BRIEF REPORT

Oral Care and Sensory Concerns in Autism

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KEY WORDS
- autistic disorder
- dental care
- oral hygiene
- sensation
- sensory threshold

We examined sensory-related aspects of oral care at home and the dentist's office in children with autism spectrum disorders (ASD) and their typically developing (TD) peers. Results from parent questionnaires (n = 196 ASD, n = 202 TD) and one focus group were analyzed to determine whether sensory experiences were different between groups. Significantly more parents of children with ASD reported difficulties with sensory-related oral care variables in the home and dental office; this finding was supported by qualitative data. Using sensory strategies to modify the environment may enhance the dental experience and improve quality of life for children with ASD and their families.

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Many children with autism spectrum disorders (ASD) exhibit difficulties with activities of daily living (ADLs; LaVesser & Hilton, 2010). One factor that may influence the ability to successfully complete ADLs is sensory processing, reported to be atypical in 69%–95% of children with ASD (Baranek, David, Poe, Stone, & Watson, 2006; Ben-Sasson et al., 2009; Tomchek & Dunn, 2007). Sensory processing has been shown to be correlated with measures of ADLs (Baker, Lane, Angley, & Young, 2008), including feeding, dressing, and toileting (Cermak, Curtin, & Bandini, 2010; Jasmin et al., 2009; LaVesser & Hilton, 2010), and negatively correlated with maladaptive behaviors (Baker et al., 2008).

Oral care is an ADL whose association to sensory processing has not been empirically documented until recently (Stein, Polido, Mailloux, Coleman, & Cermak, 2011; Stein, Polido, & Cermak, in press), although parents of children with ASD frequently describe oral care difficulties (Stein, Polido, Lopez Najera, & Cermak, in press). Oral care is integral to overall health: Poor oral health may result in difficulties with eating, sleeping, and speaking, as well as decreased school attendance and reduced self-esteem (U.S. Department of Health and Human Services, 2000). Additionally, oral conditions such as periodontal disease are risk factors for medical concerns such as cardiovascular disease (Xu & Lu, 2011).

The purpose of the study reported in this article was to examine sensory-related aspects of oral care at home and the dentist's office in children with ASD. The following research questions were addressed:

1. Do parents of children with ASD report greater challenges in sensory-related home oral care compared with parents of typically developing (TD) children?
2. Do parents of children with ASD report greater challenges in sensory-related dental office oral care compared with parents of TD children?
3. Are stories from mothers of children with ASD consistent with findings from surveys investigating oral care at home and the dental office?

Method

We developed a 37-item survey to examine oral care in the home and at the dentist's office (the Dental Care in Children survey; a copy may be requested from Leah Stein). Experts in both pediatric dentistry and sensory integration reviewed the survey, and their input was incorporated in the final questionnaire. The survey asked parents questions about toothbrushing at home (e.g., presence of difficulty with

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brushing, dislike of taste or texture of toothpaste); experiences during routine dental cleanings, including behavioral challenges (e.g., uncooperative behavior) and sensory challenges (e.g., dislike of bright lights, loud sounds); and demographic information. The survey was disseminated in paper format to parents of TD children and children with ASD via Children's Hospital Los Angeles and school districts in Southern California. Parents of children with ASD were also recruited from Southern California by means of an online survey from the Interactive Autism Network Research Database at the Kennedy Krieger Institute and Johns Hopkins Medicine–Baltimore, sponsored by the Autism Speaks Foundation. The institutional review board of the University of Southern California (HS-09–00597) approved this study for human subjects.

Participants completing the survey included 196 parents of children with ASD and 202 parents of TD children 2–18 yr old ($N = 398$). The TD group excluded children with a parent-reported diagnosis of ASD or any other disability (e.g., attention-deficit/hyperactivity disorder, learning disability, developmental delay). For both groups, children with cerebral palsy or neuromuscular disorders were excluded. Surveys were included in analyses only if 90% or more of the survey was completed. Children were identified as having ASD by parent report.

To obtain more in-depth and qualitative data on oral care in children with ASD, we conducted a 3-hr semistructured focus group with five mothers of children with ASD (ages 6–18 yr). This group constituted a convenience sample obtained from parents who completed the Dental Care in Children survey and indicated that they would be willing to participate in a focus group. The focus group was facilitated by the use of several prompts or open-ended questions about oral care, such as the following: "Tell me about an experience with your child at the dentist that stands out in your mind," "What is hardest for your child at the dentist, and why?" and "What are the strategies you and your dentist use at the dental office that are most successful, and why do you think they are?"

