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Editorial

An end-of-the-year message in turbulent times

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The Nobel Peace Prize is the highest international honour someone can receive. It bestows moral standing on a person, an institution, and their cause. Mother Teresa was awarded it. So did Nelson Mandela and Martin Luther King. But for all the laureates whose names have become synonymous with self-sacrifice and good deeds, there have been some controversial ones, too (New York Times, 11 December 2025).

Two organisations in the field of disability and development received this prestigious prize as well: Handicap International and the International Campaign to Ban Landmines.

Handicap International (now known as **Humanity and Inclusion**) was a co-recipient of the **1997 Nobel Peace Prize** as a founding member of the International Campaign to Ban Landmines. They were recognized for their crucial role in advocating for and achieving the Mine Ban Treaty, which prohibits anti-personnel landmines as a source of death and disability.

The Liliane Fonds – based in the Netherlands - was awarded the Wateler Peace Prize in the year 2000 for its special achievement in the field of war and peace. The Liliane Fonds focuses on supporting and empowering children with disabilities in low-income countries. The Wateler Peace Prize is a biennial award managed by the Carnegie Foundation.

The year 2025 was also the year that - in her wisdom - the Fédération Internationale de Football Association (FIFA) introduced the FIFA Peace Prize award. This prize is due to be bestowed annually on an individual in recognition of their extraordinary action for peace. I don't want to pay too much attention to this award. A sheer contrast with the awards bestowed upon the organisations mentioned: organisations working on the prevention of disabilities, establishing accessible services for people who have been injured due to war and conflict, and promoting equal opportunities for adults and/or children with disabilities.

We live in turbulent times and wonder what the new year 2026 will bring to the world. As a user of X (the former Twitter), I am becoming pessimistic about the situation in the world. The enormous polarisation of ideas and opinions is mindboggling and very worrying. We are heading for a Brave New World where (tech) billionaires and dictatorial governments determine, to an increasingly large extent, how the world should be. For a long time, I had hoped that previously colonized countries would eventually become liberated from their corrupt leaders, but nowadays, I am not too optimistic anymore.

The ever-increasing role and power of social media, major tech companies, and Artificial Intelligence in the world we live in are undeniably present. Blatant lies seem to reign more and more. New forms of colonialism are probably more evil than the old forms. We live in uncertain times. Not only the ongoing war in Ukraine, but also the horrific events elsewhere - for example, in the Middle East, Sudan, and Congo - cannot leave us indifferent. Moreover, we are faced with unprecedented geopolitical tensions.

What does this all have to do with disability and/or rehabilitation and thus with this journal? At first, it does not mean much, but when one starts realising that in every war, people are not only being killed but many people (combatants as well as civilians) become permanently disabled. I assume that the reason for writing this editorial becomes clear. Over one billion people worldwide are living with some form of disability, 16% of which are attributable to armed conflict (UNMAS, 28 May 2020).

The editorial board of this journal has no pretensions that we could influence the above-described developments, except that we advise our readers to be vigilant, critical, and above all, to continue to play a role in making this world a better place. We hope that the year 2026 will be a year where the Norwegian Nobel Committee finds it too difficult to select a laureate for the Nobel Peace Award because so many people or organisations deserve this award because of their outstanding work in realising peace.

The Dutch author Rutger Bregman published in 2019 the book Humankind: A Hopeful History (Dutch title: *De meeste mensen deugen,* freely translated 'most people are okay'), where he argues that humans are fundamentally mostly decent, and that more recognition of this view would likely be beneficial to everyone, as it would reduce excessive cynicism. I am not sure that I will agree with him because there are also too many people who are not okay. However, let us be the ones who continue to make a difference in the lives of people, disabled or not. I am wishing you, on behalf of the entire editorial board, a healthy and peaceful 2026!

Huib Cornielje
Assistant to the editor

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Original Research Article

Perceptions of State-Owned Enterprises on the Employment of People with Disabilities and Special Needs in Namibia: A Qualitative Study

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ABSTRACT

Introduction: Previous research has shown that employers' attitudes can affect the hiring of People with Disabilities and Special Needs (PWDSN); however, there is insufficient research on the perceptions of Namibian state-owned enterprises (SOEs), their recruitment practices, and their compliance with national legislation and guidelines.

Aim: This study examined the views and experiences of SOE managers and HR personnel regarding the employment of PWDSN in Namibia.

Methods: A phenomenological qualitative research design was used for this study. Semi-structured interviews were conducted with fifteen participants who were recruited using purposive sampling. The interview recordings were transcribed verbatim before thematic analysis. Adherence to the four ethics principles, comprising autonomy, beneficence, non-maleficence, and justice, was maintained throughout the process.

Results: Five main themes were generated from the study. These relate to employee welfare; perceptions of impairments on performance abilities; employee experiences and exposure; work environment and employment procedures. Findings show that there are insufficient dedicated recruitment strategies for PWDSN and limited adherence to national policies and legislation. Recommendations include strategies for development and implementation of employment practices that are inclusive of people with disabilities and special needs within the SOEs.

Conclusion & implications: Despite some progress to ensure sustainable employment of PWDSN, there remain significant gaps and inequality in the development, understanding and implementation of inclusive employment practices within the SOEs included in this study. These findings are valuable for supporting decision-making across multiple stakeholder groups, including management, human resources personnel, health and safety officers, wellness coordinators, training and development teams, organisational planners, and recruitment professionals in SOEs in Namibia. The findings may also be applicable to other organizations operating under comparable employment policies and legislation. Furthermore, this study offers recommendations to support the implementation and consistent adherence to inclusive employment policies and legislation.

Keywords: Employment, persons with disabilities, job accommodations, human rights, state-owned enterprise, Namibia

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INTRODUCTION

The Namibian Constitution, together with the Affirmative Action Act (1998) and the National Disability Council Act (2004), provides legal protection for Persons with Disabilities and Special Needs (PWDSN) by prohibiting discrimination and promoting equitable employment opportunities for groups historically marginalized from mainstream labour markets (Hindjou, 2022). In Namibia, approximately 53.4 % employees work in the private sector, 21.5 % are employed by government, 17.5% work in other settings such as private households and 7.6 % work for State-Owned Enterprises (SOEs) (Namibia Statistics Agency, 2018). Although SOEs account for 7.6 % of Namibia's formal workforce, there is an absence of research on the role of SOEs in addressing the employment inequalities faced by PWDSN. SOEs in Namibia are responsible for key services such as water, ports, electricity and energy. Therefore, they have a significant responsibility to ensure that inclusive employment policies are in line with the Government of the Republic of Namibia directives (Paulus, 2022). The SOEs in Namibia have a total estimated financial portfolio of $N119 billion, which is an equivalent of 49% of Namibia's GDP (The Brief, 2023; World Bank, 2024). This makes the SOEs key players in employment and socio-economic landscape of the country.

The estimated number of Namibian PWDSN increased from 42,932 in 1991 to 98,413 in 2011, of which only 6,388 were employed (Chibaya et al., 2022). These numbers remain questionable due to the limited coverage of disabilities within the national housing and population census data variables. PWDSN constitute one of the most financially marginalized minority groups and are disproportionately excluded from the psychosocial, economic, and health benefits associated with meaningful employment (Tinta & Kolanisi, 2023). Disabilities and special needs encompass a wide spectrum of conditions, including physical, sensory, intellectual, psychiatric, neurological, neurodiverse, and learning disabilities, highlighting the diverse support requirements and structural barriers faced by this population (Wearmouth, 2022). 'Disability' describes conditions restricting a person's movements, senses, or activities, while special needs are the diverse requirements of individuals who have unique characteristics or circumstances and stigma (Carty et al., 2021; World Health Organization, 2022). The National Disability Act, Act 26 of 2004 defines disability as "physical, mental or sensory impairment that alone, or in combination with social or environmental barriers, affects the ability of the person concerned to take part in educational, vocational, or recreational activities". These factors contribute significantly to the high unemployment rate among PWDSN, which requires urgent attention from State-Owned Enterprises (SOEs) (Modise, 2022). Załuska et al. (2020) found that there is a link between employers' perceptions toward PWDSN and the factors contributing to their unemployment. These perceptions were found to be linked to: a job applicant's disability or special need status; the employer's previous experience and knowledge of PWDSN; recruitment strategies or practices; as well as policies and legal requirements (Strindlund, Abrandt-Dahlgren & Ståhl, 2019).

McKinney and Swartz (2021) highlighted the key role that employers' perceptions, attitudes, recruitment practices, and policies play a great role in shaping the employment landscape for PWDSN (Pinilla-Roncancio, et al., 2022). Despite it being the responsibility of SOE managers and human resource personnel to manage the employment process, many do not have the required knowledge and experience to recruit PWDSN (Maclean & Ned, 2024). Negative perceptions and prejudices also hamper the employment prospects of PWDSN, as there are misconceptions regarding their productivity and training costs (Malesa & Maleka, 2023). The inadequacy of policies and legislation to effectively include PWDSN in national development agendas is clear. *There is an absence of research on SOEs* implementation and adherence to the policies and laws of the Government of Namibia; lack of accountability and enforcement mechanisms ensuring equitable representation of

PWDSN in employment (Katulo & Mapudzi, 2024; Mahomed, Lord & Stein 2019; Padrón, Kovačević & Moreno, 2023; Breen, Havaei & Pitassi, 2019).

Research investigating employers' perspectives of persons with disabilities and special needs found that PWDSN are minorities with minimal participation in the labour force compared to peers without disabilities and/or special needs (Schloemer-Jarvis, Bader & Böhm, 2022). Studies on the employers' perception present mixed or inconsistent research findings. Most studies found that employers' perception is an important factor in the employment of PWDSN (Kanobe et al., 2022). Positive and negative attributes influence the employers' perception and subsequently their attitudes, thus affecting the comparison, conclusions and application to the Namibian context (Goliath, 2022).

There remains limited evidence on the development and implementation of policies and legislation governing the employment of persons with disabilities and special needs (Percy, 2018). This gap underscores the need to critically examine organisational efforts to uphold the rights and address the challenges faced by these employees, particularly in relation to equitable access to employment, retention, and opportunities for advancement (Blustein et al., 2019).The employers' perception in the Namibian SOEs is under-researched and there is a low rate of employment of PWDSN in the country with unemployment rate among PWDSN ranging from 34% to 91% in some regions (Ylinen, 2024; Engelbrecht, 2020, National Statistics Agency, 2019). Therefore, there is a need to establish the recruitment practices as well as the formulation and implementation of established disability policies and laws (Chichaya, Joubert & McColl, 2020). Therefore, this study explored the perceptions and experiences of Namibian SOEs regarding the employment of PWDSN, and assessed the extent to which these organisations promote and safeguard employees' rights (Chibaya, Naidoo & Govender, 2022). The findings indicate that many SOEs lack targeted recruitment strategies for PWDSN and demonstrate limited adherence to national disability– related policy and legislation. These gaps highlight the need for strengthened strategies that support the development and implementation of inclusive employment practices across SOEs in Namibia. A comprehensive understanding of employers' perceptions, recruitment practices, and policy adherence is necessary to create effective strategies to improve the employment prospects of PWDSN in Namibia (Załuska et al., 2020; Strindlund, Abrandt-Dahlgren & Ståhl, 2019).

METHODS

A qualitative phenomenological research design was used in order to gain an in-depth understanding of the employment situation of PWDSN from the perspectives of SOE employers. This qualitative approach was selected because it allows for an in-depth understanding of phenomenon and context in which it occur (Holloway & Galvin, 2023). Grimaud, Gumbo and Le Belfou (2022) argue that a qualitative paradigm allows researchers to analyse data by examining phenomena within their natural context. Guided by this approach, the study explored the perspectives and experiences of SOE managers and HR personnel regarding the employment of PWDSN in Namibia. The Standards for Reporting Qualitative Research (SRQR) were applied to guide and structure the reporting of the study findings (O'Brien et al, 2014).

