Relationship Between Pain Catastrophizing Level and Sensory Processing Patterns in Typical Adults

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**KEY WORDS**
- activities of daily living
- pain threshold
- sensation disorders
- sensory processing
- sensory threshold

**OBJECTIVE.** We examined the relationship between pain perception, as expressed by pain catastrophizing level, and sensory processing patterns among typical adults.

**METHOD.** Two hundred ninety healthy adults participated in this study: 138 men and 152 women. Their ages ranged from 18 to 50 (mean age = 30.2 ± 6.8). All participants completed the Adolescent/Adult Sensory Profile and the Pain Catastrophizing Scale (PCS).

**RESULTS.** PCS scores significantly correlated with Low Registration, Sensory Sensitivity, and Sensation Avoiding. Women had higher sensory sensitivity and a higher pain catastrophizing level than did men.

**CONCLUSION.** Sensory processing patterns may be related to individual pain perception, as expressed in pain catastrophizing level. Intervention programs should take these factors into account to be more focused on the specific needs of each client, facilitate his or her optimal engagement in daily living activities, and elevate well-being.


**Pain** significantly enhances disability and negatively affects social and occupational functioning (Sullivan & Loeser, 1992). Across the breadth of research and practice care settings, including occupational therapy, pain and its perceived effect on daily function are poorly assessed (Cadogan et al., 2008; Ferris, 2009). This study examined whether a relationship exists between the perception of pain sensation, as measured by pain catastrophizing level, and individual sensory processing patterns in other modalities, as expressed in daily living situations.

The complex phenomenon of pain has physiological, behavioral, emotional, and cognitive aspects. A specific cognitive aspect receiving growing attention in the pain literature is **pain catastrophizing**, an exaggerated negative cognitive response to actual or anticipated pain experience. It involves rumination about painful sensations, magnification of the threat value of the painful stimulus, and perceived inability to control pain (Sullivan, Bishop, & Pivic, 1995; Sullivan & Neish, 1999; Sullivan, Stanish, Waite, Sullivan, & Tripp, 1998). The level of pain catastrophizing is associated with enhanced pain experience and pain-related outcomes caused by augmented nociception processing through the affective and cognitive processes (Bartley & Rhudy, 2008; Gracely et al., 2004; Granot & Ferber, 2005). Thus, it has a significant effect on a person’s pain experience and response (Sullivan et al., 2001).

A possible mechanism of action for greater pain catastrophizing was proposed by Sullivan et al. (2001), who claimed that catastrophizing represents a multidimensional trait in which activation, appraisal, attention, and coping play a role in the experience of noxious events. The Appraisal Model (Jensen, Turner, Romano, & Karoly, 1991; Thorn, Rich, & Boothby, 1999) explains that primary appraisals, which are the judgments about whether a potential
stressor is irrelevant, benign–positive, or stressful, interact with secondary appraisals, the beliefs about coping options and their possible effectiveness, and influence whether and which coping responses will be attempted (Haythornthwaite & Heinberg, 1999; Thorn et al., 1999). The use of specific strategies to cope with a stressful sensory event is also prevalent among people with atypical sensory processing patterns (Kinnealey & Fuiek, 1999).

Sensory processing refers to the ability to register and modulate sensory information and to organize this sensory input to execute adaptive responses to situational demands and thus successfully engage in daily occupations (Humphry, 2002). Evidence is growing that people process sensory information in different ways. Specifically, some people are more sensitive than others to sensory information (Aron & Aron, 1997; Dunn, 2001). They often perceive sensory events as noxious (Bundy, Lane, & Murray, 2002) and exhibit behaviors with catastrophizing traits. A possible explanation for these reactions may be found in Dunn’s (1997) Model of Sensory Processing.

Dunn (1997) developed a model of sensory processing that outlines the relationship between the person’s neurological thresholds and the behavioral response–self-regulation continua (Brown, Tollefson, Dunn, Cromwell, & Filion, 2001; Dunn, 1997). People found at the edges of the interaction of the two continua exhibit atypical sensory processing patterns.

