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Accessibility and inclusion of people with autism spectrum disorder in science museums in Rio de Janeiro/Brazil

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This work aimed to identify the perceptions and experiences of mediators and mediation team leaders of four science museums in Rio de Janeiro/Brazil, regarding the accessibility and inclusion of people with Autism Spectrum Disorder (ASD). The research was conducted in four science museums in the state of Rio de Janeiro: Espaço Ciência Viva, Casa da Ciência, Memorial Carlos Chagas Filho, and Espaço Ciência InterAtiva. The data was collected through semi-structured interviews focused on the experiences and perceptions about the accessibility and inclusion of people with ASD. Three managers of mediation teams and nine mediators, in a total of 12 participants. The results show the need to offer specific training for the mediators when attending to the public with ASD, as well as the implementation of inclusive practices and communicational and attitudinal accessibility strategies. We can conclude that, although there are punctual initiatives, there is a need for changes and the implementation of practices to make museums accessible and welcoming spaces committed to the inclusion of people with ASD.

KEYWORDS

mediators training, people with disability, autism, science centers, inclusive practices in museums

1 Introduction

Science centers and museums play a social role in disseminating scientific knowledge democratically and inclusively. In the early 2000s, Wagensberg (2000, 2005) raised important reflections about the educational process in science museums. Based on the proposal by Museo Total, the author presented 13 hypotheses related to the “Fundamental Principles of Modern Scientific Museology.” Among them, the second stands out. It states that the public of exhibitions in science museums is universal, i.e., there should not be a distinction of age, formation, cultural level, or any other characteristic. Therefore, the discussion revolves around the need to rethink how science museums and centers act when faced with differences, mainly the need to implement inclusion and accessibility programs and projects for the whole public. Many debates and reflections have emerged, mainly concerning the accessibility of people with disabilities. These discussions are based on the new definition of a museum established by the

International Council of Museums (ICOM) in 2022, which highlights that museums should be inclusive and accessible spaces in which the accessibility of people with disabilities to scientific and cultural goods has become a key principle (International Council of Museums, 2022).

The inclusion of people with disability in Science Museums and Centers still presents significant gaps regarding physical accessibility as well as communicational and attitudinal barriers. However, the specialized literature has been pointing out promising alternatives to different profiles of disability, such as deafness, blindness, and the autism spectrum, showing methodological and technological advances that favor the participation of these publics in spaces of non-formal education (Fernandes and Norberto Rocha, 2022; Norberto Rocha et al., 2020; Ferreira et al., 2023). Faced with the complexity and the diversity of this field, it is imperative to broaden the investments in educational actions and mediation strategies that consider the specificities of these subjects, promoting inclusive, equitable, and scientifically meaningful, mainly concerning the welcome of people with the Autism Spectrum Disorder (ASD). Studies point out that many of these spaces are still not prepared to receive visitors with intellectual disability and/or neurodevelopmental disorders, which compromises the possibilities of interaction and quality participation of this public in activities of science communication (Norberto Rocha et al., 2020; Norberto Rocha et al., 2017; Caetano et al., 2024).

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that appears at an early age (since childhood). Regarding the prevalence of children with ASD, according to data from the Centers for Disease Control and Prevention (CDC), in 2025, in the United States of America (USA), 1 in every 31 children aged 8 years old are within the Autistic Spectrum (Shaw, 2025). In Brazil, data from the 2022 Demographic Census, conducted by the *Instituto Brasileiro de Geografia e Estatística* (IBGE), indicate that 1.2% of the population reported having an ASD diagnosis. There is a higher concentration of diagnoses among children and teenagers and less frequent among adults (IBGE, 2023). According to the Diagnostic and Statistical Manual of Mental Disorders, revised fifth edition (American Psychological Association, 2023), the person with ASD has deficits in communication and social interaction, as well as restricted and repetitive behavioral patterns. They can also experience difficulties in learning, cognitive inflexibility, and sensorial alterations, such as hyper- or hypo-reactivity to sensory stimuli (American Psychological Association, 2023), which can vary from one person to another. Faced with these characteristics, the presence of certain elements in the museum, such as loud or repetitive noises, bright and twinkling lights, and rough objects, among other environmental stimuli, can lead to individual dysregulation, hindering the interaction process in the science museum (Theriault and Jones, 2018; Hladik et al., 2022). In this perspective, Kulik and Fletcher (2016), in a study about accessibility in North American museums, highlight that many parents of children with ASD avoid taking them to these spaces due to the presence of intense sensorial stimuli – such as noises, blinking lights, and agglomerations – which can lead to children's stress and sensorial dysregulation. Moreover, parents report they fear social judgment regarding the atypical behavior of their children, mainly because the museum's professionals, such as mediators, are generally not prepared to deal with the specificities of the ASD audience. The study also shows a lack of interest from these families in attending cultural spaces, as most of these places do not offer activities focused on their children's interests.

