RESEARCH ARTICLE

Changes in Caregiver Knowledge and Perceived Competency Following Group Education about Sensory Processing Disturbances: An Exploratory Study

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Abstract

Parents or teachers (n = 10) of children diagnosed on the autism spectrum and exhibiting sensory processing disorders (SPD) attended a series of six weekly educational sessions designed to increase the participants’ knowledge of SPD, skills in interacting with children exhibiting SPD and confidence in intervening with children exhibiting undesirable behaviours stemming from SPD. The sessions consisted of group classroom instruction with instructional methods including PowerPoint-assisted lecture/discussion and short video clips. Pre-test and post-test assessment was made of the participants’ (a) self-perceived knowledge of sensory processing concepts; (b) actual knowledge of sensory processing concepts; and (c) self-rated competency for dealing with children exhibiting behaviours related to SPD. Statistical analysis revealed significant gains were achieved on all measures. The results were interpreted as indicating that group classroom instruction is an effective means of increasing such caregivers’ self-perceived knowledge of sensory processing concepts, actual knowledge of sensory processing concepts and self-rated competency for dealing with children exhibiting behaviours related to SPD. Future research to assess the short-term and long-term impacts of these gains and to gauge the relative effectiveness of various contents for such sessions is recommended. Copyright © 2016 John Wiley & Sons, Ltd.

Received 22 May 2015; Revised 23 August 2015; Accepted 22 September 2015

Keywords
caregiver training; autism; sensory processing

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Published online in Wiley Online Library (wileyonlinelibrary.com) DOI: 10.1002/oti.1435

Background

Sensory processing disturbances and/or disorders have become more widely accepted as diagnosable conditions, with the latest edition of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2013) including sensory hyporeactivity and hyperreactivity as diagnostic criteria for several conditions. Despite the editors of this edition choosing not to identify sensory processing disorder (SPD) as a discrete diagnosis, the Sensory Processing Disorder Foundation and other advocates continue to push for such a classification and point to scientific evidence for the increasing prevalence of SPD, the validity of such a diagnosis and the effectiveness of treatment for it (Miller, 2012).

Whether or not sensory processing disorders sometimes represent a discrete disorder and subdisorders, it is increasingly apparent that such atypicalities are frequently manifested in children diagnosed with an
autism spectrum disorder (ASD). Tomchek and Dunn (2007) reported differences in sensory processing between children with an ASD between ages 3 and 6 years and age-matched typically developing children as measured by the Short Sensory Profile (McIntosh et al., 1999), with 95% of the ASD group demonstrating some degree of sensory processing dysfunction and 84% of them falling within the definite difference classification as compared with 3% of the typically developing group.

Furthermore, a meta-analysis of 14 studies (Bensasson et al., 2008) found a significant difference between ASD and typically developing samples in the presence and frequency of sensory processing disorder and/or disturbance-related symptomology, as well as for the subcategories of sensory modulation disorder, specifically under-responsivity, over-responsivity and sensation seeking/craving. The identified sensory differences were highest in the research studies that included children aged 6–9 years, with more than 80% prevalence in the children in that age category carrying an ASD diagnosis.

Additionally, Lane et al. (2009) compared the sensory processing patterns and adaptive behaviour outcomes of 54 children with an ASD using the Short Sensory Profile (SSP) and the Vineland Adaptive Behaviour scales and found that the majority of the participants in the study demonstrated under-responsivity/sensation seeking (86% of the sample) and auditory filtering (92% of the sample) domains on the SSP.

Given this frequency, it is of concern that our clinical experience has been that parents of children diagnosed with an ASD often come to therapy with limited to no knowledge of sensory processing or sensory processing disturbances and/or disorders. Additionally, many of these parents appear to have limited knowledge of specific activities or strategies aimed at managing their children’s behavioural and cognitive responses to sensory stimuli that could be implemented at home and lack the competence or confidence to carry out activities that might be provided to them by therapists.

The increasing recognition of the frequent presence of sensory processing disturbances and/or disorders in children diagnosed with an ASD coupled with a general consensus regarding this knowledge deficit has engendered a corresponding effort to educate parents, caregivers and teachers of such children about this phenomenon. Instructional topics documented in the literature include efforts to educate caregivers about their children’s conditions (McConachie et al., 2005), sensory processing-related behaviours in general (Gee and Nwora, 2011), methods for accessing and navigating complex medical and educational systems (Turnbull et al., 1999) and techniques to improve their children’s behavioural and cognitive capacities (Drew et al., 2002).