The neurological threshold is the point at which input is sufficient to cause a nerve cell or a system to activate (Kandel, Schwartz, & Jessell, 2000). The two poles of the neurological threshold continuum are low and high. A person at the low pole requires low-intensity stimuli for neurons to fire and for the person to react. A person at the high pole requires high-intensity stimuli or takes longer to react to the same stimuli. The two poles of the self-regulation continuum are anchored by passive versus active coping strategies. People who use passive strategies would not counteract in response to unpleasant stimuli, whereas people who use active strategies act to control the amount and type of sensory input (Dunn, 2007). According to Dunn’s (2007) model, the interaction of the two continua results in four sensory processing patterns. People with high neurological thresholds experience either low registration (which reflects passive responses) or sensation seeking (which reflects an active response). With low registration, people fail to detect or have slow responses to sensation. With sensation seeking, people experience pleasure from a rich sensory environment and behaviors that create sensation.

The other two patterns refer to people with low neurological thresholds: sensation avoiding, which is an active strategy in response to a low neurological threshold, and sensory sensitivity, which reflects a passive pattern in response to low thresholds. People with avoiding patterns engage in behaviors that limit exposure to stimuli, whereas people with sensory sensitivity experience distractibility and discomfort with sensation (Dunn, 1997).

The new nosology suggested by Miller, Anzalone, Lane, Cermak, and Osten (2007) refers to atypical sensory processing patterns as sensory processing disorders. One category of these disorders describes sensory modulation disorders, which include three subtypes:

1. People with sensory underresponsivity (SUR), who fail to respond to sensory stimuli, including pain. SUR may lead to lethargy.
2. People with sensory seeking and craving (SS), who energetically engage in actions that add intense sensations to their bodies. SS may negatively influence social interactions.
3. People with sensory overresponsivity (SOR), who respond to sensation, including pain, faster, with more intensity, or for a longer duration than people with typical sensory responsivity. People with SOR express negative, impulsive, or aggressive responses or avoidance of sensation (Miller et al., 2007) and are more likely to experience depression or anxiety disorders such as social phobia (Neal, Edelmann, & Glchan, 2002) and avoidant personality disorder (Johnson, Turner, & Ivata, 2003; Meyer & Carver, 2000). Moreover, they may experience nonharmful sensations as painful (Bundy et al., 2002; DeGangi, 2000; Liss, Timmel, Baxley, & Killingsworth, 2005).

Enhanced emotional and cognitive processes, as well as the use of coping strategies to manage the discomfort of sensory stimuli, are often found among people with a low threshold to sensations, that is, people with SOR (Kinnealey, Oliver, & Wilbarger, 1995). This finding was reported with regard to healthy people (i.e., those with no sensory processing difficulties and no other problems) and among people with sensory processing difficulties as a part of a general disorder. For example, people with posttraumatic stress disorder (PTSD) exhibit exaggerated activation of preattentional and attentional processes of sensory stimuli as measured by evoked response potentials (ERP; Morgan & Grillon, 1999).

Previous studies with people with affective disorders noted that although sensory hyporesponsivity was associated with depression and with low levels of arousal, sensory hypersensitivity was correlated with anxiety and high levels of arousal (Lane, 2002; Neal et al., 2002; Pfeiffer & Kinnealey, 2003; Pfeiffer, Kinnealey, Reed, & Herzberg,
2005). Thus, it may be suggested that the uncomfortable bodily sensations of people with sensory hypersensitivity or sensation avoiding may also be related to their general catastrophic thinking styles (Drahovzal, Stewart, & Sullivan, 2006).

Both sensory processing patterns and pain perception are major contributing factors to emotional responses and cognitive and coping strategies (Kinnealey & Fuiek, 1999). Indeed, studies about behavioral trends of people with sensory hypersensitivity or overresponsivity have described patterns similar to those of people who suffer from pain disorders (Arnold et al., 2008; Egger, Costello, Erkanli, & Angold, 1999; Gignac et al., 2008; Kinnealey & Fuiek, 1999). The literature suggests that central sensitization processes play a role in the modulation of various sensory input as well as pain (Ayesh, Jensen, & Svensson, 2007; Lloyd, Findlay, Roberts, & Nurmikko, 2008; van Laarhoven et al., 2007). However, knowledge is scarce about whether a relationship exists between sensory processing patterns and pain phenomena and what the special characteristics of that relationship are.