The mediator's work is fundamental to the museum experience because it establishes the bridge between the scientific content and the public, stimulating interaction and dialogue (Carlétti and Massarani, 2015). About the mediator's preparation, the specialized literature (Kulik and Fletcher, 2016; Caetano et al., 2024; Caetano and Pereira, 2025) points out the need for continuous training or, at least, specific guidelines that can make these professionals feel more secure and prepared to welcome visitors with ASD. Caetano et al. (2024) point out that “the mediators should be prepared to deal with visitors' different sociocultural realities, aiming to create an interaction that contemplates the several forms of knowledge present in society” (p.336). Thus, when welcoming people with Autism Spectrum Disorder (ASD), their role is even more meaningful because mediation, when incorporating practices of communicational and attitudinal accessibility, can favor the effective inclusion of this public during the visitation.

However, when there is no previous knowledge about the characteristics, demands, and forms of communication more adequate to deal with people with ASD, the mediation can be inefficient or even excluding. A study conducted by Caetano et al. (2024) with mediators from different Brazilian regions identified that many mediators are insecure in interacting with this public, mainly because they do not know their characteristics and needs, such as difficulties in verbal communication, sensorial sensitivity, and unexpected reactions to environmental stimuli. The lack of preparation can make families and professionals uncomfortable, negatively impacting the visitation experience. Thus, the need for the presence of attitudinal accessibility (inclusive and welcoming practices, engagement, and institutional) and communication (equipment and resources that can help overcome barriers in interpersonal communication, including written and informative material, use of accessible language, and reduction of sensorial stimuli). However, contrary to this need, Norberto Rocha et al. (2020) show a significant lack of these accessibility forms in Latin American science centers and museums. In a survey held in 109 institutions, the authors sought to identify the degree of accessibility in these spaces, analyzing three dimensions: physical (access, facilities, use of space), attitudinal, and communicational. The results show that, although physical accessibility was completely or partially present in 66% of the institutions researched, 61.3% did not have any type of attitudinal accessibility, and 75.4% did not offer resources on communicational accessibility.

According to the Guide to Science Centers and Museums of Latin America and the Caribbean 2023 (Massarani et al., 2023), out of the 448 science centers and museums in 18 countries of the region, only 14 mentioned actions towards the accessibility and inclusion of people with ASD. In Brazil, out of the 221 spaces of non-formal science education listed, only 10 declared offering accessibility to this public. There are 32 science centers and museums in the state of Rio de Janeiro, but only four affirmed that they provided accessibility resources for people with ASD. This panorama highlights the lack of inclusive initiatives and underscores the need for reflection and concrete actions that promote attitudinal and communicational strategies, enabling the full and meaningful participation of this public in science spaces.

Faced with the Brazilian scenario, marked by significant gaps in the policies and practices for the accessibility of people with ASD in spaces of non-formal science education, this work proposes an analysis of four science museums in the state of Rio de Janeiro,

focusing on the inclusion and accessibility for this audience. From this analysis, we sought to understand how these museums have structured (or not) actions for the inclusion of visitors with ASD, considering the dimensions of physical, communicational, and attitudinal accessibility as listed by [Norberto Rocha et al. \(2020\)](#). The research is guided by the following question: What are the perceptions and the experiences of mediators and team leaders in science museums in the state of Rio de Janeiro about the accessibility and the inclusion of people with Autism Spectrum Disorder in the activities and exhibitions in the museums? This work aimed to identify the perceptions and experiences of mediators and team leaders in four science museums in Rio de Janeiro/Brazil, concerning the accessibility and inclusion of people with Autism Spectrum Disorder.

