



Dental desensitization by dentists and occupational therapists for autistic adults – A pilot study

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Keywords:	Autism, Dentistry, Dental treatment, Desensitization, Occupational therapist
Abstract:	<p>The aim of this pilot study was to assess the efficacy of a desensitization program developed by dentists and occupational therapists, targeted at autistic adults, to encourage their cooperation in the dental setting. The study group consisted of 18 individuals with autism (10 men and 8 women, aged 18–45 years). The patients underwent a baseline examination, after which they were progressively exposed to oral examination maneuvers and ultimately dental procedures. To this end, the participants engaged in 1 desensitization session weekly performed by an occupational therapist and 1 monthly assessment session by a dentist applying the Frankl scale, for a maximum period of 30 weeks. During the first session, 44% of the participants completed all oral examination procedures, reaching 94% by the fourth visit and 100% by the seventh visit. None of the participants completed a simple dental treatment up to the third session, subsequently increasing the percentage progressively until reaching a maximum of 61% in the seventh visit. In conclusion, a dental desensitization program implemented by dentists and occupational therapists could help in performing oral examinations and simple therapeutic procedures for a considerable percentage of adults with autism, without having to resort to pharmacological behavioral control techniques.</p>

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3 **Lay abstract**

4 Managing patients with autism in the dental clinic often requires resorting to
5 pharmacological behavioral control techniques, including general anesthesia.
6 References in the literature to desensitization programs are scarce and focus on
7 training children with autism to undergo oral examinations and preventive procedures.
8 This study shows that a dental desensitization program implemented by dentists and
9 occupational therapists could help in performing not only oral examinations but also
10 simple dental therapeutic procedures for a considerable percentage of adults with
11 autism, without using a pharmacological intervention (sedation or general anesthesia).
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For Peer Review

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8 **Abstract**

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30 **Keywords**

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Introduction

References in the literature on the oral health of adults with autism are scarce, and most agree in that the prevalence of caries in these individuals is similar or even lower than that in the general population (Blomqvist et al., 2015; Orellana et al. 2012; Vajawat et al. 2012; Loo et al.2008). However, studies have indicated that these adults are more susceptible to periodontal disease, gingival recession, dental malocclusions, bruxism, self-inflicted oral injuries and hyposalivation (Blomqvist et al. 2015; Orellana et al. 2012; Vajawat et al. 2012).

Accordingly, most of these individuals have significant dental treatment needs (Mangione et al. 2020; Rada 2013). It has been suggested that, among adults with autism but no intellectual disability, the most widely used health service after the family doctor is the dentist (Vogan et al. 2017). However, many of these patients are uncooperative (Loo et al. 2008), the dental treatment cannot be provided under conditions of consciousness (Mangione et al. 2020), and pharmaceutical sedation (both oral and inhaled with nitrous oxide) are less effective in adults than in children (Mangione et al. 2020). Therefore, a considerable percentage of adults with autism require general anesthesia when undergoing dental treatment (Loo et al. 2008; Mangione et al. 2020).

General anesthesia often causes disruptive behaviors in the hospital (Rada 2013) and is not exempt from morbidity and mortality risks (Parry et al. 2021), especially if we consider that many adults with autism have comorbidities such as obesity, heart disease, diabetes and toxic habits (Dumbuya et al. 2021; McNeil et al. 2022) and that a considerable percentage of dental treatment sessions under general anesthesia have to be repeated in 2 years (Parry et al. 2021).

The occupational therapists work with individuals with autism in various scenarios such as the home, school and community settings, where the therapists assess the factors that determine the skills and participation of these individuals in activities of daily living (including oral care) (Crabtree et al. 2018). Their fundamental goal is to identify the individuals' strengths and challenges, while simultaneously adapting and modifying activities to facilitate the participation of individuals with autism (Como et al, 2020). A number of previous experiences have been published on interdisciplinary collaboration between occupational therapists and dentists for planning changes in the dental setting and adapting dental protocols, with the aim of reducing some of the barriers for individuals with autism (Stein Duker et al. 2019). Desensitization is a structured teaching resource based on temporal