Occupational therapists are involved in evaluating and treating people with impairments that involve pain as well as people who suffer from sensory processing, affective, and cognitive disorders (Pfeiffer et al., 2005). To better meet clients’ needs, the knowledge of the relationship between pain perception and individual sensory processing patterns should be elucidated. This study aimed to examine this relationship among typical people. Specifically, the research questions were as follows: (1) Does a relationship exist between sensory processing patterns and pain catastrophizing? (2) If so, what are the special characteristics of this relationship (i.e., does pain catastrophizing level correlate with specific sensory processing patterns)?

Answering these two questions may contribute to theory and practice in the following ways: First, the answers will improve understanding of basic common underlying mechanisms in perception processes of sensory events in various modalities, noxious or nonnoxious. Second, understanding traits among typical adults may serve as a platform for further examining pain and sensory processing patterns among people with physiological, behavioral, emotional, or cognitive disabilities that are often characterized by atypical sensory processing patterns (e.g., people with mental health disorders, such as schizophrenia [Brown, Cromwell, Filion, Dunn, & Tollefson, 2002], people with autism [Kientz & Dunn, 1997], and people with Asperger syndrome [Dunn, Myles, & Orr, 2002; Pfeiffer et al., 2005]).

Method

Participants

This correlative and comparative cross-sectional study involved 290 healthy participants, 138 men and 152 women. Their ages ranged from 18 to 50 years (mean = 30.2 ± 6.8). Mean years of education was 14.55 ± 2.13. Exclusion criteria included the presence of systemic severe chronic diseases, pain disorders, severe impairments in the nervous system, and medication use on a daily basis. All participants were recruited by an advertisement published in several neighborhoods in north Israel calling for participation in a study about sensations and pain perception.

Instruments

This study relied on two assessments: the Adolescent/Adult Sensory Profile (AASP; Brown & Dunn, 2002) and the Pain Catastrophizing Scale (PCS; Sullivan et al., 1995).

Adolescent/Adult Sensory Profile. The AASP is based on Dunn’s Model of Sensory Processing (Dunn, 1997). In this self-report tool, respondents answer questions about their responses to sensory experiences. The 60 items include questions pertaining to each of the sensory systems. For scoring, the 60 items are sorted equally into four quadrants: Low Registration, Sensation Seeking, Sensory Sensitivity, and Sensation Avoiding (based on factor analysis), reflecting different sensory processing patterns. Participants indicate how often they respond to the sensory event in the manner described in the items using a 5-point Likert scale (ranging from 1, almost never, to 5, almost always). The resultant score for each quadrant ranges from 5 to 75. Using national samples of 950 adolescents and adults (ages 11–90), the authors calculated cut scores that indicate when scores are significantly different from their peers’ responses. Each age group (11–17, 18–64, and ≥65) has its own norms. This questionnaire has good internal consistency; coefficient α values are .692 for Low Registration, .639 for Sensation Seeking, .657 for Sensory Sensitivity, and .699 for Sensation Avoiding (Pohl, Dunn, & Brown, 2003). This questionnaire was translated into Hebrew and back-translated into English by bilingual occupational therapists to examine the validity of the translated form.

Pain Catastrophizing Scale. The PCS was used to assess the pain catastrophizing level. The questionnaire includes 13 items representing the three components of pain catastrophizing: rumination (e.g., “I can’t seem to keep it out of my mind”); magnification (e.g., “I wonder whether something serious may happen”); and helplessness (e.g., “There is nothing I can do to reduce the intensity of pain”). This scale has been validated in Hebrew (Granot...
Participants were asked to complete the questionnaire in reference to a previous pain event and indicate the degree to which they experienced the 13 thoughts or feelings during the event on a 5-point Likert scale ranging from 0 (not at all) to 4 (always). The PCS provides a total score and three subscale scores: (1) assessing rumination, (2) magnification, and (3) helplessness. The psychometric data of the PCS showed high internal consistency (Cronbach’s α = .87). Test–retest reliability was high (r = .75). Items within each subscale were strongly related to each other (Osman et al., 1997; Sullivan et al., 1995). Total α score for the PCS Hebrew version (entire scale) was .86. Cronbach’s α for each PCS factor was as follows: rumination, .93; helplessness, .92; and magnification, .65 (Granot & Ferber, 2005).