2 Materials and methods

This work is a descriptive research with an applied nature, aiming to build technical and scientific knowledge for theoretical and practical applications in the area of science education. The research approach is qualitative, as [Gil \(2021\)](#) proposes, because it seeks to understand the perceptions, feelings, and experiences of science museum professionals. This approach, focused on the interpretation of phenomena and the attribution of meanings, allows us to go beyond simple data collection and enables a deep analysis of the lived experiences and challenges faced by mediators when attending to the public with ASD. This study was authorized by the signing of the Free and Informed Consent Form, written for the specific aims of this research, following the resolution of the *Conselho Nacional de Saúde* (CNS) 466/12 and Resolution 510/16. It was approved by the Research Ethics Committee of the *Instituto Federal de Educação, Ciência e Tecnologia do Rio de Janeiro*, under the report no. 7.369.791, CAAE no. 85521224.7.0000.5268.

2.1 Research context

In this study, we conducted interviews with representatives from science centers and Museums located in the state of Rio de Janeiro. We chose the institutions based on the Guide to Science Centers and Museums of Latin America and the Caribbean ([Norberto Rocha et al., 2017](#)), which offers a panorama of accessibility initiatives implemented by museums in the region. Thus, we initially mapped 17 scientific-cultural institutions in the state. However, the empirical phase of the research was conditioned on the representatives' availability to participate in the interviews and the compatibility of institutional schedules with the data collection period. Therefore, we included in the study the institutions that accepted to participate and with which it was possible to articulate the fieldwork within the available time. The work was conducted in four science museums: *Espaço Ciência Viva*, *Casa da Ciência da Universidade Federal do Rio de Janeiro*, *Memorial Carlos Chagas Filho da Universidade Federal do Rio de Janeiro*, and *Espaço Ciência InterAtiva* (ECI), connected to the *Instituto Federal de Educação, Ciência e Tecnologia do Rio de Janeiro*. In the first three spaces, the interviews were conducted with the person managing the mediation team, aiming to understand the institutional actions for the inclusion of people with ASD. In the case of ECI, the research was conducted directly with the mediator who had recently mediated with

children with ASD, allowing a more direct view of the practices and challenges experienced in the mediation with this population. Hence, the research was divided into two moments: (1) interviews with the mediators from *Espaço Ciência InterAtiva*, (2) Interviews with the mediation team managers of *Espaço Ciência Viva*, *Casa da Ciência*, and *Memorial Carlos Chagas Filho*.

2.2 Research participants, instruments for data collection and analysis

We conducted semi-structured interviews with the research participants to collect data. According to [Minayo \(2013\)](#) and [Gil \(2021\)](#), the semi-structured interview is an ensemble of open questions that have been previously defined, unfolding in a fluid dialogue through the interaction between the interviewer and the interviewee, with the freedom to explore additional topics that may emerge during the conversation. The interviews with the mediators from *Espaço Ciência InterAtiva* aimed to understand their experiences when receiving children with ASD. The questions sought to investigate if the participants had already conducted mediations with this public, if they could identify children with ASD during the activities, which difficulties they faced, and how they evaluated the experience. Hence, the interview with the mediators from the *Espaço Ciência InterAtiva* followed the questions: Have you ever mediated for children with ASD? Considering the children who attended, could you identify which among them were autists?; Did you have difficulties in the mediation?; How was the experience for you?

The interviews with those responsible for the mediation teams in the other museums aimed to investigate accessibility and inclusion actions focused on people with ASD in the context of science dissemination spaces and identity-inclusive practices. Based on the work by [Caetano et al. \(2024\)](#), we identify inclusive practices, such as materials with simple language, models or replicas to be touched, sensorial maps – showing the possible sensorial stimuli in the environment, pictorial communication system, self-regulation box with fidget toy, and clear communication. We also sought to understand the institutional initiatives used to promote the participation of this public in the activities and exhibitions, exploring attitudinal, structural, and formative aspects, the challenges faced, and the effectiveness of the inclusive practices developed. Therefore, the questions were directed by the following guide: What are the main attitudinal and structural challenges that involve accessibility for people with ASD? Do the professionals working in the science museum receive continuous training to welcome people with Autism Spectrum Disorder (ASD)? Did any visitor with ASD have difficulties accessing the knowledge available in the museum? How and which were these difficulties? Does the museum meet the minimum conditions of inclusion?

