The current study is a correlation study, and therefore it cannot be indicative of causal relations between sensory processing defects and clinical features. However, it is important to indicate that sensory processing defects are neurological defects, so it is likely that they form the ground for the development of the personality, in an interaction with environmental factors, of course. It can also be assumed that the relationship is not unidirectional and that the developing clinical features contribute to the development of the neurological defects. Future studies in the field can examine the influence of sensory processing difficulties on the development of the personality. In addition, more studies are needed regarding the interaction between sensory processing defects and environmental variables in the prediction of psychological difficulties and clinical features. The findings indicate that individuals with an increased tendency for sensory avoidance suffer from higher levels of stress (A), suffer more from a sense of alienation from themselves and others (Si2), have lower self-esteem (LSE), and social discomfort (SOD). They also suffer from a higher general level of distress (A), family problems (MDS) and less ego strength (ES).

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