Procedure

After receiving ethical approval from the institutional review board of Haifa University, advertisements for participation in this study were published in several neighborhoods. Participants who wished to take part in the study telephoned the research coordinator and completed a questionnaire that included sociodemographic data and information about health status. This questionnaire was used to determine participant eligibility as well as to determine subgroups. Participants who met the inclusion criteria were asked to complete the questionnaires in their home in the presence of the data collector. After signing the consent form, participants completed the AASP and the PCS.

Data Analysis

Pearson correlation was used to examine the relationship between AASP and PCS scores. We performed t tests and analyses of variance, with Scheffé post hoc test (Maxwell & Delaney, 2004), to examine the significance of differences between genders and between the four patterns of sensory processing. Logistic regression examined whether pain catastrophization may be predicted by sensory processing patterns. Probabilities ≤ .05 were considered significant.

Results

Relationship Between Sensory Processing Patterns and Pain Catastrophizing Level

Table 1 shows the means and standard deviations of AASP quadrants and PCS scores in the total sample. This table also depicts the percentage of participants found in each range of the AASP quadrants. According to Table 1, the sample’s AASP quadrant mean scores were found in the “Similar to Most People” range of the AASP, meaning that all scores were found in the typical performance range.

Significant positive correlations were found between PCS scores and the sensory processing patterns of Low Registration, Sensory Sensitivity, and Sensation Avoiding (Table 2).

Despite the five ranges presented for each pattern in the AASP manual (i.e., Much less than most people, Less than most people, Similar to most people, More than most people, and Much more than most people), we merged the original five AASP ranges into three ranges: (1) Much less than most people and Less than most people were merged and defined as Less than most people, (2) Similar to most people was not changed, and (3) More than most people and Much more than most people were merged and defined as More than most people. The categories were merged so as to have a larger number of participants in each range.

Using the new divisions, significant differences were found between Sensory Sensitivity, Sensation Avoiding, and Low Registration patterns and total PCS score (Table 3). The Scheffé post hoc test demonstrated that higher levels of sensory sensitivity, sensation avoiding, and low registration were associated with higher pain-catastrophizing scores.

Table 1. Means and Standard Deviations of Adolescent/Adult Sensory Profile (AASP) Quandrants and Pain Catastrophizing Scale (PCS) Scores

<table>
<thead>
<tr>
<th>Scales</th>
<th>Mean (SD)</th>
<th>% Much Less Than Most People</th>
<th>% Less Than Most People</th>
<th>% Similar to Most People</th>
<th>% More Than Most People</th>
<th>% Much More Than Most People</th>
</tr>
</thead>
<tbody>
<tr>
<td>AASP quadrants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Registration</td>
<td>33.71 (9.1)</td>
<td>1.0</td>
<td>5.9</td>
<td>60.7</td>
<td>24.1</td>
<td>8.3</td>
</tr>
<tr>
<td>Sensation Seeking</td>
<td>47.86 (6.9)</td>
<td>3.8</td>
<td>15.5</td>
<td>70.3</td>
<td>9.0</td>
<td>1.4</td>
</tr>
<tr>
<td>Sensory Sensitivity</td>
<td>36.93 (8.2)</td>
<td>0.0</td>
<td>6.6</td>
<td>65.2</td>
<td>19.3</td>
<td>9.0</td>
</tr>
<tr>
<td>Sensation Avoiding</td>
<td>32.62 (6.3)</td>
<td>2.1</td>
<td>13.1</td>
<td>76.6</td>
<td>7.6</td>
<td>0.7</td>
</tr>
<tr>
<td>PCS scores</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ruminaiton</td>
<td>8.57 (4.4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magnification</td>
<td>4.58 (2.9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Helplessness</td>
<td>9.72 (5.4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>22.87 (11.3)</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
In the Sensation Seeking quadrant, no significant difference was found in total PCS score between the three AASP ranges.

Role of Age in Pain Catastrophizing and Sensory Processing

The only significant correlation was found between age and Sensation Seeking mean score \( r = -0.123, p = 0.036 \), meaning that as age rises, the tendency for sensation seeking is lower. This finding is consistent with findings from other studies with older adults (Pohl et al., 2003). No significant correlation was found between age and each of the PCS measures.