A total of 12 people participated in the research: nine mediators from *Espaço Ciência InterAtiva* (ECI) and three mediation team leaders of the other science museums: one from *Espaço Ciência Viva*, one from *Casa da Ciência*, and one from *Memorial Carlos Chagas Filho*. The interviews lasted between 40 and 50 min and took place in 2024.

For the analysis of the data collected, we applied [Fontoura's \(2011\)](#) technique of thematic analysis, summarized in seven steps: (1) Transcription of the material collected orally; (2) Floating reading of

this transcribed material; (3) Delineation of the corpus of analysis; (4) Grouping the relevant themes for the objective of the work; (5) Definition of the context units or meaning unities; (6) Separation of the context units from the corpus of analysis; and (7) Interpretation of the results based on the theoretical references. Therefore, all the material collected from the interviews was analyzed and organized into context units. Examples of these units are presented in the results sections, organized in tables. To preserve interviewees' anonymity, Espaço Ciência InterAtiva's mediators are identified by random letters, while the team managers are identified by the acronyms of their respective museums: Espaço Ciência Viva (ECV), Casa da Ciência (CdC), and Memorial Carlos Chagas Filho (MCCF).

3 Results

3.1 Results of the interviews with *Espaço Ciência InterAtiva* mediators

The interviews were conducted after welcoming a group of six children, aged between 7 and 12 years old, who visited the institution. One of them was a neurotypical girl, and the other five were boys diagnosed with ASD. Out of the nine educators of the science museum who conducted the mediation with children, none of them had mediated a visit with children and/or people with ASD, and eight of them would not be able to identify a person with ASD. Only one mediator affirmed that, out of the visiting children, he would be able to identify a boy, as the child had a higher communication impairment.

Through interviews with ECI mediators, the following themes were created: (1) possible mediation challenges; (2) specific behaviors of the public with ASD; (3) allowed learning about ASD; (4) need for specific training (Table 1).

For the theme "Possible mediation challenges," nine units of context were grouped as all mediators had some difficulty in the interaction process with children with ASD (Table 1). These units of context emerge in the narratives that highlight difficulties in service but also the importance of establishing a dialogue directed to each child, individualized, stimulating the interaction of the child with different elements of the museum (experiments, people, images, texts, etc). The following testimony exemplifies such an aspect: "It was necessary to adapt the activities to the specificities of children with ASD" (Mediator I). The mediators also highlight in their statements that, though they had no experience with the public, the interactions between all museum mediators, working together, eased the mediation process for children with ASD.

Based on the mediators' testimonies, Table 1 highlights the mediators' testimonies regarding the specific behaviors of children during the visit to the museum. Three units of context were inserted in the theme "Specific behaviors of the public with ASD." Mediator F gives the following testimony: "There was a boy that had difficulties to touch the experiments and exhibition objects, he seemed afraid to touch it but after insisting and showing the objects, he decided to touch them." The initial refusal to touch can indicate a tactile sensory hypersensitivity, considering that certain stimuli (in this case, touch) can lead to strong discomfort. However, when the mediator insisted, welcomed, and paid attention, the child could open up to new sensorial experiences. Mediator M presented a second episode with another child from the following narrative: "[child] did not want to

interact with anything else in the exhibition, he really liked one experiment and he always returned to the same experiment." Mediator P presents a similar testimony about a third child: "There was a child that only wanted to watch a 3D film about dinosaurs, he cried a lot in the other activity, but I did not know what to do, so I called the teacher." These situations show a behavior that might be associated with restrictive interests, common in children with ASD. It can indicate the pleasure in repetition or the need for predictability in a complex sensorial environment, such as an interactive museum. These reports reveal the importance of science museums and their mediators to be prepared to recognize different interaction forms, respecting the conditions, interests, and specificities of each child.