Despite these efforts and the intuitive appeal of such educational approaches, there appears to be a limited body of evidence documenting the effectiveness of group-based caregiver training on self-perceived knowledge of sensory processing topics, actual knowledge of sensory processing topics and self-perceived competence in providing care for children with an ASD who are exhibiting challenging behaviours related to sensory processing. Among the evidence that supports such approaches is a study by Farmer and Reupert (2013) who showed that group meetings involving face-to-face instruction resulted in decreased stress and increased understanding of an ASD among participants. Symon (2005), however, found one-to-one caregiver training to also be an effective model of education, increasing caregiver’s general knowledge and ability to implement strategies at home.

In addition to variation in the structure of educational approaches (group vs. individual), the literature describes varied mediums of instruction. These have included more formal approaches such as PowerPoint presentations, videos and manuals as well as informal means such as group discussions and reflections (Symon, 2005; Farmer and Reupert, 2013). Barlow and Parsons (2003) published a review of the literature regarding group-based parent-training programmes (for improving emotional and behavioural adjustment in 0–3-year-olds) where mediums of delivery included videotape modelling programmes. Such videotapes coupled with feedback were used by Hames and Rollings (2009) in order to provide caregivers an opportunity to observe how others manage children’s behaviours.

The literature also shows variety in the treatment paradigm chosen for educational sessions, with both behaviour-based and cognitive-behavioural approaches represented. Reviews by Case-Smith and Arbesman (2008), who found support for behaviour-based approaches, and Barlow and Parsons (2003), who also found support for cognitive-behavioural programmes, were found. Additionally, Koegel et al. (2002) found that short-term, intensive parent education based on
pivotal response training, which deals with motivational strategies, to be effective.

The overall evidence regarding the effectiveness of parent education efforts appears to remain mixed with some authors (such as Sofronoff and Farbotko, 2002; Sofronoff et al., 2004) noting that it can improve the parent’s confidence and self-esteem while improving the child’s behaviour and with other authors (such as Drew et al., 2002; McConachie et al., 2005) noting that training parents to implement skill-based interventions has mixed evidence for its effectiveness in promoting the child’s performance and does not lower parent stress.

Additionally, there are gaps in the literature relating to caregiver education groups devoted to sensory processing disturbances/disturbances. According to Case-Smith and Arbesman (2008), there is a lack of evidence to support the pragmatic implementation of caregiver educational groups for this specific purpose. Of the studies reviewed, few, if any, had caregiver education groups devoted solely to sensory processing disturbances and/or disorders and its attendant challenging behaviours. Finally, Case-Smith and Arbesman (2008) noted that no study in their review offered caregiver strategies specific to deviant behaviours that might have their roots in SPD.

This study sought to fill these gaps by measuring the effectiveness of educational groups focused on sensory processing disturbances and/or disorders and their associated behaviours, specifically sensory over-responsivity and under-responsivity and sensory seeking/craving. The purpose of this study was to determine the effectiveness of a caregiver education group to increase perceived knowledge about SPD, actual knowledge about SPD and perceived competency for managing sensory-related behaviours in caregivers of children with ASD.

The research questions that guided this study were the following:

(1) Does a caregiver education group increase **self-perceived knowledge** of sensory processing topics in caregivers of children with ASD?
(2) Does a caregiver education group increase **actual knowledge** of sensory processing topics in caregivers of children with ASD?
(3) Does a caregiver education group increase self-perceived **competency of caregivers in addressing sensory processing disturbances** of children with ASD?

**Methods**

The study design was a pre-test/post-test, single-group design (Portney and Watkins, 2009) in which changes in three dependent variables were assessed to determine the effectiveness of a series of six education sessions (the independent variable). Three separate measures were used to assess the dependent variables, which were (a) self-perceived knowledge of sensory processing concepts, (b) actual knowledge of sensory processing concepts and (c) self-rated competency for dealing with children exhibiting behaviours related to sensory processing disturbances and/or disorders. The study protocol received approval from the Human Subjects Committee at Idaho State University.

**Inclusion/exclusion criteria**

To be included in this study, a person was required to be the caregiver (parent, classroom teacher or aide, child care provider, etc.) of a child, 5 to 10 years old, with a diagnosis of an ASD (as reported by the potential participant) demonstrating difficulty with sensory modulation difficulties (e.g. under-responsiveness, over-responsiveness or sensory seeking/craving). This difficulty could be determined in one of two ways: either it was reported by the potential participants, other caregivers or teachers who perceived the disturbance as disrupting the child’s daily routines (basic and instrumental activities of daily living, socialization, play/leisure and learning) at home, in school or in the community or it was identified on the Short Sensory Profile [parents (McIntosh et al., 1999)].