The study employed a multi-stage selection process for respondents. First, all State-Owned Enterprises (SOEs) operating in Namibia as of March 1, 2019, were identified. Second, these SOEs were categorized into broad operational sectors: mining, agriculture, banking, housing, and telecommunications. Finally, one SOE sector was purposively selected from each of these five sectors. The inclusion criteria included fulltime employees in management/supervisory positions; involved in employee recruitment and overseeing implementation of organizational human resources policies and legislation. Approval was then obtained to conduct interviews with management and human resources personnel at the selected organizations. Fifteen participants were included in the study, i.e., three from each of the five chosen organizations.

Semi-structured interviews were conducted. Six interviews were held face-to-face and nine via telephone due to logistical challenges of meeting face to face. All participants were asked the same questions based on the identified literature gaps on the employment of PWDSN. Written consent for participating in the study and being audio recorded was obtained from all participants. The interviews lasted between 45 and 60 minutes. The recorded interviews were transcribed verbatim before data analysis. The interview guide consisted of the following questions:

1. What is your perception of persons with disabilities and/or special needs as employees and colleagues?
2. How do you feel about working with people with disabilities and/or special needs? Is this the case with other employees?
3. Do you think employees in your organization are trained and/or informed on how to deal with issues of disability and special needs? Please elaborate.
4. Do you think your working environment is conducive for people with disabilities and/or special needs?
5. What are the current recruitment practices of people with disabilities and/or special need in your organization?
6. What do most employees feel about the employment of people with disabilities in your organization? Is that the same way you feel, too?
7. What are the available opportunities for people with disabilities and/or special needs in your organization?
8. To what extend does your organization implement national legislatures on the employment of people with disabilities and special needs?
9. In your view, are staff members equipped to implementing legislature on the employment of people with disabilities and/or special needs?
10. Are you satisfied with the way your organization is adhering to national guidelines and legislature? Please elaborate.
11. What are the barriers to employing people with disabilities and special needs?
12. What are the benefits of employing people with disabilities and special needs?

Thematic analysis was employed to explore participants' perceptions. As Herzog, Handke, and Hitters (2019) note, thematic analysis offers a flexible and robust approach for analysing qualitative data. This study followed the analytical procedures outlined by Reyes, Bogumil, and Welch (2024), which include familiarization with the data, generation of initial codes, identification and refinement of themes, definition and naming of themes, and the production of a coherent analytical narrative. In order to mitigate the risk of bias, bracketing was used. According to Weatherford and Maitra (2019), bracketing is used to acknowledge and manage possible biases by suppressing assumptions to approach research data with openness and objectivity, thereby improving the credibility and rigor of the findings (Rashid et al., 2019).

Ethical Considerations

The research received approval from the University of Liverpool. Approval to conduct the study was also obtained from the gatekeepers who are the leaders of the SOEs included in the study. Verbal and written consent were obtained from each participant prior to the commencement of the data collection processes. The study maintained the ethical consideration through voluntary participation, right of withdrawal, refusal to answer any questions as well as upholding of anonymity. To maintain anonymity, participants' names are not reported; instead, they are identified as Participant One through Participant Fifteen in the presentation of data.

RESULTS

A total of fifteen participants, six females and nine males from SOEs across five economic sectors took part in the study. Most of the participants had experience working with PWDSN, with the exception of two participants. Table 1 shows the themes and sub-themes.

Table 1*:* Themes and sub-themes

Themes	Sub-themes
Employee Welfare and Support	Opportunities and Benefits
	Aids and Assistance
Impairments and Performance	Physical Impairments
	Attitudes and productivity
Employee Experiences and Exposure	Positive and Negative Experiences
	Thoughts and Observations
Awareness Creation, Guidance, Knowledge and Understanding	Information Dissemination and Sensitization.
	Awareness and Access to Information
Working environment and employment processes	Inclusivity and Accessibility
	Recruitment Practices

Theme 1: Employee welfare and support

This theme describes the employers' efforts to improve the well-being of PWDSN, i.e., creating a welcoming environment that promotes physical and emotional well-being, resulting in enhanced performance and staff morale.

Sub-theme 1: Opportunities and benefits

Despite employee welfare going further than health and safety management, adapting working conditions that accommodate different employees' needs is critical, as quoted by one SOE:

> *"Employees with disabilities have same opportunities just like all employees. At times, the organization goes an extra mile for their equipment, alterations and training. There is also provision made in their medical aids for their needs."* (P2)
>
> *"We employed quite a few of people with disabilities or special needs., For example, we can hire blind people to work as switchboard operators, or we can hire a person on a wheelchair to work as receptionist and so on."* (P8)

Sub-theme 2: Aids and assistance

This sub-theme is related to adjustments made or aids provided to promote accessibility, which enable PWDSN to be productive.

> *"Support and aids position employees in a position to enable them to do their work properly."* (P4)

Theme 2: Impairments and performance

The participants in this study see impairments and performance as an indicator for physical and mental functioning of employees, and how they contribute to the employee's fulfilment and executions of tasks and responsibilities.

Sub-theme 1: Physical impairments

This sub-theme captures the understanding of managers, HR personnel and others involved in recruiting PWDSN and their relationship to employee performance.

> *"Limitations preventing people to move or act in a certain way or acting normal. Employees limitation to doing certain things due to their physical disabilities."* (P6).

> *"A person with a mental, emotional or physical disability. Someone that may need help with communication, movement, self-care or decision making." (P10).*

Sub-theme 2: Attitudes and productivity

This theme assesses the employers' attitudes toward performance and productivity in the SOE: *There were both positive and negative attitudes toward the performance and productivity of PWDSN among participants.*

> *"I perceive them as normal employees, because they are mentally capable with the ability to contribute to the organizational needs and goals."* (P6)

> *"My perception is that these people need extra assistance in executing their jobs and that a total of 70% performance should be regarded as a 100%."* (P12).

Theme 3: Employee experiences and exposure

This theme serves to create an understanding of employees' observations and experiences of working with PWDSN. Thus, enabling employees to share their thoughts and experiences encountered while working with employees with disabilities and special needs.

Sub-theme 1: Positive and negative experiences

This sub-theme captures participants' feelings and experiences of working with PWDSN as employees. Their level of exposure to PWDSN appeared to shape their attitudes in different ways. Participants with greater exposure reported negative attitudes, while those with limited exposure expressed more positive or neutral views. This contrast may be linked to varying levels of comfort and confidence when interacting and working with PWDSN.

> *"I personally feel challenged; do I attend to their needs or assist them? I don't know what assistance to offer. I am not comfortable talking to them, particularly about their disabilities. I observed that some colleagues are comfortable and others like me are not."* (P1).

> *"To me, working with employees with disabilities is the same as with other employees. I am only challenged with the employees who are not mentally well. I am impressed by my previous boss and our current employees with disabilities. These staff members are intelligent and performing very well. I at times consult them for work tasks."* (P2)

Sub-theme 2: Thoughts and observations

This theme includes the ideas, actions, opinions, and processes of employers when it comes to the employment of PWDSN: *No participant observed or developed negative thoughts about the employment of PWDSN. The only negative thought or observation is the employees' lack of understanding of individual's disability or special needs.*

> *"The colleagues in the same department with employee with disabilities understand better, they are more comfortable and know how to deal with these colleagues. Yes, I feel the same too."* (P10)

> *"Our recruitment makes provision for qualified applicants from designated groups as defined in the Affirmative Action Act (1998) that also encouraged employees with disabilities to apply."* (P11)

Theme 4: Awareness creation, guidance, knowledge and understanding

This theme is a description of employers' view on the requirement of training and provision of disability related information for employees, implementation of relevant legislations as well as whether they are equipped with the knowledge and skills to deal with disabilities and special needs matters.

Sub-theme 1: Information dissemination and sensitization

The sub-theme information dissemination and sensitization, includes awareness and education as described by participants when asked if they think employees in their organization were trained or informed to deal with issues of disabilities and special needs:

> *"Not really. Employees' education and awareness are not done here. However, assistance and engagement are done by a health and safety committee established to deal with employees' needs."* (P1)
>
> *"Not all staff members have enough training or knowledge on how to deal with disability issues. There are no dedicate efforts to cater for the needs of people with disabilities and special needs. No developed standard and guidelines."* (P11)

Sub-theme 2: Awareness and access to information

This sub-theme highlights employees' limited preparedness and inadequate access to information needed to implement relevant legislation. Hence, it reflects participants' views on how organisations create awareness, provide information, or equip employees with the necessary knowledge to implement legislation on the employment of persons with disabilities and special needs (PWDSN).

> *"No, there are no platforms to equip employees. No awareness on legislature, the bank relies on HR department to implement this legislature."* (P2)
>
> *"Not all employees but management and those responsible for the implementation are equipped."* (P4)

Theme 5: Working environment and employment processes

This theme focuses on solutions that could support and adjust the employment process according to different needs.

Sub-theme 1: Inclusivity and accessibility

This sub-theme assesses if the working environment is suitable for PWDSN to make a meaningful contribution to the organization.

> *"Definitely, our environment is conducive, simply because we have the required facilities and equipment that are accessible to our staff with disabilities, ranging from toilets, parking and equipment required to carry out the duties and responsibilities. Provision and adjustments are made based on the nature of disability of the staff members."* (P4)
>
> *"Our environment is hazardous; we do not encourage the recruitment of disabled persons."* (P10)

Sub-theme 2: Recruitment practices

This sub-theme highlights the current recruitment practice in the SOEs. The sub-theme consists of categories for the current recruitment practice identified by participants. These practices should prioritize inclusivity, accessibility and reasonable accommodation.

> *"No provision is made for people with disabilities. They are required to go through the same process as other employees, except that they are in most cases encouraged to apply. Provision to cater for their needs is then made if they're shortlisted or hired." (P3)*

The participants' demographic variables were found to influence the employment of PWDSN; however, the literature indicates mixed perceptions regarding the employment of PWDSN across genders. Verulava and Bedianashvili (2021) noted that there are no differences, while Nguyen and Armoogum (2021) observed a more positive perception among women. These findings were supported by Ballo (2020). According to Pritchard (2019), this shows that women are more sympathetic and better understand PWDSN.

Across the five sectors, the study found a notable difference in the participants' perceptions, i.e., agriculture and mining were seen as being risky, demanding and unconducive for PWDSN. Kanobe et al. (2022) found that employees in the banking, housing, and telecoms sectors were more positive about employing PWDSN.

Employers' experience and exposure to PWDSN also contribute to their perceptions and employment of PWDSN. Verulava and Bedianashvili (2021) noted that employers' position, length of service and experiences of working with PWDSN have a positive influence on employers' perceptions. Kanobe et al. (2022) indicated that exposure to PWDSN in the workplace may lead to a positive perception and the eventual employment of more PWDSN. For this reason, earlier exposure to PWDSN positively influences employers' views. Bonaccio et al. (2020) similarly reported that employers with prior exposure were more likely to recruit PWDSN.

This study found that most SOEs only employed one PWDSN, although one had five employees with disabilities. Derbyshire et al. (2024) similarly noted that despite laws and policies to address discrimination against PWDSN, their employment rate remains low.

The participants said that the support and services provided to PWDSN were equal and non-discriminatory, and that equal opportunities and benefits are provided to all employees. This was as per Carr and Namkung (2021), who claimed that employees are given similar support and welfare services, without discrimination based on race, gender, age, disability, culture or sexuality. According to the interviewees, services such as special assistance, equipment, affiliation, medical aid, and membership are available to all staff. According to Wu et al., (2020), these services are offered to ensure effective well-being, to enhance performance capacity, and to motivate employees to fulfill their duties and responsibilities. In addition, Carr and Namkung (2021) confirmed that in the United States, there are support and welfare services for all employees, regardless of their disabilities or special needs. Romeo, Yepes-Baldó and Lins (2020) found this to be useful to retain employees.

Some interviewees reported that certain employers hold negative perceptions about employing PWDSN; however, this occurs in contexts where the provision of disability-specific support and welfare is often overlooked. According to Khayatzadeh-Mahani et al., (2020), a lack of effective employee support and welfare has a negative impact on both employees' and employers' perceptions, leading to the unemployment of PWDSN. This was confirmed by Watts and Hodgson (2022), who found that employees have diverse support and welfare needs that arise from different aspects of their well-being. For this reason, understanding the needs of employees with disabilities and special needs is of great importance as it impacts the employment of PWDSN (Peronja, Dadic & Mihanovic, 2019).