For the theme "Allowed learning about ASD" (Table 1), we identified testimonies from five mediators that highlighted that the visit from children with ASD was a moment to learn about ASD and understand the differences between these children. For the mediators, the real contact would help the learning process about the theme: "It was very interesting to see the interaction of children during the proposed activities and the diversity of the different levels in the spectrum among them. It is important to see these peculiarities in real situations, beyond the purely academic knowledge" (Mediator K). The following testimony also reinforces the need to deconstruct myths about people with ASD "It allowed me to deconstruct myths about autism" (Mediator C). In mediator C's whole narrative, we could perceive that welcoming this group led to a process of awareness and change of perception regarding ASD, raising an interest in studying the theme.

The theme "Need for specific training" (Table 1) resulted in six units of context from the mediators' testimonies. The narratives from mediators P and C exemplify this theme: "It is important to better understand the mediation for children with ASD" (Mediator P); "I notice the need for more training, due to the specificity of this public" (Mediator C). In the testimonies, we see the importance of continuous training actions, deepening the theme and the debates about inclusion within spaces of non-formal education. We can also perceive in the statements, the need of guidance on how to act in situations of visitors' emotional dysregulation, or even better mediation strategies for this public aiming to implement inclusive practices in science museums.

3.2 Results from the interviews with team leaders in the investigated museums

Through interviews with leaders responsible for the mediation teams at Espaço Ciência Viva, Casa da Ciência, and Memorial Carlos Chagas Filho the following themes were created: (1) Specific behaviors of the public with ASD; (2) Challenges in the process of mediation and accessibility for people with ASD; (3) Inclusive practices in the museums; (4) Need of specific training for mediators.

From the analysis of the units of context, three narratives regarding the theme "Specific behaviors of the public with ASD" emerged (Table 2). In the narrative of the leader from Espaço Memorial Carlos Chagas Filho (EMCCF), we can perceive visitors' interest for specific themes: "We see that he is paying attention, but he is in their corner, you know? [...] when he went to the laboratory there was some activity that raised his interest, something with the microscope." This narrative shows that specific interests were a behavior observed in the visit. In this sense, understanding that people

TABLE 1 Mediators’ perceptions about attending children with ASD (N = 9).

Themes	Citations*	Unit of context
Possible mediation challenges	9	“Demanded more attention” (Mediator P); “Used a more adequate language for the public” (Mediator G).
Specific behaviors of the public with ASD	3	“[...] he always returned to the same experiment” (Mediator M); “[...] a boy that had difficulties to touch the experiments and exhibition objects” (Mediator F).
Allowed learning about ASD	4	“[...] allowed me to deconstruct myths about autism” (Mediator C); “I had the opportunity to learn with them and think about how to include them in the activities” (Mediator P).
Need of specific training	6	“Need for training actions to better attend to the public” (Mediator P); “I feel unprepared for some situations” (Mediator F).

*Number of testimonies in the theme.

TABLE 2 Percepções dos responsáveis pelas equipes de mediação dos museus investigados sobre a inclusão de pessoas com TEA (N = 3).

Themes	Citations*	Unit of context
Specific behaviors of the public with ASD	03	[...]faced by visitors with ASD in overcrowded environments [...] (CDC leader) [...]child within the autistic spectrum was isolated [...] (ECV leader)
Challenges in the process of mediation and accessibility for people with ASD	03	[...]I highlight the high turnover of mediators [...], which really hinders the development of the activities. (CDC leader).
Inclusive practices in the museums	03	[...], just now we are, you know, we are really thinking about this, on the importance [...] of being inclusive, of learning, of being updated” (EMCCF leader)
Need for specific training for mediators	03	We need to specialize, to make courses [...] (EMCCF leader). There needs to be an investment to capacitate mediators [...] (ECV leader).