Other inclusion criteria included proficiency of the participant in the English language, both verbal and written, and availability to take part in six instructional sessions.

Exclusion criteria included persons who cared for or taught a child diagnosed with both an ASD and an additional developmentally related condition or conditions (Down syndrome, cerebral palsy, etc.). Additionally, persons who already had participated previously in a formal educational programme/curriculum focusing on sensory processing topics via face to face or in an on-line format were excluded.

**Subject identification and recruitment**

The participants were recruited from outpatient rehabilitation clinics in the community and from area
schools. Key personnel, including occupational therapists and school principals at the sites, were given written information regarding the study’s purpose, timeline and potential benefits and risks along with contact information for the Primary Investigator (PI). These people were encouraged to solicit potential participants and instruct them to contact the PI. Potential participants contacting the PI were given additional information about the study and screened during a telephone conversation to determine if they met its inclusion criteria. If the inclusion criteria were met, the potential participants were invited to attend the educational sessions. Informed consent was obtained from each of the participants prior to the first session.

**Description of the participants**

A total of 10 participants meeting inclusion criteria were recruited. Seven of the participants were parents of at least one child with a diagnosis of ASD. All of the parent participants were from two-parent families and had more than one child present in the home. Three of the participants were teachers whose students included at least one child with an ASD diagnosis. All participants completed the full programme of six 1-hour educational sessions.

**Intervention**

Six education sessions were held on consecutive weeks in the fall of 2013. The sessions, which were all held in a conference room on a college campus, lasted for 60 minutes and consisted of an ice-breaker activity, review of content from previous sessions, presentation of targeted content via lecture supported by PowerPoint and video, opportunity for questions and a wrap-up. The curriculum was designed by the PI based on portions of a nosology of sensory processing (over-responsivity/under-responsivity and sensory seeking/craving) as suggested by Lane et al. (2007) and included instruction in a parental reasoning approach for addressing challenging behaviours related to sensory processing titled A SECRET (Bailer & Miller, 2011; Miller, 2014); see Table I (bottom) for the list of weekly education session topics. The educational sessions were taught by second-year graduate students enrolled in the Master of Occupational Therapy programme at Idaho State University who were specifically trained by the PI prior to each session and supervised during the sessions.

![Table I. Instructional schedule](image)

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Sensory processing/sensory processing difficulties among individuals with autism spectrum disorder</td>
</tr>
<tr>
<td>Week 2</td>
<td>Proprioception/tactile (touch) sensory processing</td>
</tr>
<tr>
<td>Week 3</td>
<td>Vestibular (movement) sensory processing</td>
</tr>
<tr>
<td>Week 4</td>
<td>Olfactory/gustatory (smell/taste) sensory processing, auditory (sound) sensory processing, visual (vision) sensory processing</td>
</tr>
<tr>
<td>Week 5</td>
<td>Sensory seeking or craving/intervention principles for sensory processing</td>
</tr>
<tr>
<td>Week 6</td>
<td>Sensory diets, A SECRET (reasoning approach)</td>
</tr>
</tbody>
</table>

The pre-measures/post-measures were administered to each participant during the first week (Week 1) of the instructional schedule and on the last week (Week 6) of the schedule. Each participant completed all measures for both the pre-testing and post-testing. The Sensory Processing Learning Tool (SPLT), a modified version of a survey developed by Gee and Nwora (2011), was used to measure self-perceived knowledge of sensory processing concepts. The SPLT included 10 questions, each answered on a 7-point Likert scale, which were aligned with the sensory domains and SPD subtypes: exploring, over-responsivity/under-responsivity and sensory seeking/craving (Miller et al., 2007).

The Sensory Processing Knowledge Assessment (SPKA) was used to measure the actual knowledge of each participant. It consisted of a total of 15 application-based questions, falling within the comprehension and application levels of Bloom’s cognitive domain (Bloom and Krathwohl, 1956). The questions used as a part of the measure aligned with instructional objectives for each of the lessons taught. For each question, there was one correct response and two distracters for each stem.