The participants recognized the link between impairment and employee performance and its influence on the employment of PWDSN (Reyes, Bogumil & Welch, 2024). Employees can have mental, physical and psychological impairments that influence their performance and attitude. According to Peronja and Mihanovic (2019), employers' perceptions of employing PWDSN are shaped by the degree to which they understand and recognize the associated impacts. This was confirmed by Marques et al., (2020), who claimed that the way in which employers address their employees' impairments influences their perceptions of the employment of PWDSN (Hajure et al., 2021). Overall, a positive outlook leads to a positive attitude, and eventually improves employee performance (Zhu et al., 2019).

This study shows that staff with physical impairments have the right attitudes to carry out their duties and responsibilities. The interviewees indicated that employees with disabilities and special needs are capable, productive performers. This is as per Zhu et al., (2019), who linked impairments and employee performance to both positive and negative perceptions and influences. According to Dreaver et al., (2020), comprehending the relationship between impairment and an employee's performance can influence a manager's opinions. These findings confirm that impairments affect employers’ perceptions and affect the employment of PWDSN (McKinney & Swartz, 2021). For this reason, employers should not view an impairment as an obstacle to performance or employment (Dreaver et al., 2020).

This study found that there are mixed perspectives, experiences and exposure to PWDSN. Dwertmann et al. (2023); Callaghan (2020) and Wilde & Hsu (2019) similarly found that employers' experiences and exposure can result in negative or positive perceptions of the hurdles facing PWDSN in the workplace, which influence employment and recruitment processes. According to Ogińska-Bulik and Juczyński (2024), positive experiences and exposure lead to positive perceptions, and vice versa.

This study found that it is critical to create awareness and sensitize employers to PWDSN. SOEs utilize different strategies for reaching out to their employees, including awareness creation, guidance, understanding, and knowledge creation. Other studies have discovered that disseminating information and sensitizing people is crucial for positively influencing employers' perceptions regarding the employment of PWDSN (Verulava & Bedianashvili, 2021; Lee, Li & Tsai, 2021).

As per the study, some SOEs create more information sharing platforms than others. According to Charles (2022), informed employers contribute more to the integration of PWDSN, particularly with regards to implementing national policies and laws. Charles, Gie and Musakuro (2023) argued that a lack of information sharing platforms lead to an uninformed workforce, which negatively affects employers’ perceptions of the employment of PWDSN. It also obstructs the recruitment processes of PWDSN and impedes the successful implementation of policies and procedures linked to disability inclusion (Pinilla-Roncancio & Rodríguez Caicedo, 2022). This was confirmed by Mhone (2022), who showed that information sharing and familiarizing employers with legislation can promote equal opportunities and treatment and eliminate work-related stigma and discrimination.

This research found that the working environment not only includes the physical and structural features of a work setting but encompasses social acceptance and ensuring that the needs of PWDSN are met. The interviewees described accessibility features in their workplaces and evaluated their current recruitment practices in light of the employment challenges of PWDSN. This is in line with Hafeez et al., (2019), who argued that employers should create an emotionally and physically healthy atmosphere to ensure a positive working environment.

The participants highlighted that SOEs do not create policies related to PWDS, but rather adopt national policies, guidelines and laws, e.g., the Affirmative Action Act, Act 29 of 1998 and employment equity guidelines. Reasonable accommodations related to equipment, financial resources, accessibility, inclusivity, and professional development are some of the aspects that affect employers’ perceptions of the employment of PWDSN. Chumo et al. (2023) similarly found the working environment to be critical for the accommodation and employment of PWDSN.

The interviewees also claimed that their organizations utilize special grading, inclusive advertising and selection, considerate shortlisting, special scoring, prioritizing, and implementing and adhering to policies and laws to accommodate PWDSN. On the contrary, however, Shaw et al. (2022) found that current recruitment strategies are not sufficiently conducive to mitigate the employment challenges of PWDSN, which they attributed to a lack of capacity and HR development. Organizations should thus use inclusive and disability-specific recruitment practices. Borghouts et al. (2021) also suggested that companies should develop recruitment strategies that accommodate the needs of PWDSN.

Limitations and areas for Further Research

The focus on 15 participants might have left out other potential participants, which could affect the generalization of the findings. While the participants were responsible for the implementation of laws and the recruitment processes, it is unclear whether their opinions and practices represent those of all SOEs. Secondly, disabilities and special needs were not clearly defined to the interviewees, leading to confusion. The terms 'disability' and 'special needs' broadly in the research in order to leave it up to the participants' interpretations. This could be seen as a limitation as if they had been clearly defined, the interviewees may have responded differently. *It* is recommended that future studies use a bigger sample and extend the number of SOEs to capture a wider view of employers' perceptions of the employment of PWDSN. Future research should also include PWDSN as participants. Finally, future research should address the factors that influence employers' perceptions of PWDSN in Namibia.

CONCLUSIONS

Despite some progress to ensure sustainable employment of PWDSN, there remain significant gaps and inequality in the development, understanding and implementation of inclusive employment practices within the SOEs included in this study. These findings are significant for various stakeholders, including management, HR personnel, health and safety officers, wellness coordinators, training and development teams, planners, and those involved in recruitment processes. This research has generated evidence that could be helpful in informing improvements in ensuring inclusive recruitment for PWDSN within SOEs in Namibia. The findings could also be applicable to other organizations where similar employment policies and legislation apply in line with international labour practices. Additionally, the findings from this study provide recommendations for the implementation and adherence to inclusive employment policies and legislature. The implementation of the Affirmative Action Act, Act 29 of 1998, and adherence to the National Disability Act, Act 26 of 2004, the National Policy on Disability (2025-2030), and the National Vocational Training Act, Act 18 of 1994 varies across organizations. By addressing this, it could eliminate negative perceptions, lessen employment challenges, and result in inclusive employment practices for SOEs.

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Competing interests

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Data availability

The data that support the findings of this study are available from the corresponding author, DA, upon reasonable request.

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Original Research Article

Actions, Potentialities, and Limitations of the Brazilian Network of Care for People with Disabilities: A Qualitative Study

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ABSTRACT

Introduction: The Care Network for Persons with Disabilities aims to provide comprehensive and continuous care to this population, structured through components of primary care, specialized rehabilitation care, and hospital care, including urgent and emergency care. In this context, the Care Network should be anchored in the guidelines of decentralization and regionalization of health to promote equal access.

Objective: To understand the actions aimed at people with disabilities, and the strengths and limitations of the Care Network for Persons with Disabilities in the IX Health Region of Pernambuco, Brazil.

Materials and Methods: This is a qualitative narrative study, guided by Critical Disability Theory, conducted with five regional health managers and five primary care coordinators working in the IX Health Region of Pernambuco. Data were collected through semi-structured interviews and subjected to thematic content analysis.

Results: Three thematic categories emerged, condensing the main topics addressed by the participants: (1) "We don't stop to think about this; it's rare and difficult": actions aimed at people with disabilities; (2) "Specialized Rehabilitation Centers need to be opened": potential of the Care Network for People with Disabilities; and (3) "Recife is a long way away, isn't it?": limitations of the Care Network for People with Disabilities.

Conclusion: the health system in the IX Health Region perpetuates a fragmented and unequal care model, which reinforces the marginalization of people with disabilities.

Keywords: People with disabilities; Health Care; Health Services; Comprehensive Health

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INTRODUCTION

The enactment of the 1988 Federal Constitution (CF) represented a milestone in the consolidation of health as a right for all and a duty of the State, through the creation of the Unified Health System (SUS), based on the principles of universality, comprehensiveness, and equity (Brazil, 1988). Years later, the Brazilian Law for the Inclusion of Persons with Disabilities, also called the Statute of Persons with Disabilities, reinforced this commitment, establishing the guarantee of comprehensive care for Persons with Disabilities (PwD) at all levels of complexity within the scope of the SUS (Brazil, 2015).

According to the Continuous National Household Sample Survey (PNAD Contínua), Brazil had approximately 18.6 million people with disabilities in 2022, representing 8.9% of the population aged two and over. In Pernambuco, approximately 949,000 people are estimated to have disabilities, representing 10.1% of the population in this age group. Nationally, the Northeast region has the highest proportion, reaching 10.3% of the population, corresponding to approximately 5.8 million individuals. Visual impairment is the most prevalent, followed by physical, hearing, and intellectual disabilities (IBGE, 2022).

Despite this significant prevalence, PwD face significant barriers related to health, education, employment, and income. In the health field, Ordinance No. 4,279/2010 (Brazil, 2010) guided the organization of Health Care Networks (RAS), defining as a priority the Care Network for Persons with Disabilities (RCPCD), formally established by Ordinance No. 793/2012, which established its implementation in the SUS through the creation, expansion, and articulation of care points (Brazil, 2012; Brazil, 2014).

The RCPCD is structured into three components: Primary Care, Specialized Care in Rehabilitation for hearing, physical, intellectual, visual, ostomy, and multiple disabilities, and Hospital and Emergency Care. These components must operate in an integrated manner, with regulated access and coordination between the different services, in order to ensure comprehensive care (Brazil, 2012). However, studies indicate that, despite legal support, the RCPCD remains a public policy that lacks structural investment and the strengthening of professional performance, resulting in fragmented care and compromised comprehensiveness (Farias et al., 2023; Miranda et al., 2024; WHO, 2011).

The national and international literature on disability mostly presents analyses focused on specific dimensions, such as the role of Primary Care, policies segmented by type of disability, accessibility, functionality, inclusive education, insertion into the labor market, and the use of assistive technologies (Miranda, 2024; Almeida et al., 2024; Macedo et al., 2025; Macedo, Leite & Gimenez, 2024; Mota & Bousquat, 2023). However, there are gaps in research on the RCPCD as a structuring and articulating network of care in the SUS, especially in regional contexts.

In this context, analyzing the RCPCD in the IX Health Region of Pernambuco is relevant, given the high prevalence of PwD in relation to the total population and the need for effective actions to ensure comprehensive and quality care. The RAS (Regional Health Programs) are an essential strategy for strengthening the management and organization of services in different regions (Barbosa, Rodrigues & Alencar, 2025; Brazil, 2010).

The IX Health Region presents critical indicators for the organization of the Care Network, including a high proportion of persons with disabilities, unequal distribution of rehabilitation services, extensive territorial dispersion, long distances from the state capital Recife (up to 640 km), and dependence on informal interstate care flows (Barbosa, Rodrigues & Alencar, 2025). These characteristics make the region an emblematic example of the structural inequalities that shape the provision of care for persons with disabilities in Northeast Brazil.

Thus, this study aimed to understand the actions aimed at people with disabilities, as well as to identify the potentialities and limitations of the Care Network for People with Disabilities in the IX Health Region of Pernambuco.

MATERIAL AND METHODS

This is a qualitative, narrative study guided by Critical Disability Theory, which examines in depth social inequalities, access to resources, and discrimination processes that directly impact the lives of people with disabilities (Pereira Spiniele, 2024). The *Standards for Reporting* guidelines were followed in the preparation and reporting of the study.

Qualitative Research (O'Brien et al., 2014), aiming to ensure transparency, systematicity and rigor in the description of procedures.

The research was conducted in the IX Health Region of the state of Pernambuco, Brazil, whose headquarters are located in the municipality of Ouricuri and encompassing the cities of Araripina, Bodocó, Exu, Granito, Ipubi, Moreilândia, Parnamirim, Santa Cruz, Santa Filomena, and Trindade. During the research period, from October 2019 to February 2020, this region had an estimated population of 327,866 inhabitants, distributed across eleven municipalities (IBGE, 2019). The location was chosen because it has a structured Health System (RAS) that offers services ranging from Primary Care to High Complexity Care.