Role of Gender in Pain Catastrophizing and Sensory Processing

According to multivariate analysis of variance, significant differences existed between the genders in AASP scores \( F[4, 285] = 3.89, p = 0.004 \). Table 4 illustrates that the differences were expressed only in the Sensory Sensitivity pattern. In the PCS scores, women had higher scores in rumination and helplessness as well as in the PCS total score.

Predicting Sensory Processing Patterns Related to Low Neurological Threshold, by Gender and PCS Score

We divided the sample into two groups on the basis of low threshold quadrants: (1) Sensory Sensitivity or Sensation Avoiding \( (n = 85) \) and (2) those found in all other ranges of these sensory processing patterns \( (n = 205) \). Logistic regression revealed that both gender and total PCS scores predicted the participants’ inclusion in the groups representing low threshold to sensory stimuli \( (\chi^2[2] = 13.12, p < 0.001, N = 81) \). For total PCS score, Wald (Harrell, 2001) = 4.12, \( p = 0.041 \). For gender, Wald = 5.97, \( p = 0.015 \). Accordingly, women had higher pain catastrophizing levels and higher chances to be included in the hypersensitivity range.

We also divided the sample into two groups that refer to the Low Registration pattern: (1) Participants found to be in the More than most people range and Much more than most people \( (n = 94) \) and (2) those found in all other ranges of these sensory processing patterns \( (n = 196) \). Logistic regression also revealed that the total PCS score was a significant predictor for participants belonging to the group representing Low Registration in the first range, accounting for 10% of the variance \( (Wald = 18.66, p < 0.001) \).

Table 2. Correlations Between Adolescent/Adult Sensory Profile Quadrants and Pain Catastrophizing Scale (PCS) Scores

<table>
<thead>
<tr>
<th>PCS Scales</th>
<th>Low Registration</th>
<th>Sensation Seeking</th>
<th>Sensory Sensitivity</th>
<th>Sensation Avoiding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rumination</td>
<td>.164**</td>
<td>ns</td>
<td>.304***</td>
<td>.239***</td>
</tr>
<tr>
<td>Magnification</td>
<td>.182**</td>
<td>ns</td>
<td>.202**</td>
<td>.200***</td>
</tr>
<tr>
<td>Helplessness</td>
<td>.205***</td>
<td>ns</td>
<td>.280***</td>
<td>.268***</td>
</tr>
<tr>
<td>Total PCS</td>
<td>.209***</td>
<td>ns</td>
<td>.304***</td>
<td>.272***</td>
</tr>
</tbody>
</table>

Note. ns = not significant. **\( p \leq 0.01 \). ***\( p \leq 0.001 \).

Table 3. Significance of Difference Between Mean of PCS Total Score in Each AASP Quadrant

<table>
<thead>
<tr>
<th>AASP Quadrants</th>
<th>Mean of PCS Total Score (SD)</th>
<th>( R(2, 287) )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AASP Sensory Sensitivity quadrant ranges</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low ( (n = 19) )</td>
<td>11.63 (7.56)</td>
<td>12.05***</td>
</tr>
<tr>
<td>Normal ( (n = 189) )</td>
<td>22.88 (10.93)</td>
<td></td>
</tr>
<tr>
<td>High ( (n = 82) )</td>
<td>25.21 (11.35)</td>
<td></td>
</tr>
<tr>
<td><strong>AASP Sensation Avoiding quadrant ranges</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low ( (n = 44) )</td>
<td>19.23 (11.73)</td>
<td>9.45***</td>
</tr>
<tr>
<td>Normal ( (n = 222) )</td>
<td>22.68 (10.82)</td>
<td></td>
</tr>
<tr>
<td>High ( (n = 24) )</td>
<td>31.25 (10.83)</td>
<td></td>
</tr>
<tr>
<td><strong>AASP Low Registration quadrant ranges</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low ( (n = 20) )</td>
<td>19.35 (12.69)</td>
<td>11.75***</td>
</tr>
<tr>
<td>Normal ( (n = 176) )</td>
<td>20.89 (10.82)</td>
<td></td>
</tr>
<tr>
<td>Normal ( (n = 176) )</td>
<td>20.89 (10.82)</td>
<td></td>
</tr>
</tbody>
</table>