Survey data were analyzed using the SAS computing package (SAS Institute, Inc., Cary, NC). All questions were dichotomously scored (e.g., some questions were yes–no; Likert-scale questions were dichotomized into greater and lesser degrees of difficulty). We performed Fisher's exact probability and chi-square tests to test for associations between groups and oral care and demographic variables and logistic regression to test for associations after controlling for possible confounders; two-tailed statistical tests were used to provide a more conservative estimate of results. The focus group discussion was audiorecorded and transcribed; formal qualitative analyses were not conducted, but the first author (Stein) identified themes that were confirmed by independent review by a second reader. Parent comments were examined to support or refute survey results; quotations from parents are reported in the Results section to illustrate findings from the survey.

Results

The ASD group included significantly older children than the TD group ($p < .0001$). Likewise, the gender distribution was significantly different between groups ($p < .0001$), with male:female ratios in the TD and ASD groups of 1.2:1 and 4.4:1, respectively; this distribution is consistent with national statistics (Centers for Disease Control and Prevention, 2012). Significant differences existed for paternal education level ($p = .02$; more fathers in the TD group had a higher level of education) and Hispanic ethnicity ($p = .02$), with 69% of the ASD children and 58% of TD children reported to be Hispanic. No significant between-group differences existed for race or maternal education level.

Oral Care at Home

As expected, the survey results indicated that significantly more parents of children with ASD reported difficulty with toothbrushing in the home. Additionally, all home-related oral care sensory variables yielded significantly different responses between parents of children with ASD and parents of TD children. Variables included dislike of the taste or texture of toothpaste and dislike of the feeling of the toothbrush in the mouth (see Table 1).

Comments by parents in the focus group supported these findings. All five mothers reported difficulty with toothbrushing in the home; one stated,

> I had to brush his teeth for the first 9 years of his life, and every single time it was a battle. Every night. And we only brushed teeth once a day and that's all I could handle. And yeah, it was never not a battle. When he was little, we had to force him down and open his mouth and brush his teeth. . . . Everything, every single step along the way is a battle.

The focus group participants also described challenges with home-related sensory variables, with one mother stating, "He doesn't like toothpaste. We've tried organic, we've tried homemade, we've tried everything from Dora to whatever. . . . The toothpaste, I think, is the biggest challenge." Intraoral sensitivity was also mentioned; one mother noted,

> It's hard to get a toothbrush in his mouth, and when we do . . . he will only let us brush the side, like the outer sides, but you can't do the inner sides. So anything that would include touching his tongue or that inside area is nearly impossible to do.

Oral Care at the Dental Office

Responses to survey questions about the dental office were also significantly different between groups. Significantly more parents of children with ASD than of TD children reported that it was moderately to extremely difficult to have a dental professional clean their child's teeth. Likewise, significantly more parents of children with ASD reported that their child was afraid of, disliked, or complained about the sensory features of the dentist's office, including drilling, bright lights, loud sounds, smells, instruments in the child's mouth, and leaning back in the dental chair. Additionally, significantly more parents of children with ASD reported that their child's sensory sensitivities, self-stimulatory behaviors, and

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Table 1. Percentage of Affirmative Responses in Each Group and Odds Ratios for Challenges to Oral Care Items

Oral Care Item	Group (%)		Odds Ratio[a]
	TD (n = 202)	ASD (n = 196)	
Home			
Difficulty with toothbrushing in the home	10	61**	17.8
Dislike of taste or texture of toothpaste	20	55*	9.5
Dislike of feeling of toothbrush in mouth	25	57*	8.1
Dental office			
Parent reported "moderate to extreme" difficulty with cleaning at dental office.	13	60**	15.0
Parent reported that child was afraid of, disliked, or complained about the following:			
Dentist drilling	23	50**	3.2
Bright lights	6	35**	7.6
Loud sounds	8	53**	11.5
Having someone put instruments in his or her mouth	18	69**	29.2
Smells	4	25**	9.4
Sensory sensitivities increased at the dental office.	6	47**	16.3
Self-stimulatory behaviors increased at the dental office.	0	28**	15.9
Uncooperative behaviors increased at the dental office.	4	49**	31.1
Sensory sensitivities made dental appointments challenging.	—	46	—
Uncooperative behaviors made dental appointments challenging.	—	45	—