Ten participants participated, distributed in two segments: Segment 1, composed of managers linked to the IX Regional Health Management, including the Manager, the Health Care Coordination, the Microcephaly Supporter, the Health Regulation Supporter and the Health Planning Supporter; and Segment 2, formed by Primary Care coordinators from five municipalities in the region. The selection of participants followed an intentional approach (*purposive sampling*), being invited initially by email and, later, by face-to-face contact.

The sample of ten participants was appropriate for the qualitative design, whose purpose is to explore perceptions and experiences in depth rather than produce statistical generalization. The intentional selection of strategic managers enabled the capture of diverse perspectives on the organization of the Network, and theoretical saturation was reached when additional interviews no longer contributed substantive elements to the emerging categories, as recommended in qualitative health research (Rahimi & Khatooni, 2024).

Individuals who had held the position or served as legal representatives for at least three months were considered eligible, a period defined to allow familiarity with the service network. Individuals on leave due to vacation or any other type of leave, as well as those unavailable for the interview, were excluded. Two coordinators were on leave, and three were unable to participate due to unavailability.

Data collection was conducted through semi-structured interviews, guided by a script developed by the authors and composed of trigger questions. The guiding question was: "What health actions aimed at people with disabilities are carried out in the municipality/health region, and what are the strengths and limitations identified in the network?" With consent, the interviews were audio-recorded, transcribed verbatim by the interviewing researcher, and reviewed by another team member. Preliminary analyses and interpretations were discussed with two researchers, ensuring triangulation of perspectives. Each interview was conducted individually, in a private location chosen by the participant, and lasted an average of 30 minutes.

To ensure anonymity, alphanumeric codes were assigned, with the letter "A" for regional managers and the letter "B" for municipal managers, followed by the interview sequence number. Data collection ended at theoretical saturation. Before the actual start, a pilot test was conducted to verify clarity, feasibility, and any adjustments to the instrument.

The analysis of the material followed the Thematic Content Analysis, according to Bardin (2011), fulfilling the steps: (1) pre-analysis, with exhaustive reading and organization of the corpus; (2) exploration of the material, identifying registration units and context, relevant excerpts and emerging categories; and (3) treatment and interpretation of the data, searching for underlying meanings and articulating them to the adopted theoretical framework.

Methodological rigor was ensured through the criteria of credibility, reliability, dependability, and transferability (Forero et al., 2018). The results were organized into thematic categories, illustrated by excerpts from the interviews and interpreted in light of Critical Disability Theory.

Although the analysis followed the principles of Thematic Content Analysis, the interpretative stage was strengthened by an analytical logic inspired by the SWOT matrix, widely used in policy and service network evaluations. This framework enabled the synthesis of findings in terms of strengths, weaknesses, opportunities, and threats that influence the functioning of the Network, without modifying the original corpus or analytical procedures, while expanding the strategic understanding of the phenomenon under study (Helms & Nixon, 2010).

As this is a qualitative study, the results do not aim at statistical generalization, but rather at an in-depth understanding of the processes and perceptions that structure the Care Network within the investigated context. The intentional sampling of strategic participants allowed the capture of central elements of network organization, whose findings are analytical and potentially transferable, rather than representative of other regions. The validity of the interpretations is grounded in analytical depth, internal coherence, and theoretical saturation.

This study was approved by the Research Ethics Committee (CAAE No. 20541019.2.0000.5191) and followed the guidelines of Resolution No. 466/2012 of the National Health Council.

RESULTS

Of the 10 study participants, seven were female, and the average age was 38. Three thematic categories emerged, condensing the main topics addressed by the participants: (1) "We don't stop to think about this; it's rare and difficult": actions aimed at people with disabilities; (2) "Specialized Rehabilitation Centers (CERs) need to be opened": potential of the Care Network for People with Disabilities; and (3) "Recife is a long way away, right?": limitations of the Care Network for People with Disabilities.

Category 1 – "We don't stop to see this, it's rare, it's difficult": actions aimed at people with disabilities

In this category, health actions aimed at people with disabilities stood out, which are mostly punctual and scattered, without a continuous and integrated strategy.

Most of those interviewed highlighted the work of the Family Health Support Center (NASF) and services such as the Pernambuco Specialized Care Unit (UPAE), but the lack of resources and limited staff make it difficult to provide adequate and comprehensive care.

> *"Look, very little, it's just occasional. So, we've already had some kind of video conference that talks about it, it's... the UPAE that does rehabilitation that is kind of specific for patients with microcephaly, but who have other disabilities, so there's the UPAE, and some municipalities do it occasionally, like, one or another, but nothing routine, like, nothing that we have a specific time for it" (A1).*

> *"There's Recife, we have meetings that are held at the Disability Network so we can see decrees, but nothing very routine, so we don't stop to see that, it's rare, it's difficult" (A2).*

> *"[...] The assistance is more like this, it is punctual, it is not specifically directed, it is part of the general flow, but there is special attention, a special list and there are also some children who need diapers and milk" (B5).*

> *"I don't know if there are any within the municipality, not that I know of. Video conferences are always held here and occasionally they are for people with disabilities, but there are no actions aimed solely at people with disabilities" (B1).*

It is recognized that there is a gap in the implementation of consistent and frequent policies and actions for people with disabilities, with these actions being limited and dispersed, rather than part of a broader or structured approach to care.

Interviewees revealed that there is no routine programming or ongoing strategy aimed at people with disabilities, although some teams, such as the NASF, are making efforts to meet demand, as reported below:

> *"Yes, they do some things, like the municipalities that when there is a specific month they do specific activities" (A5).*

> *"Yes, we do. We have the support of the NASF at the units, and with the support of the NASF, these actions are carried out. Some at the unit itself, others right here at the Secretariat. We experience the Week of Persons with Disabilities very well [...]" (B3).*

> *"Well, in the municipality there are no actions that are... totally focused on them, what exists is the NASF team that provides this care to them in the units and at home. […] however, they are also unable to provide full support because it is a small team and there is a large number of these patients in the municipality" (B4).*

Another important factor identified was the perception of the Psychosocial Care Center (CAPS) as a place to serve PwD.

> *"In the municipality there is monitoring by professionals such as speech therapists, psychologists, physiotherapists, psychiatrists and there is CAPS, aimed at people with disabilities [...]" (B2).*

The indication of CAPS as a place of care highlights the way in which PwD are sometimes understood in public policies and health services.

Category 2 – "Specialized Rehabilitation Centers to be opened": potential of the Care Network for People with Disabilities

This category describes positive, but cautious, perceptions about the potential of RCPCD, highlighting important advances, but also highlighting challenges in the process, with emphasis on the implementation of CER III, monitoring of children with microcephaly and the proper functioning of the regulatory flow.

According to managers, the implementation of CER III offers great hope for improving resolution in the health region, providing more effective and regionalized care, as well as expanding diagnosis and care for people with disabilities. This demonstrates the quest for a more robust and integrated structure, capable of meeting demands that are currently resolved in a fragmented manner or late.

> *"Look, we have the potential to open the CER […]. So this gives us another perspective, so we will be able to resolve some things that could have already been resolved here in the region and we will be able to achieve resolution, I think, right? […]" (A2).*

> *"The potential we have is that this is central. The municipalities are close, so this CER III will be a powerful force for this rehabilitation. That's all (laughs)" (B1).*

> *"So, I think we have potential, because we have good professionals, we have the physical space for this, so with the CER I think we can open up the range a little more for this specifically [...]" (A2).*

Other potentialities include monitoring children with microcephaly and ensuring the proper functioning of the regulatory flow, despite the challenges.

> *"I don't really know how to tell you this, because this microcephaly trend came about because of these children, right? [...]. So, the potential I can say is that there was a different perspective here, the state saw this issue, unfortunately, because of this fatality that happened and then everything turned around here. So, it was a very broad, very beautiful perspective that the state had for these children" (A5).*

> *"The potential is that through our monitoring, this issue of microcephaly and this list that classifies, right, these children, we know where they are, because of this today we have a rehabilitation service that serves not only microcephaly but also other syndromes" (A1).*

> *"[...] and as a benefit, I think that the flow via regulation has worked, although it can't cover everyone, but there isn't, like, so much confusion around this sector, since we work with confusion, right? So it has worked well, it's a flow that continues well […]" (B5).*

Although the implementation of CER III, the monitoring of children with microcephaly, and the regulatory flow can be seen as progress, these efforts do not yet reflect structural or transformative change.

Category 3 – "Recife is a long way away, isn't it?": limitations of the Care Network for People with Disabilities

This category highlighted the difficulty in accessing referral services in Recife, the lack of specialized professionals, inadequate infrastructure, low salaries, and hiring difficulties. The delay in implementing CER III and government negligence were also highlighted as obstacles, in addition to the lack of guaranteed rights and insufficient empowerment of Primary Care in caring for PwD.

> *"[...] so everything we need to improve, like, a little more assistance, goes to Recife and it's 640 km from some municipalities, from others it's even further, so 640 km for you to resolve something that you could resolve here. So, I think that's it" (A2).*

> *"Okay, we have speech therapy, we have... physical therapy, but this issue of orthoses and prosthetics, Recife is a long way away, right? Very far for us who are from the countryside, which in the case of the eleven municipalities, it's a huge distance, right? So, if it were closer, it would be much better for the users, right? Because with that distance sometimes, for example, a child or even you leaving here with an adult, some people say, 'No, I'm not going because it's far. No, I don't want to. Isn't it here? And over there in Ceará, I can't?' Because we border Ceará, so they think we should be sending them to Ceará. They don't understand, you know? That, like, our reference is Pernambuco and we have to send them to Recife [...]" (B3).*

> *"I just think that I could come here a little bit more, instead of everything being in Recife, come here, you know?" (B1).*

> *"We don't have anything that we can forward and resolve, have resolution in the region, in the entire region, forward to Recife" (B5).*

> *"[...] it is also a suffering for the family not to have this support nearby, not in (name of municipality) or in neighboring municipalities. So, they end up being very dependent on the state, the Ministry for this service and, whether we like it or not, we fail to provide adequate assistance to these families" (A1).*

A reality of profound inequalities in access and quality of care for people with disabilities in the IX Health Region is evident. The distance from Recife, where specialized services are concentrated, represents a significant barrier, generating long and tiring commutes for patients and their families.

Another limitation cited in the reports was the difficulty municipalities had in offering comprehensive assistance to PwD due to the absence of some key professionals for rehabilitation in the municipality.

> *"[…] there is a limitation on professionals, due to the workload and salary, we limit ourselves a bit […] on a recent visit there was a specific place to do BERA, the only thing missing was the booth, they were already seeing a booth but there was no speech therapist, why? Because the pay is low and the workload is long, so this is a limitation, the issue of workload and salary" (A4).*

> *"And the limitations, because some specialties are very difficult to find, such as occupational therapists, this limits our care, our rehabilitation, which, by not having a professional, ends up harming the service and the patient" (B3).*

> *"In relation to what we have today, we could get a neuropediatrician, which is a difficulty we have in the region, not only here, but at the state level because this issue of specialists is also difficult" (B2).*

> *"So I think the weaknesses are because it is a smaller region, because it doesn't have university services, it doesn't have professional training services, but there is also the will of the people" (A5).*

Furthermore, the delay in implementing CER III, which was in the process of being implemented and was scheduled to begin operating in 2019, was mentioned in the interviews.

> *"[...] and the CER that is built in the municipality that already has it set up, it is already to receive resources, just missing completion and can't move forward . It's been a long time, a really long time and it should already be funded, if they had started to assemble it would already be funded, so it would already be funded, it would already be good and it would be of great value to the entire region, because we have nowhere to run [...]" (A3).*

> *"[...] When CER III opens, it will enhance this Network because it will be specifically for these users. We will have people from different areas, but unfortunately, we expected it to open in 2019. It didn't. It's not something that depends on us; we don't know what stage it's at. The last time we heard from him was when he came to CIR, specifically to purchase equipment, and they said it was close to being operational, but since then, we haven't heard anything about the situation at this center [...]" (A4).*

The delay in opening CER III highlights the inefficiency in implementing important projects for specialized care, leaving municipalities even more dependent on urban centers to meet essential demands.

Furthermore, government negligence towards RCPCD was cited by respondents.