Note. \( N = 290 \). AASP = Adolescent/Adult Sensory Profile; PCS = Pain Catastrophizing Scale; SD = standard deviation. ***\( p \leq .001 \).
Discussion

Pain Catastrophizing Level and AASP Quadrants

Significant positive correlations were found among all PCS subtests (i.e., rumination, magnification, and helplessness as well as total PCS scores) and low threshold sensory processing patterns (i.e., sensory sensitivity and sensation avoidance) as well as the Low Registration pattern. However, the correlations were weak, probably because they were measured among typical adults. Further studies in people with mental or cognitive impairments should examine this relationship and its strength.

According to the results, people who are more sensitive to stressful events seem to have two facets of less efficient processing abilities (i.e., expressed by greater sensory sensitivity and enhanced pain response). Previous literature mentioned that people with a low threshold for sensations and pain show hypervigilance, increased level of attention and arousal, and the need to control or avoid situations (Kinnealey & Fuiek, 1999; Last & Hersen, 1988). They may use cognitive and emotional coping strategies to deal with unpleasant sensations. Jerome and Liss (2005) elaborated on this point and stated that people with sensory hypersensitivity tended to focus on the cause of emotional distress and express that concern to others, whereas people with sensory avoidance tended to avoid all situations in which coping might be required.

People with a Low Registration pattern showed a higher pain catastrophizing level expressed in all PCS subscales; this finding may have several explanations. It may be that people in this group fail to detect sensations in a graded manner and can even miss “hints” of coming pain in their surroundings. Thus, when they startle into the pain experience, it is accompanied by a higher catastrophizing level. The theoretical models described by Sullivan et al. (2001) may strengthen this explanation. The first is the Appraisal Model, in which people with low registration have difficulties in judging whether a potential stressor is relevant (primary appraisals). This difficulty may be related to their beliefs about coping options and their possible effectiveness (secondary appraisals). In this regard, their coping strategy is to deny stressors and to disengage both behaviorally and mentally from the stressor (Jerome & Liss, 2005).

The second theoretical model described by Sullivan et al. (2001) is the Attentional Model. According to the Attentional Model, people with low registration may exaggerate the threat value of pain sensations, which increases their attentional focus on pain. Additional studies that also use neurophysiological models should examine this point.

The only sensory processing pattern that did not significantly correlate with PCS scores was sensory seeking. Jerome and Liss (2005) suggested that seekers exert control over their circumstances with regard to both sensory stimulation and emotions.

Role of Age in Pain Catastrophizing and Sensory Processing

In previous studies, age correlated with lower tendency for sensation seeking (e.g., Lawton, Kleban, Rajagopal, & Dean, 1992; Pohl et al., 2003). This result highlights older adults’ lower responsivity to sensations (Ford et al., 1995; Taylor, Alsup, & Parkes, 1995) and the way in which they may interact with their environments (Nusbaum, 1999). On the contrary, no significant correlation was found between age and each of the PCS measures. It may be assumed that pain catastrophizing is a solid trait and is not significantly affected by age.

Table 4. Difference Between Mean Scores of Adolescent/Adult Sensory Profile (AASP) and Pain Catastrophizing Scale (PCS) Total Score of Both Genders

<table>
<thead>
<tr>
<th>Variable</th>
<th>Men (n = 138)</th>
<th>Women (n = 152)</th>
<th>F(1, 288)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AASP scores</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Registration</td>
<td>33.83 (10.15)</td>
<td>33.56 (8.02)</td>
<td>0.54</td>
</tr>
<tr>
<td>Seeking</td>
<td>47.24 (6.68)</td>
<td>48.41 (6.98)</td>
<td>2.13</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>35.37 (8.24)</td>
<td>38.34 (7.88)</td>
<td>9.86*</td>
</tr>
<tr>
<td>Avoiding</td>
<td>32.16 (6.72)</td>
<td>33.02 (5.91)</td>
<td>1.33</td>
</tr>
<tr>
<td>PCS scores</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rumination</td>
<td>7.50 (4.43)</td>
<td>9.54 (4.12)</td>
<td>16.53***</td>
</tr>
<tr>
<td>Magnification</td>
<td>4.31 (2.91)</td>
<td>4.83 (2.88)</td>
<td>2.30</td>
</tr>
<tr>
<td>Helplessness</td>
<td>8.38 (5.13)</td>
<td>10.93 (5.34)</td>
<td>17.09***</td>
</tr>
<tr>
<td>PCS total score</td>
<td>20.18 (11.04)</td>
<td>25.31 (10.97)</td>
<td>t = −3.95***</td>
</tr>
</tbody>
</table>