*Number of testimonies in the theme.

with ASD can have restricted interests, often related to their attention focuses or sensorial affinities, is relevant for visitors’ better interaction and engagement. Still on the theme, we identified in the testimony of the Casa da Ciência (CdC) leader the following issue: “When the space is full, many visitors with ASD get very uncomfortable, but this is due to our space limitation.” The statement refers to the difficulties faced by visitors with ASD in overcrowded environments or with physical limitations that can lead to discomfort, emotional dysregulation, or sensorial overload. We also highlight the testimony of the Espaço Ciência Viva (ECV) leader: “Once a child within the autistic spectrum was isolated during the service. The teacher could not introduce her into the activities, and there was no mediator in the museum who could start a contact.” The situation presented illustrates that a lack of preparation can hinder not only children’s participation in activities but also their continued presence in the environment. Hence, formative actions, even if punctual, can cause debates and build strategies that seek approximation and engagement, respecting the times and forms of interaction typical of people with ASD.

The theme “Challenges in the process of mediation and accessibility for people with ASD,” (Table 2) gathers units of contexts, such as “challenges connected to the spaces’ physical infrastructure” and “lack of personnel and team instability, compromising the continuity of inclusive actions.” The Espaço Memorial Carlos Chagas Filho (EMCCF) leader states: “The greatest challenge, I think, there are structural issues [...]. Regarding the building that is not accessible [...] [...]” It is evident in the interview that the physical accessibility of this space is a serious problem, compromising the access of people with ASD and visitors with other disability. The statement of the ECV leader highlights the importance of attitudinal and communicational accessibility in different museum actions: “Welcoming specific needs and the adaptation of resources used during mediation. The Casa da

Ciência leader also gives the following testimony: “Our main challenge is the lack of personnel. Our team is extremely small [...] I highlight the high turnover of mediators [...], which really hinders the development of the activities.” This declaration shows the limitations of human resources and the fragility of the institutionalization of formative and continuous practices, which compromises the quality of mediation that is sensitive to the needs of the public with ASD. “[...] there is an exhibition that [...] is not self-explanatory, so we need mediation” (EMCCF leader). This statement shows that, in contexts where exhibition resources are not accessible autonomously, mediation becomes the main resource of interpretation and approximation of contents for visitors — mainly those that need individualized support, as is the case with people with ASD.

The theme “Inclusive practices in the museums,” as in Table 2, gathers narratives that indicate a recent awareness of the importance of inclusion, highlighting that the theme is yet to be fully incorporated into institutions. However, they recognize that this is a need, not merely a legal obligation. The following testimony portrays this concern: “No, we have never done anything specifically focused on this. To be honest, just now we are, you know, we are really thinking about this, on the importance [...] of being inclusive, of learning, of being updated” (EMCCF leader). We perceived a lack of or reduced offer of inclusive practices for the accessibility of people with ASD in the three spaces investigated.

The theme “Need for specific training for mediators” also appears in the three interviews (Table 2). The Casa da Ciência leader highlights that they frequently conduct training, but, so far, no training focused on attending to the public with ASD: “[...] they are very general issues, more associated with our work, but we think about a diverse public, but not specific” (CdC leader). The following testimonies unveil the need for training actions focused on ASD: “We have not been doing

this training specifically, and it is something we need [...] We need to specialize, to make a course [...], but there was nothing specific.” (EMCCF leader). “There needs to be an investment to capacitate mediators regarding the specificities of attending people with ASD” (ECV leader). The testimonies indicated that, until the moment of the interview, the three science museums had not yet conducted training for the mediators focused on the accessibility and inclusion of people with ASD in a systematic way, but all of them recognized the need to implement this training as a practice in the training processes.

4 Discussion of results

The present study sought to understand the perceptions and demands about the accessibility of the public with ASD under the perspective of two groups that attend the public in science museums: the mediators, who directly conduct the interaction actions with visitors, and the leaders responsible for the mediation team, who manage and create the activities, as well as attend the public. It was possible to perceive that, though the research was conducted in four different spaces, the narratives converged regarding the need for accessibility, inclusive practices, and training actions focusing on the accessibility of people with ASD.