> *"It's a network with great potential for growth, due to the number of people who can benefit from it. However, it's largely neglected by the federal government, states, and municipalities. What we can see is that they alone can't build a network that can meet these people's needs. I think it needs to be discussed more, with more specific actions for these people." (B2)*

It is evident that these entities are unable, on their own, to structure a network that adequately meets the needs of this population, reflecting a structural failure and the need for greater debate and more targeted and specific actions for the inclusion and care of people with disabilities, aiming at the development of a robust and accessible care network.

The lack of guarantees for some rights, such as the right to come and go and the right to health, were also cited.

"The difficulty is really accessibility, right? Many don't have it, many don't have it, the vast majority don't have the right to come and go, it's... that's it! I see that the biggest problem with these disabled patients is really accessibility, it's the rights, the rights they don't have, the vast majority don't even have the right to come and go. In many municipalities, they also don't have the right to health care because of a lack of services. For example, in ours, I can say with certainty that we guarantee at least speech therapy, physical therapy, and a psychologist, but I know that other municipalities don't have them. Qualified professionals, in our municipality, yes, but in many others, unfortunately, they don't have these professionals either [...]" (B4).

The lack of guarantees for basic rights, such as accessibility, is a critical issue, reflecting a RCPCD that still lacks substantial progress in both the planning and implementation of public policies.

Another challenge encountered was the lack of empowerment of Primary Care in caring for PwD.

> *"I think we don't empower Primary Care enough. Primary Care doesn't end up working as hard as it should. Of course, Primary Care already has a lot of work to do, it already has a whole care process, but sometimes we let them go to specialized services too often and lose the connection between these patients and Primary Care" (B5).*

Primary Care, by not being sufficiently trained and structured to deal with the complexity of disabilities, ends up relegating people with disabilities to the specialized system, which could be avoided with more comprehensive and preventative care.

DISCUSSION

Although Brazil has a robust legal framework to guarantee the rights of people with disabilities, the results of this study show that the RCPCD in the IX Health Region of Pernambuco remains marked by isolated actions, fragmentation, and a lack of continuous planning. This discontinuity is not only operational but also reflects structural inequalities and the persistent inability to transform policies into effective practices. This scenario is central to Critical Disability Theory, which understands disability as a social construct permeated by institutional, symbolic, and structural barriers that limit full participation and the exercise of rights (Spinieli , 2024).

The first category revealed that, although initiatives such as the NASF (National Family Health Strategy) and some activities carried out in health units exist, there is no regular, systematized strategy aimed at people with disabilities. The episodic nature of these actions, already identified in other contexts (Campos, Souza & Mendes, 2015; Ferreira, Mota & Bousquat, 2023), maintains a reactive logic of care, dependent on campaigns, commemorative dates, or specific mobilizations. Furthermore, the reference to the CAPS (National Center for Social Assistance) as a place to care for people with disabilities reinforces a pathologizing conception, which associates disability with psychiatric disorders. This view, also present in previous studies (Almeida, 2012; Cubas, 2016; HRW, 2018), runs counter to inclusive guidelines and contributes to the perpetuation of stigma, as opposed to a rights-based and socially inclusive approach (Blikstein & Reis, 2023).

In the second category, the implementation of CER III emerged as the main potential for regionalizing and improving care, reducing reliance on travel to Recife and increasing resolution. More than just a new physical space, this service has the potential to reorganize patient flows, promote early diagnosis, and enable interdisciplinary rehabilitation integrated into the network (Brazil, 2012a; Brazil, 2020; Lopes, 2021).

However, delays and bureaucratic obstacles compromise the realization of this expectation, perpetuating the specialized access gap (Dubow, Garcia & Krug, 2018). Another positive point highlighted was the regulatory flow, which interviewees considered functional. This finding deserves attention because it demonstrates that, even in contexts with structural limitations, it is possible to implement effective organizational mechanisms when there is clarity of processes, integration between services, and well-defined agreements (Andrade et al., 2023; Ferreira, Mota & Bousquat, 2023).

The third category encompassed the most critical limitations: a distance of up to 640 km from Recife to access specialized services, a shortage of professionals with specific training, inadequate infrastructure, and low salary attractiveness. These factors restrict access, discourage the retention of professionals, and exacerbate territorial inequalities, a reality also observed in other regions of the country (Soratto et al., 2017; Pinafo et al., 2020; Vaz, 2020; Maciel et al., 2020). The lack of universities and training centers in the region exacerbates this situation, reducing the local supply of professionals and limiting the capacity for team renewal (Haddad et al., 2010; Melo, Moysés & Moysés, 2010).

Another relevant finding was the low empowerment of Primary Care (PC) in caring for PwD. When PC does not fully exercise its role as care coordinator, opportunities for close monitoring, disease prevention, and reduction of unnecessary referrals to specialized levels are lost (Schultz & Alonso, 2016; Almeida et al., 2017). This weakness maintains the centralization of services, disconnects care from the territory, and favors dehumanization, as disability is treated as an isolated problem rather than as an issue within the community context (Machado et al., 2018; Lopes, 2021).

From a critical disability perspective, the results are not limited to "operational failures," but also highlight forms of institutional oppression that materialize as accessibility barriers, the disempowerment of Primary Care, and the medicalization of disability. The RCPCD imposes positive duties to remove barriers and provide reasonable accommodations; when care remains episodic and specialist-centered, this normative framework is violated and inequity is perpetuated. The pathologization detected in CAPS referrals echoes the critique of the hegemonic "medical model"; international literature proposes a reorientation toward rights-based approaches and the removal of barriers (not the "correction" of the body), with concrete effects on the care experience (Hogan, 2019; WHO, 2022).

These limitations are symptoms of a health system that, instead of guaranteeing the rights of PwD, perpetuates inequality by failing to provide equitable and comprehensive access to services. The lack of a more comprehensive and integrated vision for people with disabilities highlights how the system, even in its current form, tends to reinforce the structural barriers these individuals face. In this context, empowering Primary Care means redistributing clinical and organizational power to where people live, reducing dependence on urban centers, strengthening the continuity and coordination of care, and mitigating stigma and exclusion.

Therefore, the analysis indicates that consolidating an effective RCPCD in the IX Health Region requires overcoming isolated measures and adopting strategies that promote: the regionalization of services, the strengthening and capacity-building of Primary Care, the guarantee of fundamental rights, and the swift implementation of structures such as CER III. True integration between levels of care, combined with an approach that recognizes disability as a matter of social justice, not just clinical, is essential to breaking the cycle of exclusion and building a continuum of inclusive and equitable care.

CONCLUSIONS

Based on the framework of Critical Disability Theory, which problematizes inequalities in access to health services and highlights the importance of decentralizing and regionalizing care, it was possible to understand that the health system in the IX Health Region of Pernambuco still perpetuates a fragmented and unequal model, reinforcing the marginalization of PwD. The lack of integrated and continuous planning, evidenced, for example, by the delay in implementing CER III, constitutes a significant structural limitation to the effectiveness of the RCPCD, compromising the comprehensiveness of care.

The main finding of this research was the identification of a persistent cycle of inequality in access to specialized care, fueled by interconnected factors such as geographic distance from referral services, the shortage of qualified professionals, and inefficient implementation of public policies. These factors reverberate in the violation of basic rights, including accessibility and the constitutional right to health, keeping PwD in a position of vulnerability and dependence.

As a limitation of the study, the decision to interview primarily managers tends to institutionalize the narrative (emphasis on administrative flows, norms, and bottlenecks), potentially underrepresenting experiences marked by barriers (transportation, communication, stigma) experienced by users and families. Methodologically, this creates a risk of elite bias and an interpretive "blind spot," even under rigorous criteria. For future studies, we recommend including multiple voices (PwD, family members, frontline professionals), using theoretical sampling, and practicing systematic team reflexivity to deepen understanding of the demands and challenges of RCPCD.

Ethical Approval

This study was approved by the Research Ethics Committee under protocol CAAE 20541019.2.0000.5191.

Informed Consent

All participants provided written informed consent.

Conflict of Interest

The authors declare no conflict of interest.

Data Availability Statement

Due to the qualitative nature of the data and the possibility of identifying participants, full interview transcripts are not publicly available. De-identified excerpts supporting the analysis may be obtained from the corresponding author upon reasonable request.

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Original Research Article

Caregivers' Beliefs, Practices, and Experiences about Spoon Feeding Children with Cerebral Palsy from Rural North Karnataka

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ABSTRACT

Aim: Spoon feeding is a foundational skill supporting the transition from breastfeeding to independent eating. In India, however, traditional hand-feeding practices dominate, and limited research exists on spoon-feeding practices, especially in children with cerebral palsy (CP). Gaining caregivers' perspectives will benefit researchers in developing culturally relevant treatment protocols. This study aimed to explore the beliefs, practices and experiences of caregivers of children with CP from rural North Karnataka regarding spoon feeding.

Methods: Eight caregivers of children aged 2 to 17 years diagnosed with oral dysphagia secondary to CP participated in a focus group discussion. The discussion was video-recorded, transcribed, and thematically analysed.

Results: Eight key themes emerged: Spoon-feeding practice in families, Early experience with spoon feeding, Child's preference towards spoon feeding, Present status of spoon feeding, Communication by the child during feeding, Caregiver preference for spoon feeding, Managing spoon feeding difficulties and Impact of spoon feeding difficulties on the caregiver. Findings revealed a strong cultural preference for hand-feeding, with spoon use limited to semi-solid or hot foods, particularly in contexts such as school or travel. Early spoon-feeding attempts were inconsistent and often involved unsafe techniques, such as scraping food against the child's teeth or feeding in a supine position. Post-therapy, caregivers reported improved oral motor skills and greater acceptance of spoon-feeding. Non-verbal cues were commonly used by children to communicate hunger and fullness.

Conclusion: These insights underscore the importance of incorporating caregiver experiences into feeding interventions, emphasising the need to develop culturally sensitive training modules for rural Indian contexts.

Implications: Speech-language pathologists must consider these insights when designing caregiver education and feeding therapy protocols. Future research should involve larger and more diverse caregiver populations across different cultural and socioeconomic settings.

Keywords: Focus group discussion, Oral dysphagia, CP, Indian context, Thematic analysis, Cultural influence

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INTRODUCTION

Eating is one of the most multisensorial experiences that occurs in a child's developmental journey. It is done through various methods that evolve over time. Once a child is weaned from breast or bottle feeding, one of the earliest feeding methods introduced is spoon-feeding, which serves as a transitional skill, bridging the gap between infant feeding and independent eating. Coordinated oral-motor skills, such as lip closure, jaw stability, and tongue control, are essential for successful spoon feeding to manage the bolus and remove food from the spoon. The jaw opens to receive the spoon, the lips seal around it to prevent spillage, and the tongue collects and propels food backwards for swallowing. Meanwhile, the cheeks assist in stabilizing the bolus and supporting it, maintaining intraoral control. These skills not only promote efficient food clearance from a spoon but also support the development of later feeding methods such as chewing and cup drinking (Delaney & Arvedson, 2008).

However, children with cerebral palsy (CP) may have severe disruptions in the development of these oral-motor skills, which makes spoon-feeding particularly challenging. Feeding is negatively impacted by the motor, sensory, and postural challenges that children with CP frequently exhibit. Inadequate lip closure, instability in jaw, tonic bite reflex and issues with head and trunk control are some of their challenges, which can lead to ineffective spoon-feeding behaviours (Benfer et al., 2013). Furthermore, the presence of swallowing difficulties can make food manipulation and safe swallowing more difficult. Consequently, children with CP may remain dependent on caregivers for feeding far longer than typically developing children, with prolonged mealtimes, and increased caregiver stress (Sullivan et al., 2000).

The cultural setting in which feeding takes place is also crucial to understanding feeding difficulties. The feeding practices and utensils used during mealtimes vary significantly across cultures, influenced by historical traditions, local food preferences, and social norms. Chopsticks are the primary eating utensils in East Asian nations, such as China, Japan, and Korea, and are mainly used for eating noodles and bite-sized foods. Western nations, such as the US, Canada, and a large portion of Europe, on the other hand, primarily use spoons, knives, and forks. Hand-feeding is customarily preferred in South Asian nations, especially Bangladesh, India, and parts of the Middle East. In addition to promoting functional feeding, these culturally specific utensils also reflect values around self-reliance, hygiene, and social interaction during meals (Renda, 2013; Xu, 2014).