The Caregiver Self-Efficacy with Sensory-related Behaviour in ASD questionnaire was modified, with permission, from an existing questionnaire developed by Hastings (2009) by adding “sensory-related” before “behaviors”. This measure sought to capture the change in caregivers’ self-perceived competency about sensory-related behaviours in ASD. An example question from this questionnaire is as follows:

**How confident are you in dealing with challenging sensory related behaviors of the child/children with autism you care for.**

(1) “Not at all confident” to 7 “Very confident.”
Although reliability and validity have not been formally evaluated for these measures, they were chosen because they have face validity and were aligned with the research questions.

Analysis of the pre-data and post-data was conducted via SPSS 22.0 (IBM, 2013) using a two-tailed Wilcoxon signed-ranks test and a paired t-test (Table I).

**Results**

The group average pre-test and post-test Likert scores on each question contained in the SPLT were compared to assess the increase in participants’ perceptions of their knowledge regarding sensory processing topics. Results of statistical analysis using the Wilcoxon signed-ranks test are shown in Table II. The post-test score was significantly higher than the pre-test score on every question, indicating increased self-perceived knowledge following participation in the educational sessions. Although the sequence of testing sometimes resulted in negative numbers among the results, these should not be seen as indicating a directionality of the data as they were merely artefacts of the mathematical processes involved.

The group average total scores from pre-test and the post-test administrations of the SPKA were analysed using a paired t-test in order to assess increases in actual knowledge of the participants regarding sensory processing topics (refer to Table III). A ceiling effect appeared to be present in that the participants’ scores averaged 84% for the pre-test and 96% for the post-test. Because of this effect, it is possible that the magnitude of the actual increase in knowledge may have been greater than indicated by the particular measurement tool used.

Owing to the ordinal nature of the data generated from the measurement tools and the nonparametric statistical test, the magnitude of the difference between the pre-test and post-test means for the Self-perceived Learning Tool and Knowledge Assessment of Sensory Processing could not be determined.

To examine the third research question, regarding change in the participants’ perceived competency to deal with behaviours exhibited by children diagnosed with an ASD, the group’s average pre-test and post-test scores for each of the five survey questions were compared.

The results using the Wilcoxon signed-ranks test (refer to Table IV) yielded a significant increase in scores for four of the five questions on the survey.

**Discussion**

This pilot study was the first of its kind to explore the use of face-to-face instruction for parents and teachers of children with ASD for content related to sensory processing and sensory processing disturbances. The findings of this study are similar to those reported by

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### Table II. Self-perceived learning tool

<table>
<thead>
<tr>
<th>Test</th>
<th>Wilcoxon signed-ranks test</th>
<th>Z</th>
<th>Asymp. sig (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensory processing</td>
<td></td>
<td>-2.414</td>
<td>0.016*</td>
</tr>
<tr>
<td>Vestibular sensory processing</td>
<td></td>
<td>-2.379</td>
<td>0.017*</td>
</tr>
<tr>
<td>Tactile sensory processing</td>
<td></td>
<td>-2.214</td>
<td>0.016*</td>
</tr>
<tr>
<td>Auditory sensory processing</td>
<td></td>
<td>-2.53</td>
<td>0.011*</td>
</tr>
<tr>
<td>Proprioception</td>
<td></td>
<td>-2.384</td>
<td>0.017*</td>
</tr>
<tr>
<td>Visual sensory processing</td>
<td></td>
<td>-2.214</td>
<td>0.016*</td>
</tr>
<tr>
<td>A SECRET</td>
<td></td>
<td>-2.379</td>
<td>0.017*</td>
</tr>
<tr>
<td>Sensory over-responsiveness</td>
<td></td>
<td>-2.388</td>
<td>0.017*</td>
</tr>
<tr>
<td>Sensory under-responsiveness</td>
<td></td>
<td>-2.375</td>
<td>0.018*</td>
</tr>
<tr>
<td>Sensory seeking/craving</td>
<td></td>
<td>-2.388</td>
<td>0.017*</td>
</tr>
</tbody>
</table>

*Statistical significance.
Farmer and Reupert (2013) who found that a face-to-face instructional group increased the participant’s knowledge of content related to ASD. The findings are also comparable with Symon (2005) who found that a face-to-face model of instruction increased the participants’ general knowledge and ability to apply strategies learned within the home contexts. Additionally, the results lend support to approaches, including the STAR Center (2015), the DIR/Floortime Model (Interdisciplinary Council on Development and Learning, 2015) and the SCERTS approach (Prizant et al., 2005), which focus on establishing and implementing structured education for teachers, caregivers and parents that is concurrent with the therapist’s interventions.