Note. SD = standard deviation. df for t = 1.
*p ≤ .05, ***p ≤ .001.
Role of Gender in Pain Catastrophizing and Sensory Processing

The results of the regression analysis confirmed that gender (female) and higher pain catastrophizing were associated with a higher level of sensory hypersensitivity. Similarly to the reports of Osman et al. (1997), Sullivan et al. (1995), and Sullivan, Tripp, Rodgers, and William (2000), the differences between genders were found only on the rumination and helplessness subscales. It is well accepted that women demonstrate a higher level of pain catastrophizing than men (Cano, Leonard, & Franz, 2005; Sullivan et al., 1995, 2001). Women also show higher sensitivity to pain (George, Wittmer, Fillingim, & Robinson, 2007) and to other sensory modalities than do men (Chopra, Baur, & Hummel, 2008; Takekuma, Ando, Niino, & Shimokata, 2000). This finding may explain why women show higher rates of health care utilization (Taylor & Curran, 1985) and display more pain behaviors (Keefe et al., 2000; Sullivan, Tripp, & Santor, 2000).

As Sullivan et al. (2001) stated, additional studies are needed on the factors that contribute to the evolution of catastrophizing to develop more effective interventions for pain disorders. These studies should refer to sensory processing patterns as well.

In summary, a relationship may exist between sensory processing patterns and pain catastrophizing level, suggesting that both factors may share a common cognitive and affective vulnerability that contains excessively negative information and beliefs about sensations and pain-related experiences and the ability to cope with them. The issue of whether cognitive and personality traits determine the sensory processing patterns or vice versa needs to be addressed in further prospective or interventional studies.

Extreme responses to sensory stimuli (including pain) interfere with successful participation in daily living (Brown & Dunn, 2002; Brown et al., 2001; Dunn, 2007), physical and mental status, and personal relationships (Ahn, Miller, Milberger, & McIntosh, 2004; Brown, Brown, & Bayer, 1994; King et al., 2007; Schleien, Green, & Heyne, 1993) and, therefore, significantly impair well-being. Thus, the relationship between pain perception and sensory processing patterns should be further examined among typical people as well as among people with disabilities involving pain or with sensory processing disorders.

Clinical Applications

Occupational therapists aim to help patients attain, regain, or maintain their ability to participate in occupations (Youngstrom, 2002). Thus, an important facet of occupational therapy intervention involves the way in which people process sensations and how sensory processing relates to the cognitive and emotional states needed for participation. When we understand the contribution of underlying factors to the person’s performance, participation, and well-being, we also have insights about how to design effective and individualized interventions.

For example, if pain experiences are related to patterns of sensory processing, then sensory processing knowledge can provide additional options for serving people whose pain is interfering with participation. Teaching people about their own patterns of sensory processing could generate ideas about how to manage situations that are more likely to trigger pain responses. Now that we have some insight into the relationship between pain and sensory processing patterns in a typical population, further study of populations who have pain as a comorbidity may expand our practice options with these people as well. By focusing intervention on the specific needs of individual clients, occupational therapists may facilitate people’s optimal engagement in daily living activities and promote their health status and well-being (Kinnealey, 1998; Pfeiffer, 2002).

Limitations and Future Research

This study is based on a convenience sample from a specific geographic area. Thus, the sample may not adequately represent the adult population, and generalizability of the study results is limited. Future research should examine the relationship between sensory processing patterns and additional personality traits and the way in which this relationship affects the individual’s performance and participation in daily living. These studies should be performed on typical people, as well as on people with cognitive, affective disorders or people with pain disorders. Studies should also measure whether considering individual sensory processing patterns in the intervention process affects intervention outcomes.

References

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