Culturally rooted practices, such as hand-feeding, are particularly preferred in Indian households during early childhood due to its sensory feedback, adaptability, and emotional bonding between the caregiver and child. Indian meals usually consist of hand-mixed, semi-solid foods that are simpler to handle by hand rather than with utensils. Spoons tend to be used selectively, such as for foods like kheer, porridge and other desserts.

While several studies have explored differences between baby-led weaning and spoon-feeding (Cichero, 2016; Karagoz et al., 2024), and feeding practices during and after breastfeeding (Pelto et al., 2003; Kwerengwe & Singh, 2023), there is a lack of research examining the beliefs and attitudes of caregivers of children with CP regarding spoon-feeding, particularly in a culturally complex setting like India, where spoons are not the dominant feeding tool. The cultural factors surrounding feeding can both support and impede progress for children with feeding difficulties, such as those associated with CP. Due to safety concerns about utensils or a lack of awareness of therapeutic value, caregivers often resort to hand-feeding. However, research shows that when properly introduced, spoon-feeding can improve lip closure and support oral motor development (Novotny, 2006; Sigan et al., 2013). Therefore, understanding how cultural norms intersect with clinical needs is crucial for developing effective interventions, particularly in rural areas with limited access to specialized care (Dongre & Deshmukh, 2012).

To explore these complex, experience-based perspectives, qualitative methods such as focus group discussions (FGDs) are highly effective. FGDs allow researchers to capture shared beliefs, cultural practices, and challenges through interactions among participants (Kitzinger, 1995). This method is beneficial for studying culturally embedded caregiving behaviours and can yield insights that may not emerge through structured interviews or surveys.

Given the scarcity of research exploring caregiver beliefs about spoon-feeding in children with CP within rural Indian contexts, this study aims to fill that gap. Through a focus group discussion with caregivers in North Karnataka, this research investigates current spoon-feeding practices, caregiver attitudes, and perceived challenges. The findings are expected to inform culturally sensitive intervention strategies and promote better feeding outcomes for children with CP.

METHODS

Ethical approval

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki (1975), as amended in 2000. Ethical approval was obtained from our Institutional Review Board (Approval No. SH/IRB/M.1-12/2024-25, dated 23.12.2024). Informed consent was obtained in advance from the participants' legal guardians.

Study Design

A qualitative, exploratory study design was employed using Focus Group Discussion (FGD) as the primary method for data collection. This approach is well-suited for exploring participants' attitudes, experiences, perceptions, and beliefs in a group setting that encourages interaction and idea generation.

Setting

The FGD was conducted in a quiet room of the building.

Participants

A total of eight caregivers from rural regions of North Karnataka participated in this study. These caregivers were the primary caretakers of children diagnosed with oral dysphagia due to CP, diagnosed by a team of professionals including a paediatrician/ paediatric neurologist, a physical therapist and speech-language pathologist, with the children’s ages ranging from 2 to 17 years. Informed written consent was obtained from all participants prior to the study. Caregivers were included if they reported spoon-feeding difficulties in their children and consented to participate in a recorded discussion. Demographic details of the caregivers and their children are summarized in Tables 1 and 2.

Table 1: Demographic characteristics of caregivers who participated in the focus group discussion

Caregiver Code	Age (Years)	Gender	Relationship to Child	Educational Qualification	Occupation	Socioeconomic Status (Modified Kuppuswamy scale, 2024)	Family Type
CG1	23	Female	Mother	Primary education	Homemaker	Lower middle	Joint
CG2	38	Female	Mother	Secondary education	Homemaker	Lower middle	Joint
CG3	34	Female	Mother	Under graduate	Homemaker	Upper middle	Joint

CG4	38	Female	Mother	Secondary education	Homemaker	Upper middle	Joint
CG5	28	Female	Mother	Primary education	Homemaker	Upper middle	Joint
CG6	30	Female	Mother	Under graduate	Homemaker	Upper middle	Joint
CG7	24	Female	Mother	Middle school	Homemaker	Upper lower	Joint
CG8	31	Female	Mother	Primary school	Homemaker	Upper lower	Joint

Table 2: Demographic and clinical characteristics of children with cerebral palsy

Child Code	Age (Years)	Gender	Type of CP	GMFCS Level
C1	5	Male	Spastic	V
C2	16	Female	Spastic	II
C3	8	Female	Dyskinetic	II
C4	9	Male	Spastic	IV
C5	5	Female	Spastic	II
C6	7.5	Male	Spastic	IV
C7	6.8	Male	Spastic	II
C8	9.5	Female	Spastic	IV

Procedure

A FGD was employed as the primary method of data collection to explore caregivers' experiences related to spoon-feeding their children. The discussion guide consisted of open-ended questions designed to elicit detailed narratives about feeding practices, challenges, and the contextual factors influencing spoon-feeding. Discussion topics included the child's abilities with spoon-feeding, types of food given, family support, and psychosocial experiences associated with feeding.

The FGD was conducted in Kannada to ensure linguistic and cultural appropriateness. The discussion lasted approximately 50 to 60 minutes and was both video and audio-recorded with participants' permission. The session was moderated by the first author. The recordings were then transcribed verbatim, and the Kannada transcripts were translated into English for analysis.

Thematic analysis, following the six-step process outlined by Braun and Clarke (2006), was used to analyse the data. The first step involved immersion in the transcripts through repeated reading. In the second step, line-by-line coding was manually performed to capture key ideas and experiences, which were labelled as initial codes. These codes were verified by a second researcher to ensure consistency. Saturation was considered achieved when no new codes emerged from the data. In the subsequent steps, codes were grouped into broader categories and refined into themes through an iterative review and comparison process. A total of eight key themes emerged from the analysis:

1. Spoon-feeding practice in families
2. Early experience with spoon feeding
3. Child's preference towards spoon feeding
4. Present status of spoon feeding
5. Communication by the child during feeding
6. Caregiver preference for spoon feeding
7. Managing spoon-feeding difficulties
8. Impact of spoon-feeding difficulties on the caregiver

These themes captured the breadth of caregiver experiences and highlighted the multifaceted nature of feeding difficulties among children with CP in rural contexts.

RESULTS

After in-depth thematic analysis, the final list of themes, subthemes identified and some of the most illustrative quotes from each are depicted in Table 3.

Table 3: List of Themes, Subthemes and Illustrative quotes

Theme no.	Themes	Subthemes	Example quotes
1.	Spoon-feeding practice in families	a. Frequency of usage of spoon in the family	*At home, we don't use a spoon much because we mostly eat roti. Even payasa is made very thick, so we eat it with our hands. We use a spoon only when we go outside* (C1) *Some people in my family prefer eating with a spoon as it looks more standard* (C2) *We also eat idli with chutney using a spoon sometimes* (C3) *There are seven members in our house—five use spoons, while two prefer eating with their hands* (C4) *For pongal, bisi bele bath, and sweets, we now use a spoon. Earlier, everything was eaten by hand* (C6) *We use a spoon mostly for hot and liquid foods* (C7)
		b. Methods used for feeding their children	*Even while travelling, food is given by hand. Feeding my child with a spoon takes much longer than using my hands* (C2, C4) *If support is given while eating with a spoon, then he eats it. The child likes eating on his own with a spoon, so I've reduced feeding with my hand, but I still provide support* (C6) *We don't feed with a spoon, regardless of the situation* (C7, C8). *Even for kheer, I feed my child using a glass instead of a spoon* (C8)
2.	Early experience with spoon feeding	a. First food given with a spoon	*After 1 year, ragi porridge was given in a steel glass* (C1) *At 4 months, ragi porridge was the first food fed using a spoon* (C4) *I started feeding porridge at 9 months in a spoon by making the child lie down on his back, because, if made to sit, all the food used to spill out of the mouth* (C6)
		b. Ease of feeding with a spoon	*Once I tried using a steel spoon, but it got stuck in the child's mouth, and it began to bleed. Hence, I stopped using the spoon* (C1) *My child was not comfortable eating with a spoon as she hurt herself once while eating* (C2)

3.	Child's preference towards spoon feeding	-	*She doesn't like to eat from a spoon, but sometimes she asks me to give her one when she sees others using one. For eating certain foods, such as kheer, she uses a spoon* (C2) *When eating with a spoon, he takes only a little bit. He prefers to eat with his hands as he can take a larger quantity and complete the meal faster. Additionally, he has difficulty taking the spoon to the mouth* (C4) *Ever since I started feeding him with a spoon, he likes it. But when we are short on time, I feed him using my hand* (C6) *My child doesn't like to eat with a spoon* (C7, C8)
4.	Present status of spoon feeding	a. Skill deficits in spoon feeding	*He tries to take a bit of food from the spoon using his lips, but food spills* (C1) *After attending therapy, I started showing her how to use her lips to take food from a spoon. She uses her lips only when I insist, but after that, she does not. Sometimes, she also tries to come forward to take food from the spoon. Food spillage is present* (C2) *For semisolids, my child eats them neatly from the spoon. But for liquids, spillage would be present* (C3) *While using the spoon, she opens her mouth, but takes only a little bit from the spoon, and mostly spills out the food, not clearing the spoon fully* (C4)
		b. Independent spoon usage during eating	*My child eats with both a spoon and her hands. But eating with a spoon takes longer than eating with hands* (C2) *My child doesn't know how to use a spoon and often spills the food. Therefore, if I feed, I use a spoon for 25% of the meal. She eats with her hand for the rest of the 75%* (C3)
5.	Communication by the child during feeding	-	*She rarely expresses that she is full. She vomits when she is full* (C1, C5) *I understand he is full when he burps* (C6) *My child expresses fullness through facial expressions* (C7)
6.	Caregiver preference for spoon feeding	-	*I stopped feeding with a spoon as it caused an injury in my child's mouth* (C1) *Since we have hands, it's better to eat with them; we feel more satisfied when we feed or when children eat using their hands. However, we can't altogether avoid spoons — they are sometimes necessary for eating foods like smashed rice and kheer. Spoon feeding is also required when we go outside, as it helps the child eat neatly. It is an essential skill for children to learn when they start school* (C2)
7.	Managing spoon-feeding difficulties	a. Efforts made by the caregiver to facilitate spoon	*Only porridge was fed in a spoon by making the child lie down on his back, because if made to sit, all the food would be spilt out of his mouth (C6)*

		feeding	*I have never used a spoon to feed my child (C7, C8)*
		b. Efforts made by the caregiver to seek external assistance	*Doctors and physiotherapists did not give proper referrals* (C4) *A family member suggested using a silicone bib while feeding, which was very useful, as it was easy to clean and maintain* (C6)
		c. Caregiver perspectives on the need to teach spoon feeding	*A spoon is required for specific food consistencies, such as kheer* (C1) *It is useful for children with feeding difficulties* (C2) *A spoon will be required when I admit my child to a regular school* (C3) *Spoon-feeding helps reduce drooling and improves lip closure* (C4) *A spoon is required during travel* (C6) *It is important because it helps him develop the skills to eat more independently* (C7)
		d. Caregiver's knowledge about methods to teach spoon feeding	Types of Spoons: *I am only aware of plastic and steel spoons* (C2) *I became aware of silicon spoons after coming to therapy. Before that, I used ordinary spoons* (C5) *I am unaware of the types of spoons, but I feel plastic spoons are unhealthy* (C6) Body positioning for spoon-feeding: *We used to feed her, making her lie down* (C4) *Only porridge was* fed *in a spoon by making the child lie down on his back, because if made to sit, all the food would spill out of the mouth* (C6)
8.	Impact of spoon-feeding difficulties on the Caregiver	a. Family Support	*We haven't received any guidance from family members. We didn't get help from other family members to feed our children, as they were unaware of the methods and strategies and were also a little afraid to feed them* (C1) *Not many people are there to help us with our daily chores and activities* (C2)
		b. Caregiver Stress	*A long mealtime duration of about an hour stresses me out* (C5) *It gets stressful when I am hungry and also need to feed the child* (C6) *My child doesn't eat like other normal children, and it is stressful. Sometimes, when my child never expressed that he was hungry, it became even more stressful for me* (C7)

DISCUSSION

Theme 1: Spoon-feeding practice in families

In Indian households, hand-feeding is a culturally ingrained practice, especially for infants and children. This tradition is shaped by a combination of sensory, practical, and emotional factors that influence caregiving behaviours. One key reason is the tactile feedback it provides to the caregiver. By using their hands, caregivers can better judge the temperature, texture, and quantity of food, allowing them to respond immediately to a child's oral-motor cues. This responsiveness is particularly critical for children with conditions like cerebral palsy (CP), who may have oral sensory issues (Dhiman et al., 2024). Another major factor is the flexibility in food texture. Indian meals often consist of semi-solid or mixed textures, such as mashed rice with dal, which are more easily handled and adjusted when feeding by hand. Hence, this served as a secure and effective method to ensure adequate intake, especially in children who have difficulty coordinating swallowing, thereby helping to prevent choking in those with poor oral-motor control (Kamal et al., 2022).