The ceiling effect that was noted on the SPKA was likely due to the fact that the participants actually had a greater knowledge of sensory processing related topics prior to the instruction than was initially thought, a fact that led to use of an evaluation tool that may have not challenged them enough to show the true magnitude of gain resulting from the intervention. Their prior knowledge likely was not due to formal instruction but, rather, came from past interactions with occupational therapists during direct client care (parents/caregivers) or consultations (teachers).

Mirroring this increase in knowledge was an increase in self-perceived efficacy in providing care for a child demonstrating sensory processing disturbances, where significant gains were demonstrated on all indicators but one. The item where there was not a significant gain concerned dealing with sensory processing related behaviours having a positive impact. This may be due in part to the fact that the content associated with teaching the participants how to reason through challenging behaviour rooted in sensory processing (A SECRET; Miller, et al., 2014) was presented during the final session (Week 6), the same session at which the post-testing measures were administered to the participants. As a result, the participants would not have had enough time to implement the strategies they had learned from that specific module in order to feel that they had experienced any success with their use.

Overall, this study presents evidence that a group instructional protocol, such as that used, represents a viable option for caregivers (parents and teachers) to gain knowledge and comprehension of information related to sensory processing as it impacts school age children who are diagnosed with ASD.

### Implications for occupational therapy practice

This study provides evidence that group education such as that presented in this study results in an increase in the ability of caregivers (parents and teachers) to understand and implement sensory-related intervention strategies. Thus, practitioners should consider implementing a structured caregiver education programme to improve caregiver/therapist collaboration through shared understanding of sensory processing in the hope that such collaboration may lead to greater therapeutic progress for their clients with sensory processing disturbances/disorders. Given the importance of caregiver interactions in behaviour management of children with ASD.
sensory processing disturbances and/or disorders, we believe that occupational therapists are in need of an effective method of increasing caregiver knowledge of sensory processing disturbances and/or disorders and skills and confidence in implementing strategies based on this knowledge when interacting with those children.

Our literature review found that there is a gap in the evidence-based knowledge indicating a lack of emphasis not only for caregiver education regarding sensory processing but also for caregiver education as key portion of occupational therapy service provision. Providing caregiver education groups related to the reasoning behind intervention strategies (A SECRET; Miller, et al., 2014) may lead to increased confidence in caregivers when implementing these strategies at home or in school. The increase in follow-through at home that this increased confidence may engender may lead to an increase in generalization of information as well as implementation of skills to the ultimate benefit of those children with SPD.

Limitations

Owing to the rural location of the study, only 10 subjects took part in the study. Even though statistically significant change was demonstrated, the additional safeguard of using Bonferroni’s correction was not conducted because of the low sample size. This omission reduces the confidence engendered by this study and provides a rationale for replication with a larger sample to be carried out.

Secondly, a ceiling effect may have been present on SPKT, indicating that the participants knew more about sensory processing, sensory processing disturbances and A SECRET than what was considered prior to the implementation of the educational group.

Additionally, the variety of instructional content was limited to PowerPoints and short video clips and did not include hands-on instruction or supervision of implementation of the skills taught. Even though significant results were achieved, the possibility exists that other protocols might be even more effective than the programme we used.

Further, the questionnaire used in this study did not measure actual caregiver competency, only perceived competency, which limits the scope of these findings. A performance measure to illustrate actual change in caregiver competency would have been a valuable addition.

Lastly, as aforementioned, the measures that were utilized were subjective in nature and did not have established content validity.

Recommendations for future research

The findings of this study demonstrated positive outcomes with self-perceived learning, actual learning and perceived competency with providing care for a child with ASD sensory processing difficulties. However, further research is warranted to assess the short-term and long-term impacts of sensory processing-based parent/caregiver education, specifically through methodological changes such as increasing the sample size of caregivers and teachers, developing a measure to capture caregivers’ actual competence in generating and implementing the A SECRET process and collecting follow-up data at 1, 3 and 6 months post-instruction to measure the level of knowledge and follow-through with the intervention and reasoning strategies.

Additionally, studies investigating the efficacy of varying types of group instruction, such as protocols including simulated cases or actual cases, are needed in order to determine the optimal instructional content for these groups.

REFERENCES


Case-Smith J, Arbesman M (2008). Evidence-based review of interventions for autism used in or of relevance to