About the perception of the characteristics of visitors with ASD and the challenges in the mediation process, both groups reported the importance of knowing how to identify behaviors associated with the disorder, highlighting the need for attitudinal accessibility, mainly concerning attentive listening, the understanding of this public’s particularities, and the mediators’ welcoming during the interaction. Hladik et al. (2022) stress in their study that children with ASD participate less in activities in broader community spaces because of the hyper sensibility and sensorial stimuli, besides their restrictive interests and difficulties in social interaction. The excess of stimuli can lead to sensorial and emotional dysregulation, interfering with the experience of visitors with ASD. The lack of preparation in the space to receive this public can limit the amount of interaction, hindering the engagement and permanence of the public with ASD in the activities proposed. In this sense, Lussenhop et al. (2016) highlight the lack of adequation and communicational and attitudinal accessibility in the museums, which can make parents of children with ASD insecure and avoid these spaces. Hladik et al. (2022) stress that cultural spaces could be prepared to offer more controlled and welcoming sensorial conditions, promoting a safe and accessible environment that respects the specificities of this public. On the other hand, regarding the identification of people with ASD, the studies by Kulik and Fletcher (2016) and Caetano et al. (2024) showed that it was common for educators in museums to have no training to identify autistic people and, therefore, in a visit open to a different audience, the professionals have difficulties in conducting a more specific mediation. Another problem lies in mediators’ turnover, something common in Brazilian science museums, hindering the continuity of implemented practices (Carlétti and Massarani, 2015). Regarding inclusion, especially, this situation compromises the quality of the service and interrupts ongoing inclusion practices.

As a whole, the testimonies reinforce the importance of the mediators in the process of dialogue and interaction with the visitor, thus, the need of their permanence in the museum. Caetano et al. (2024), when analyzing the reports from mediators about their experiences attending children with ASD, highlight that, through

practical experiences, the professionals developed their own strategies to make mediation more inclusive. Among these strategies are the use of clear and objective communication, the dialogue with the children’s guardians, and demonstrating patience to respect the time of each visitor and favor their permanence in the activities. Such actions show the importance of attentive listening and the presence of practices focused on the specific needs of the public with ASD. This behavior was observed in the mediators of the Espaço Ciência InterAtiva, even if without a specific training to mediate for people with ASD, they could provide a welcoming and dialogical service.

The testimonies also portray the lack of systematic training processes for the mediators and museum teams about the inclusion of people with ASD. Caetano et al. (2024) highlight in their work that the lack of specific training tends to reinforce attitudinal barriers, as the mediators can be insecure or unprepared to deal with the demands from this public. In this context, inclusion starts to depend on punctual initiatives and mediators’ individual sensibilities, and not as a structured institutional policy. Hence, Caetano et al. (2024) state that, besides the mediators, all workers should be involved in the inclusion of autists, actively participating in the observation and building of knowledge. After, Kulik and Fletcher (2016) noticed in their study that after participating in a training and after a mediation focused on the public with ASD, the mediators started to observe children in another way, changing their perceptions, trying to be more patient, respecting and understanding their behavior to offer a more individualized service.

Regarding the perceptions about inclusive practices, we could perceive the need to implement actions focused on communicational and attitudinal accessibility, articulated in training processes. We should stress that we could perceive attitudes and actions in the three spaces that showed communicational and attitudinal accessibilities – a concern from mediators with the approach, welcoming during visits, accessible language, and implementation of punctual formative actions. Nonetheless, there is a need to build an organized set of strategies and inclusive practices involving mediators and other professionals in the institutions. In this sense, Hladik et al. (2022) emphasize the relevance of listening and the participation of other social actors — such as families, support networks, and cultural institutions — in the process of implementing and evaluating inclusive practices, to promote the engagement of other people important in this process.

The mediators’ preparation and training were raised at different moments of the research. In the testimonies of the mediation leaders from the science museums, as observed at the Espaço Ciência InterAtiva, we perceived the lack of systematic training processes for mediators and the museum teams about the inclusion of people with ASD. We identified that, among the mediators of the Espaço Ciência InterAtiva, all had difficulties in the mediation process of children with ASD. These data match the survey conducted by Norberto Rocha et al., 2021, whose authors found that, in a sample of 370 mediators of science museums, 74.8% said they did not feel prepared to attend to the public with disabilities. Kulik and Fletcher (2016) reinforce these data when perceiving in their study that the mediators felt unprepared to attend to children with ASD.