Hand-feeding is also deeply connected to emotional and social bonding, often viewed as an act of nurturing and love, strengthening the caregiver-child relationship. Additionally, adaptability is a practical benefit of hand-feeding. Unlike rigid utensils, hands can easily adjust to the child's posture, movements, and reactions, which is particularly beneficial for children with spasticity or hypotonia. Despite this strong cultural foundation, there is a gradual shift toward spoon use in specific contexts. Caregivers report using spoons during travel or when feeding hot or semi-liquid foods, such as kheer, where hygiene and ease of feeding are considered.

Theme 2: Early experience with spoon feeding

The early experiences of caregivers with spoon feeding reveal significant variability in the timing and method of introducing complementary foods to children with CP. While some caregivers began spoon feeding as early as 4 months, others delayed until after the child turned one. This variation aligns with research findings indicating that children often experience deviations from typical feeding timelines due to parental concerns, cultural practices, or the child's medical and motor challenges (Dhami et al., 2019). Notably, caregivers frequently chose porridge-based foods as initial spoon-fed items, reflecting a cultural preference for soft, easy-to-digest options that can be modified in consistency. Additionally, some caregivers resorted to non-ideal feeding positions, such as lying down facing up, to manage spillage or support swallowing efficiency. Such practices may pose risks for choking and hinder the development of appropriate oral motor patterns (Redstone & West, 2004).

A recurring issue reported by caregivers was the physical difficulty of spoon feeding due to their child's limited oral motor skills. Nearly all caregivers encountered challenges, such as mouth injuries, discomfort during spoon feeding, and the child's inability to clear food from the spoon effectively. These difficulties led to compensatory techniques such as dumping food into the mouth or scraping it off on the child's upper teeth—methods that can discourage the development of active lip and tongue movements. Furthermore, caregivers lacked awareness about the availability and benefits of using softer materials, such as silicone spoons, which could minimise injury risk and promote safer, more comfortable feeding experiences. This finding highlights the importance of early caregiver education as part of feeding intervention programs, particularly in relation to selecting adaptive utensils and optimal feeding positions (Mlinda et al., 2018). Overall, these insights emphasize the importance of timely professional support and culturally sensitive guidance to improve initial spoon-feeding experiences to lay the foundation for long-term feeding success in children with CP.

Theme 3: Child's preference towards spoon feeding

Children with CP demonstrated varied preferences toward spoon feeding, influenced by individual sensory, motor, and social experiences. While some children actively resisted spoon-feeding, others displayed situational acceptance, particularly when observing peers or to particular foods, such as kheer. Resistance to spoon feeding was often linked to difficulties in fine motor control, which affected self-feeding abilities and the effective clearance of the spoon. A contributing factor to spoon avoidance may be the predominant use of metal spoons in Indian households. For children with an active bite reflex, contact with a steel spoon can be particularly uncomfortable. Additionally, hypersensitivities in the gums or teeth, or increased dental fragility—often a side effect of seizure medications—may further contribute to aversion (Robbins, 2009; Ghafoor et al., 2014). Consequently, many children with CP appeared to prefer hand feeding, as it allowed for greater control over food volume and ease of intake.

Theme 4: Present status of spoon feeding

The findings revealed considerable variability in the development and proficiency of spoon-feeding skills among children with CP. While some children demonstrated emerging oral motor coordination, others struggled with inconsistent lip use, difficulty in clearing the spoon and food spillage. These observations align with previous studies indicating that children with CP often exhibit impaired oral-motor control, including deficits in lip closure, tongue coordination, and jaw stability, which hinder effective spoon feeding (Bebayal et al., 2024; Ibrahim et al., 2025). Furthermore, caregivers reported that improvements in spoon feeding were typically observed only after guided therapy, reinforcing the role of structured intervention in promoting functional spoon-feeding behaviours.

In terms of independence during feeding, most children continued to rely on caregiver support, with only a few demonstrating partial self-feeding skills. The delay in achieving independent spoon use may be attributed to limitations in fine motor skills, poor trunk control, and reduced eye-hand coordination—all commonly observed in children with CP. While some children were able to use their hands or spoons during mealtime, self-feeding with a spoon was often time-consuming and less efficient compared to hand-feeding. The use of customised adapted utensils to overcome the limitations faced by each child would help promote functional independence in feeding (Lino et al., 2020)

Theme 5: Communication by the child during feeding

The FGD findings revealed that children with CP primarily used non-verbal methods, such as gestures and pointing, to express hunger during mealtimes. These observations are consistent with existing research that highlights the reliance on non-verbal communication among children with complex communication needs (Tasgal, 2023). When it comes to expressing satiety, however, responses were more varied and less direct. Caregivers described cues such as facial expressions, burping, or even vomiting as signs of fullness. These subtle or physical indicators suggest that children with CP may face difficulties in developing or expressing typical satiety cues, possibly due to limitations in motor, sensory, or cognitive functioning. Several caregivers noted that their children rarely communicated fullness intentionally, with behaviours like gagging or vomiting becoming interpreted as signs to stop feeding. These findings emphasize the need for integrating communication aids, such as augmentative and alternative communication (AAC), into feeding therapy, to support children with CP in expressing hunger and satiety more effectively and comfortably. Moreover, the reliance of caregivers on hunger and satiety cues shows the responsiveness in the feeding style of caregivers (Kanan & Alam, 2021).

Theme 6: Caregiver preference for spoon feeding

The findings highlighted the evolving perspectives of caregivers regarding spoon feeding in children with CP. While some caregivers initially avoided spoon use due to past negative experiences—such as oral injuries or perceived child discomfort—many later recognized its importance after participating in feeding therapy sessions. This shift highlights the importance of caregiver education and therapy in promoting an understanding of spoon feeding not merely as a method of food delivery, but as a therapeutic intervention supporting the development of essential oral motor skills. Research has shown that structured caregiver education enhances understanding and improves feeding outcomes for children with CP (Mansur et al., 2023; Mlinda et al., 2018; Wafeeq et al., 2022).

Caregivers emphasized the functional, social, and therapeutic relevance of spoon feeding. It was perceived as critical for facilitating lip closure, reducing drooling, encouraging mouth opening, and promoting cleaner, more manageable eating experiences, particularly in public or school environments. Additionally, caregivers noted that while hand-feeding is culturally preferred and emotionally fulfilling, the use of spoons is required to manage certain food textures, maintain hygiene while travelling, integrate children into school routines where better hygiene can be maintained while eating, and further foster inclusion with peer groups. These insights suggest that caregiver acceptance of spoon feeding increases when they understand its broader developmental, therapeutic, and social benefits.

The physical design and material of feeding utensils are also key factors influencing caregiver preferences and adherence to feeding strategies. The acceptability of a feeding tool kit is often rooted in cultural practices, hygiene perceptions, and local context. For example, a study conducted in Bihar, India, developed an innovative feeding toolkit—including a marked bowl, slotted spoon, and a pictorial counselling card—to improve the quality of maternal and child feeding practices. However, participants in that study expressed a strong preference for steel bowls and spoons over plastic, citing hygiene concerns and a lack of local acceptance for plastic eating utensils. Furthermore, traditional feeding practices were highlighted, as caregivers noted that steel bowls and spoons are commonly used to create sounds to help maintain children's attention during feeding. This evidence underscores that therapeutic recommendations for spoon feeding must be paired with locally and culturally sensitive utensil choices to maximize caregiver adoption and sustained use (Collison et al., 2015)

Theme 7: Managing spoon feeding difficulties

The discussion revealed that caregivers of children with CP lacked awareness about appropriate spoon-feeding techniques before attending feeding therapy. Many caregivers either avoided spoon use due to cultural preferences or employed inefficient methods such as scraping food off the spoon with teeth or feeding the child in a position lying flat on back, face up. These practices, while common, may hinder the development of essential oral motor skills needed for safe and functional feeding. These have been emphasised by Maggioni et al. (2020), who found that inadequate feeding positions and utensil use can negatively impact swallowing safety and oral motor development. Caregivers in the present study reported learning more appropriate strategies, such as correct body positioning and spoon placement, only after engaging in structured feeding therapy. This underscores the critical role of professional intervention, particularly by speech-language pathologists, in equipping caregivers with practical, evidence-based techniques to support feeding success.

Another key finding was the delay in accessing appropriate professional support. Most caregivers initially consulted general medical professionals, but reported receiving inadequate or delayed referrals to speech-language pathologists, who are specifically trained to manage feeding and swallowing disorders. This echoes prior research indicating that children with CP often face barriers to timely and appropriate feeding interventions due to fragmented care systems and lack of awareness among non-specialist providers (Lokheshwar & Rajasudhakar, 2021). Despite these early challenges, caregivers eventually recognized the multifaceted value of spoon feeding, including its functional, therapeutic, and social significance. These benefits, such as improved lip closure, reduced drooling, and enhanced readiness for school or social settings, are supported by literature emphasising the role of spoon-feeding in developing oral motor coordination and supporting age-appropriate feeding behaviours.

Theme 8: Impact of Spoon-feeding Difficulties on Caregiver

The findings highlight the significant psychosocial impact that feeding difficulties have on caregivers of children with CP. A prominent concern reported was the lack of family support in managing feeding responsibilities. Many caregivers expressed feelings of isolation, with family members often hesitant or unwilling to assist due to fear of feeding-related complications or lack of knowledge about appropriate strategies. This aligns with previous literature indicating that caregivers of children with developmental disabilities frequently experience low levels of familial and social support, which can heighten the overall caregiving burden (Carlson & Miller, 2017; Oh & Lee, 2009). The absence of shared responsibilities may increase emotional strain and reduce opportunities for respite, thereby compounding caregiver stress.

Caregivers also reported elevated stress levels directly associated with the challenges of feeding their children. Prolonged mealtimes, difficulties in interpreting hunger cues, and the emotional burden of watching their child struggle with basic feeding skills were cited as key stressors. These concerns are in agreement with studies that have documented the increased stress and mental health burden among caregivers managing feeding and swallowing disorders in children with CP (Le Roux, 2023; Taylor et al., 2025). Although a minority of caregivers reported coping well, most described daily feeding as physically and emotionally exhausting, particularly when paired with other household responsibilities. These findings suggest that in addition to clinical interventions for the child, there is a pressing need for psychosocial support systems, caregiver training, and inclusive family education to reduce stress and foster a more supportive environment.