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3 and spatial organization, mainly through visual information, which has been
4 used occasionally to help adults with autism tolerate oral examinations
5 (Orellana et al. 2014). It has been suggested that occupational therapists
6 could participate in these desensitization strategies for preparing the dental
7 clinic visit (Como et al. 2020; Junnarkar et al. 2022); to date, however, the
8 results of these interventions have not been published.
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11 The aim of this pilot study was to assess the efficacy of a desensitization
12 program in which dentists and occupational therapists participate, so that
13 adults with autism could undergo an oral examination and a simple dental
14 therapeutic procedure.
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16 **Methodology**

17 The study group consisted of 18 users of the XXXXX day center
18 (Association of Parents of Individuals with Autism Spectrum Disorder,
19 XXXXXXXXXXXXXXXXXXXX), 10 of whom were men and 8 of whom were
20 women, with a mean age of 24.5 years (range, 18–45 years). All patients
21 satisfied the following inclusion criteria: a confirmed diagnosis of autism, 18
22 years of age or older, arriving while accompanied but voluntarily to the
23 waiting room on the consultation days, not taking specific medication for
24 encouraging collaboration on the consultation days and authorization
25 through the informed consent of their legal guardians. We did not consider
26 the presence of comorbidities, the intellectual and verbal communication
27 level, or previous experiences in the dental clinic.
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30 The patients underwent a baseline examination, after which they were
31 progressively exposed to oral examination maneuvers and ultimately dental
32 procedures. To this end, the patients participated in a weekly desensitization
33 session performed by one of the center's occupational therapists (previously
34 instructed by a dentist) and a monthly evaluation session by a dentist in the
35 Special Care Dentistry Unit of the Faculty of Medicine and Odontology of the
36 XXXXXXXXXXXXXXXXXXXX (XXXX), for a maximum period of 30 weeks.
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39 In the desensitization sessions in the day center, the participants underwent
40 3 types of scenarios: 1) familiarization with the environment and the basic
41 dental instrumentation (simulated waiting room, simulated dental chair,
42 intraoral mirror, tongue depressor, examination probe and saliva ejector); to
43 this end, we developed image-object and image-image association activities,
44 dental instrument classification activities and recreational activities (the
45 "Dental Health" board game). 2) Simulated oral examination sessions,
46 performed by the occupational therapist (simulated orthopantomography,
47 sitting down in a stretcher with the backrest raised, leaning back on the
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3 backrest of the stretcher and lying down, tolerating a protective bib around
4 the neck, tolerating light shining directly on the face, tolerating the invasion of
5 personal space, allowing perioral manipulation with gloves, opening the
6 mouth, tolerating intraoral manipulation with gloves, tolerating intraoral
7 examination with the basic dental instrumentation, tolerating the intraoral
8 application of a stream of pressurized air and allowing the simulated
9 performance of intraoral radiography); to this end, we used the same
10 strategies described in the instrumentation familiarization phase. 3)
11 Simulated sessions of simple dental treatments, performed by the
12 occupational therapist and using portable dental equipment (tolerating a
13 mouth opener, tolerating the noise of the vacuum and of the dental
14 handpiece, allowing intraoral contact with the vacuum and with the dental
15 handpiece (with and without water), allowing the intraoral contact with an
16 anesthesia syringe without needle and simulating the placement of a rubber
17 dam in the mouth); to this end, the patients watched a video with the sound
18 of the vacuum and of the dental handpiece, a video of a simulated dental
19 procedure performed on one of their companions and role-playing activities.
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22 In the visits to the Special Care Dentistry Unit, the participants were
23 accompanied by the occupational therapist who performed the
24 desensitization and were provided visual support of the picture book that
25 they had used in the facility. The dental examinations and procedures were
26 always performed in the same dental office (except the simulated
27 performance of an orthopantomograph in the radiodiagnosis room) and
28 always by the same dentist with the help of an assistant. In the more
29 advanced sessions for evaluating a single dental procedure, the participants
30 underwent a local anesthesia injection (with a conventional syringe and
31 needle), placement of the rubber dam (which they had to maintain for 10
32 minutes), and finally application of a resin-based sealant of cracks and tartar
33 removal.
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36 The patients' behavior was assessed using the Frankl scale (Frankl et al.,
37 1962), dichotomously recoded (unfavorable: definitely negative or negative
38 in the original scale; favorable: positive or definitely positive in the original
39 scale). If the behavior while conducting a specific process was unfavorable,
40 the 4 desensitization sessions were repeated in the day center, and the
41 process was subsequently re-assessed in the dental clinic.
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43 The research study and the use of this information with purposes of
44 disclosure were approved by the Ethics Committee of the University of
45 Santiago de Compostela, Spain (approval number: USC 07/2022).
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Results