In this work, all mediators from Espaço Ciência InterAtiva interviewed recognized that attending a public with ASD was a moment rich in exchanges and reflections about the mediation forms and strategies for children with ASD. These mediators, though they had never mediated for this public, had already participated in a debate within the museum about the theme. This previous preparation

aimed to provide subsidies for a mediation focused on the specificities of children with ASD. However, we notice in the testimonies that, on the day of the activity, some mediators were still insecure and concerned with the specificities of each child. This scenario reinforces the need for a more specific and continuous training that encompasses practical strategies of mediation, management of unpredictable situations, and the construction of more welcoming sensorial environments (Kulik and Fletcher, 2016). Though important, the punctual training was insufficient to guarantee mediators' security and autonomy faced with the diversity of behaviors and needs presented by children with ASD. Hence, the need for an institutionalization of training processes with the inclusion theme, considering that it needs to be an institutional policy and not only a punctual action. Inclusion and accessibility should not depend on punctual initiatives and mediators' individual sensibility, but on a structured institutional policy (Kulik and Fletcher, 2016). In this sense, Kulik and Fletcher (2016) also emphasize the relevance of partnership between spaces of non-formal science education and universities as a way to expand not only training actions but the development and implementation of inclusive practices.

5 Limitations and future perspectives

This research presents important contributions to understanding the challenges and possibilities of including people with ASD in science museums. However, some limitations should be considered. The first refers to the number of participant institutions restricted to four museums in the state of Rio de Janeiro. Although this delineation enabled a deeper analysis of the investigated contexts, it limits the generalizability of results for other museological realities, particularly in regions with different structural, cultural, and political conditions.

Another limitation refers to the focus on the perceptions of science museums and center personnel (mediators and team managers). Although these voices are key in managing inclusive actions, the lack of direct listening to visitors with ASD and their families restricts the understanding of how these practices are, in fact, experienced by the target audience. In this sense, as developments of this research and future perspectives, these spaces need to be analyzed through the perspective of the public and the guardians of children with ASD, besides the institutionalization of training processes about accessibility and the inclusion of people with ASD in the science museums participating in the research, which can be expanded to other scientific dissemination spaces in the state of Rio de Janeiro. Finally, we hope the results presented here can support public policies and educational practices more sensitive to diversity, helping to consolidate science museums as truly inclusive, accessible, and welcoming spaces to everyone.

6 Conclusion

The research data show the need for more consistent institutional policies targeting the accessibility and inclusion of people with ASD in the science museums analyzed. The investigation enabled us to identify punctual advances, mainly connected to the engagement of educational teams, but also showed structural, formative, and attitudinal challenges that still limit the full participation of this public.

Answering the question that guided the study, we conclude that the study participants recognized the need to broaden the actions of inclusion and accessibility in the science museums. Strengthening training actions, attentive listening, and the creation of intersectoral strategies appear as fundamental pathways for the consolidation of spaces that are more welcoming, inclusive, and committed to diversity. In this sense, the work points out the need for science museums and centers to invest in continuous and collaborative training about accessibility and inclusion, focusing on ASD specificities. To build inclusive practices, it is recommended to involve science communicators, mediators, families, and professionals from different areas when elaborating strategies and accessible materials. Promoting an institutional culture focusing on listening, welcoming, and diversity can contribute to more meaningful and democratic experiences for all visitors.

We consider that the research aim was fulfilled, as it was possible to identify conceptions, practices, strategies, and limitations in the four institutions investigated. Furthermore, we analyze to what extent these museums have promoted accessibility and inclusion actions for visitors with ASD. Our findings can help strengthen public policies and more inclusive museum practices, incentivizing the development of spaces that welcome, respect, and promote the full participation of all visitors.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Research Ethics Committee of the Instituto Federal de Educação, Ciência e Tecnologia do Rio de Janeiro, under the report no. 7.369.791, CAAE no. 85521224.7.0000.5268. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

GRP: Writing – review & editing, Writing – original draft. ALAM: Writing – review & editing, Writing – original draft. HCPC: Writing – original draft, Writing – review & editing. RNSH: Writing – review & editing, Writing – original draft. GHVSA: Writing – review & editing, Writing – original draft. LFM: Writing – review & editing, Writing – original draft. SSHJ: Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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