Note. ASD = autism spectrum disorder; TD = typically developing; — = not applicable because only parents of children with ASD were asked the last two items.
[a]To be read as follows: After adjusting for age, gender, Hispanic ethnicity, and paternal education level, the child was [odds ratio] times more likely to have ASD if the parent reported *yes* on the item than if the parent reported *no* on the item.
*p < .05. **p < .0001.

uncooperative behaviors increased at the dentist's office. Within the ASD group, almost half of parents reported that both sensory sensitivities and behavioral difficulties made dental appointments challenging (see Table 1).

Reports by parents in the focus group supported these findings. All the mothers noted that it was difficult for a dentist to clean their child's teeth. When asked how a regular cleaning is for her child, one mother responded, "Horrible. Every dental visit that we have had has been negative. It has never been a positive experience for him, so now he equivocates [*sic*] dental visits with just ugliness." Parents also mentioned difficulty with the sensory-related aspects of the dental office. In fact, in response to one mother's suggestion that a child use sunglasses or a hat to block the light, another responded that her son "doesn't like bright light [or things on his head or face], so it's, like, pick your poison." Another mother suggested that dentists should

> make equipment that's less noisy. I mean, I think that would be good for everyone, not just autistic kids, because that *zzzzzz* noise. . . . I know my son hates that noise, so I'm just wondering if equipment-wise there is anything else that could make it less.

Multivariate Analyses

Logistic regression was completed for the oral care variables in the survey to control for possible confounders including age, gender, Hispanic ethnicity, and paternal education level, when assessing the association between the independent variables (group) and the dependent variables (home- and dentist-related oral care variables). All previously significant home- and dentist-related variables remained significant (all ps < .0001; see Table 1 for odds ratios).

Limitations

This study adds to the understanding of how parents view their children's challenges with oral care in the home and dental office, especially those that are sensory related. However, several limitations should be noted. Groups were formed on the basis of parent report of diagnosis, which was not confirmed by gold-standard diagnostic tools. Additionally, no formal qualitative analysis of the focus group data was conducted. Finally, significant differences were found in age, Hispanic ethnicity, and parental education between groups; however, findings remained significant after multivariate analyses to control for these possible confounders.

Discussion and Conclusion

Our findings suggest that significantly more children with ASD than TD children experience difficulty with oral care, including sensory-related factors pertaining to oral care, in both the home and the dental office. Oral care is an ADL within the scope of occupational therapy services for people with ASD (American Occupational Therapy Association, 2010). Occupational therapists are uniquely qualified to address sensory sensitivities as they relate to oral health. Sensory sensitivities, which often lead to fight-or-flight behaviors (Tomchek, 2010), are associated with and may exacerbate uncooperative behaviors at the dental office (Stein et al., 2011; Stein, Polido, & Cermak, in press); in one study, dentists reported these behaviors to be the biggest barrier to treatment (Casamassimo, Seale, & Ruehs, 2004).

Research is needed to examine whether minimizing noxious environmental sensory stimuli or using sensory integration interventions to decrease sensory sensitivities make the dental experience less anxiety producing, resulting in decreased uncooperative behaviors,

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safer and more efficient treatment, and ultimately improved quality of care for children with ASD and their families.

Implications for Occupational Therapy Practice

The results of this study have the following implications for occupational therapy practice:

- Oral care is an ADL that may be challenging for people with ASD.
- Sensory processing difficulties may negatively affect participation in oral care, both in the home and at the dental office.
- Occupational therapists are uniquely qualified to address sensory sensitivities as they relate to oral health. Occupational therapy interventions can take place at the person, task, or environment level.
    - At the person level, the focus may be on interventions such as use of sensory integration designed to reduce sensory sensitivity.
    - At the task level, one may modify the taste, smell, or other characteristics of the toothpaste, vary the bristle strength or type of toothbrush, and use sensory or social stories.
    - At the environment level, it may be possible to modify the sensory characteristics of the location where brushing occurs in the home or in the dentist's office. ▲

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