During the first session (baseline) in the Special Care Dentistry Unit, 44% of the participants completed all of the oral examination procedures, reaching 100% by the seventh visit (Figure 1).

In the first visit, more than 80% of the participants behaved favorably when the following procedures were performed: simulated performance of an orthopantomograph, entering the dental cabinet and sitting down in the chair with the backrest raised. Sixty to eighty percent of the participants behaved favorably during the first visit for the following procedures: lying down in the dental chair with the backrest reclined, tolerating a protective bib around the neck, tolerating light shining directly on the face, tolerating the invasion of personal space, allowing perioral manipulation with gloves, opening the mouth and allowing intraoral manipulation with gloves. The least tolerated procedures during the first visit (40%–50% of the participants) were as follows: the intraoral examination with basic dental instrumentation, the intraoral application of a stream of pressurized air and allowing the simulated implementation of intraoral radiography.

Most of the oral examination procedures were tolerated by the entire study group starting the fourth visit, except for sitting down voluntarily in the dental chair with the backrest reclined (fifth visit) and allowing the simulated performance of intraoral radiography (fifth visit). With the described visit schedule (a weekly desensitization session and a monthly evaluation session) and considering all visits as a whole (baseline, desensitization sessions and evaluation sessions), the average number of visits required to tolerate an oral examination was 7.

None of the participants completed a simple dental treatment up to the third session, subsequently increasing the percentage progressively, with a substantial inflexion between the sixth and seventh sessions, until reaching a maximum of 61% (Figure 2). In the seventh visit, most of the dental treatment procedures were tolerated by 77%–88% of the participants, including the local anesthesia injection (83%). The highest acceptance rate corresponded to intraoral contact with the dental handpiece without water (94%), while the lowest rate was achieved with the placement of the rubber dam (72%), which only 61% of the participants tolerated for 10 minutes. Considering all visits as a whole (baseline, desensitization sessions and evaluation sessions), the average number of visits required to tolerate a simple therapeutic procedure was 27.

Discussion

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3 This study showed that virtually all of the adults with autism who underwent
4 a specific desensitization program can tolerate an oral examination and that
5 more than 60% can tolerate a simple dental therapeutic procedure, without
6 having to apply pharmacological behavioral control techniques.
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9 In a study with similar characteristics performed in Spain in which 34 adults
10 with autism participated, 67.3% were reluctant to undergo the oral
11 examination in the baseline visit. After completing 5 desensitization sessions
12 conducted by the dentist, however, the patients showed similar results to
13 those of our study; the oral examination was completed in all participants
14 (Orellana et al. 2014). In children, especially older children, the efficacy of
15 desensitization has also been confirmed, given that a study conducted at the
16 University of Washington in Seattle in which 168 children aged 4–18 years
17 participated, 80% of the children aged 13–18 years tolerated an oral
18 examination in the first or second visit, and 96% tolerated it by the fifth visit
19 (Nelson et al. 2017).
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21 We found no references in the literature as to the efficacy of desensitization
22 programs regarding therapeutic dental procedures. Sensory processing
23 difficulties in the dental setting have been well documented in individuals
24 with autism (Stein et al. 2011). It is therefore especially striking that most
25 participants managed to tolerate the direct application of light on the face
26 and the use of the dental handpiece (without water) and that 77.7% tolerated
27 the performance of ultrasonic dental cleaning. We also did not expect that
28 more than 80% of the patients would tolerate a local anesthesia injection,
29 probably because the avoidance behaviors in individuals with autism
30 respond more to the pain-related anxiety and fear than to differences in the
31 pain threshold compared with the general population (Failla et al., 2020).
32 Placing the rubber dam and having the patient endure it for at least 10
33 minutes is a challenge, probably related to the difficulties in sensory
34 processing among individuals with autism (Stein et al., 2011). Although
35 working with the rubber dam entails advantages both for the practitioner and
36 the patient, its use in certain patients with autism should be avoided because
37 it can be difficult to tolerate (Diekamp et al. 2020).
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40 The dental procedures performed most often in individuals with autism are of
41 a diagnostic and preventive nature (Mangione et al. 2020; Dumbuya et al.
42 2021), although only 1 in every 3 adults with autism attends a preventive
43 visit with the dentist at least once a year (McNeil et al. 2022). The
44 incorporation of occupational therapists into dental desensitization programs
45 can not only facilitate visits to the dentist but also help plan favorable dental
46 environments, adapt oral hygiene strategies, eliminate a number of barriers
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3 and refer patients with oral disease or harmful habits to the dentist (Como et
4 al. 2020; Junnarkar et al. 2022).
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7 In addition to the sample size, this pilot study has other potential limitations,
8 such as omitting the severity of the participants' autism. Although it has been
9 suggested that the heterogeneity of autism spectrum disorders complicates
10 the preparation of oral care guidelines (Mangione et al. 2020), the response
11 of the adults with autism to the dental desensitization sessions appears not
12 to have been determined by their level of cognitive development (Orellana et
13 al. 2014). We also did not analyze the variables that could determine the
14 results of the desensitization. In children, it has been suggested that
15 participating in group activities, preserving verbal communication, having a
16 moderate versus severe level of autism and being autonomous for dressing
17 are predisposing factors for the success of desensitization (Nelson et al.
18 2017).
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20 **Conclusions**

21 Taking into account the study's limitations, this dental desensitization
22 program implemented by dentists and occupational therapists could help in
23 performing oral examinations and simple **dental** therapeutic procedures for a
24 considerable percentage of adults with autism, without having to resort to
25 pharmacological behavioral control techniques.
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27 **Declaration of Conflicting Interests**

28 The authors declare no potential conflicts of interest with respect to the
29 research, authorship, and/or publication of this article.
30

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33 public, commercial, or not-for-profit sectors.
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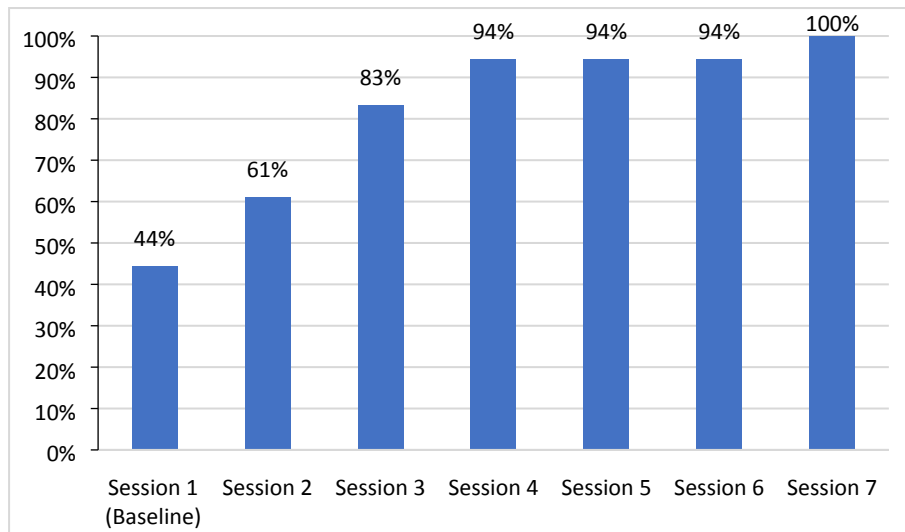
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Figure 1. Percentage of participants who in each session completed all of the oral examination procedures in the visit to the Special Care Dentistry Unit



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Figure 2. Percentage of participants who in each session completed all of the simple dental therapeutic procedures in the visit to the Special Care Dentistry Unit