CONCLUSIONS

This study provides valuable insights into the beliefs, practices, and experiences of caregivers of children with cerebral palsy (CP) regarding spoon-feeding in rural North Karnataka. The responses from caregivers revealed a strong cultural preference towards hand-feeding, with spoon-feeding gradually being adopted in specific contexts such as school settings, travel, and for semi-solid or hot foods. Early spoon-feeding practices varied among caregivers, with some introducing complementary foods earlier and others starting later. Children's preferences for spoon-feeding also differed, with some children enjoying the practice and others showing resistance. After attending feeding therapy focused on positioning, the use of flat spoons, and safe feeding practices with smooth, thick liquids, many caregivers reported a shift in preference toward spoon-feeding, recognising its role in facilitating the development of other oral motor and feeding skills. Caregivers managed spoon-feeding difficulties by using modified feeding positions to prevent food spillage and easier swallowing for children with CP. They used steel spoons for semi-solids by scraping or dumping food into the mouth. Additionally, challenges such as delayed or a lack of referrals to the right professionals hindered timely intervention. Communication during mealtimes was also found to be non-verbal, with caregivers relying on subtle physical signs and behavioural cues to identify hunger and satiety. Overall, the findings underscore the importance of caregiver education, early professional support, and culturally sensitive interventions to enhance feeding outcomes and promote a better quality of life for children with CP and their families.

However, the study's small sample size—limited to eight caregivers from a single rural region—may restrict the generalizability of its findings. To address this, future research should involve larger and more diverse caregiver populations across different cultural and socioeconomic settings. Additionally, there is a pressing need to develop structured caregiver training modules that reflect the cultural and contextual realities of rural India. Integrating such culturally sensitive, evidence-based practices into public health initiatives can lead to more effective and sustainable feeding outcomes for children with CP.

Declarations

Ethical approval: This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki (1975), as amended in 2000. Ethical approval was obtained from our Institutional Review Board (Approval No. SH/IRB/M.1-12/2024-25, dated 23.12.2024). Informed consent was obtained in advance from the legal guardians of the participants.

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Original Research Article

Investigation of Spoon-feeding Skills in Children with Cerebral Palsy and Typically Developing Children: A Comparative Study

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ABSTRACT

Aim: Mastering spoon feeding is a key developmental milestone typically achieved by age two, yet evidence comparing these skills between children with CP and typically developing (TD) peers is scarce, particularly in socio-culturally diverse contexts like India. This study aimed to compare spoon-feeding skills, including utensil use, in children with CP and TD children.

Methods: A validated questionnaire was developed to assess positioning, spoon characteristics (handle length, bowl depth), placement, normal/abnormal oral motor patterns, reflexes, and mealtime behaviours. Video recordings of naturalistic spoon-feeding sessions from 17 children with CP and 22 age-matched TD children (2-10 years) were analysed. The data were subjected to statistical analysis using chi-square tests.

Results: Significant inter-group differences were found in positioning, spoon characteristics, and spoon placement. All normal patterns except for maintained lip closure during swallowing differed significantly. Significant abnormal patterns included suckle-swallow, anterior spillage, head extension, tongue protrusion, and clearing with teeth. Mealtime problem behaviours did not differ significantly.

Conclusions: This study profiles distinct spoon-feeding patterns in children with CP versus TD children. These findings underscore the need to target these specific skills during feeding therapy for the CP population.

Limitations: The generalizability of findings is limited by the small sample size. Future research should explore regional variations within India and investigate how food consistency influences spoon placement.

Keywords: India, developing nation, utensil, culture, practice, CP, TD

INTRODUCTION

A child's feeding development is a gradual process marked by several milestones. These include breast or bottle feeding, followed by eating from a spoon, biting and chewing and drinking from a cup or a straw. Initially, feeding is a joint activity between the parent and the child. However, as the child grows, independent feeding gradually takes over. The feeding process is further influenced by several factors, such as caregiver demandingness/ responsiveness (Patrick et al., 2005), the child's receptiveness, the type of utensils, and the foods provided.

Spoon feeding emerges as one of the early feeding skills in infants, typically appearing during the first months of life. Between 5 and 7 months, infants begin to learn to obtain semi solid food from a spoon, progressing to the point where, by 8 months, they can efficiently remove food from the spoon by coordinating movements of their upper lip (i.e. upper lip moves down to spoon) and lower lip (i.e. lower lip moves inwards), as documented by Pridham (1990). Between 9 and 18 months, self-feeding using a spoon emerges, where children initially typically use a palmar grasp to hold a spoon, progressing to a digital grasp and an inverted wrist, and gradually learning to supinate the forearm (Negayama, 1993; Schuberth et al., 2013; van Roon et al., 2013). By the age of 24 months, infants typically develop the ability to feed themselves from a spoon with coordinated tongue movements to clear their lips (Willging et al., 2020). A study by Van den Engel-Hoek (2014) on 39 healthy infants in the Netherlands and Germany found that the acquisition of spoon feeding took 5.7 weeks (SD 2.1). Toyama and Ogiwara (2019) analysed spoon manipulation in 5-year-old children and adults eating curry and rice. It was found that infants' operations were monotonous, in comparison to adults, who could gather, shape, and balance curry sauce and white rice. In essence, adequate spoon feeding necessitates the stabilisation of the jaw, the capacity of the upper lip to descend and clear the spoon, the lower lip to provide stability under the spoon, and the development of mature tongue movements to transfer food or liquid efficiently.

Feeding development can be impaired due to structural deficits, sensory processing disorders, gastrointestinal issues, prematurity, developmental delays, neurological conditions, metabolic factors, behavioural factors, psychological factors, environmental factors, and medical conditions (Overland, 2011; Prathima et al., 2015; Ramos et al., 2017). Cerebral palsy (CP) is one of the neurological conditions that can hinder feeding development. CP is a group of non-progressive conditions that affects motor control, range, strength, and coordination (Smithers-Sheedy et al., 2013; Benfer et al., 2014). Oropharyngeal dysphagia affects 85% of preschool children with CP, affecting motor and sensory abilities (Benfer et al., 2013).

Gisel et al. (2000) reported that children with CP and TD significantly differed on all skills, including spoon feeding ability, using the Functional Feeding Assessment- modified (FFAm, Kenny et al., 1989; Gisel, 1994). The FFAm consists of eight domains of feeding, namely spoon feeding, biting, chewing, cup drinking, straw drinking, swallowing, associated movements and drooling during eating. Associated oral motor behaviours for each feeding domain are categorised as either "normal" or "abnormal" patterns. The competence scores (%) of normal and abnormal patterns of each feeding domain were compared between groups. Results showed significant differences in competence scores in spoon feeding (normal and abnormal), biting (normal), cup drinking (normal), and swallowing (abnormal). It was found that in the normal patterns of spoon feeding, controls had a higher competence (99.0 ± 2.0) than the CP group (93.0 ± 12.0). In the abnormal patterns, the control group had a higher competence (100.0 ± 0.0) than the CP group (91.0 ± 11.0).

Selley et al. (2000) reported a 78% malfunction in the anticipatory phase, 61% with incompetent lips, 46% exhibiting uncontrolled jaw movements, and 39% displaying poor head posture in the delivery phase. Children with CP had a fourfold increase in the duration of lip-to-spoon contact compared to typically developing children. Over 50% of children with CP required multiple swallow attempts, and 68% exhibited abnormal tongue function.

Yilmaz et al. (2004) studied functional eating abilities in individuals with CP aged 4 to 25. They reported that the lowered spoon-feeding score in the moderate to severe younger group was due to the continuance of a suckle-swallow pattern and mothers' inclination to slant the spoon into their children's mouths without allowing them to utilise their lips. Individuals with CP were also unable to draw the upper lip down and forward over the spoon and pull the lower lip inward. The most affected skills were the ability to keep the lips closed, to move food and liquids to the back of the mouth, and to maintain a closed lip position during swallowing. Individuals in the severe group frequently lost liquids and food. An impaired oral phase can lead to poor growth and nutrition, premature spillage, piecemeal deglutition, and oral residue, all of which can affect mealtime safety (Benfer et al., 2014).

In the Indian context, Gangil et al. (2001) stated that 14% of the caregivers observed a lack of lip closure around a spoon during feeding. Prathima et al. (2015) investigated eating challenges in 74 children with CP (age: 1.2 to 9.6 years). They reported that feeding problems affected 63.5% of the children, and difficulty with self-feeding using a spoon was observed in 72.85% of the children with CP.

However, studies investigating and profiling the spoon-feeding skills in terms of position adopted during spoon feeding, spoon characteristics and placement, along with the skills involved in spoon feeding in children with CP, are sparse. Such studies in Indian children with CP are also limited. Since there may be socio-cultural variations in feeding practices across different countries, conducting such studies in India can provide valuable insights into the spoon-feeding patterns of Indian children with CP and TD children. By conducting research that directly compares spoon usage and feeding patterns in children with CP and TD children in India, SLPs can gain important insights regarding the choice of intervention strategies to improve feeding outcomes in the clinical population. Such studies will also help in developing treatment programs that will address the specific spoon-feeding difficulties in these children. This study aimed to compare spoon-feeding skills in children with CP with those of TD children.

METHODS

Ethical approval

This study was conducted in line with the principles outlined in the Declaration of Helsinki. The study was granted approval by the Institutional Review Board of of the All India Institute of Speech and Hearing (SH/IRB/M.1-12/2024-25, dated 23 December 2024). Consent to participate in the study was obtained in advance from the legal guardians of all participants.

Development of the Questionnaire

A questionnaire was developed to identify all aspects related to spoon feeding. This was based on the existing books and internet sources. The questionnaire was organised under seven different sections, namely (i) demographic details, (ii) body position during spoon feeding, iii) spoon characteristics, iv) placement of spoon, v) normal patterns of spoon feeding, vi) abnormal patterns during spoon feeding and (vii) mealtime problem behaviours exhibited, if any, during spoon feeding. The section on spoon characteristics included the material and dimensions of the spoon. The Placement of Spoon section documented the positioning of the spoon in the child's mouth. The Normal and Abnormal Patterns During Spoon Feeding section categorised appropriate (e.g., lip closure on the spoon) and inappropriate (e.g., suckle-swallow reflex) oral motor feeding behaviours exhibited by the child. The final section, Mealtime Problem Behaviours, identified any problematic reactions to spoon feeding. However, as the analysis was based on video recordings, it may not fully represent the child's typical response to spoon feeding at home.

The questionnaire was content-validated for appropriateness, coverage of related parameters and rating scale by four expert Speech-Language Pathologists with more than five years of experience in the area of paediatric feeding disorders, using a 5-point rating scale (1 indicates 'very poor', two indicates 'poor', 3 indicates 'fair', 4 indicates 'good' and 5 indicates 'excellent'). The questionnaire was rated to have good to excellent appropriateness and coverage of parameters by all four validators. Since there were no suggested changes, the final checklist consisted of 52 items (5 related to demographic details, three related to feeding position, five related to spoon characteristics, one related to spoon placement, 14 related to normal patterns, 15 related to abnormal patterns and nine related to mealtime problem behaviours). The ratings used in the questionnaire were similar to those used in FFAm. The normal patterns were rated as adequate, poor, absent, or unable to determine. The abnormal patterns were rated as absent, inconsistent, present or unable to determine. Mealtime problem behaviours were rated as either present or absent. Items such as the position of a spoon in the mouth, its material, and its dimensions were documented after viewing the video.

Participants

Spoon-feeding of seventeen children with CP, aged 2-10 years, was video recorded for analysis. For comparison, twenty-two spoon-feeding videos of TD children who were age and gender matched to the clinical group were also recorded, forming the control group. TD participants were screened using the WHO 'Ten Questions Screen' checklist (Singhi et al., 2007) to exclude those with seizure disorders or hearing, vision, motor, speech, or cognitive impairments. The participants in the clinical group were selected through convenience sampling from patients referred to the Centre for detailed feeding and swallowing evaluation. In contrast, those in the control group were recruited from in and around Mysuru.

Setting

All assessments were conducted in a quiet room at our Centre.

Procedure

For all participants, the parent or caregiver was instructed to spoon-feed their child using their customary food/liquid, usually fed with a spoon, bringing their regular utensils and maintaining their typical feeding position to replicate natural feeding conditions. The testing duration was approximately 15 minutes, and the testing was completed in a single day. The entire session was video recorded using a Sony Handycam model HDR-PJ540E.

Analysis

Two of the researchers (first and second authors) jointly analysed all the videos for all sections of the developed questionnaire. The data were tabulated and were subjected to further statistical analysis using IBM Statistical Package for Social Sciences (SPSS) software (Version 25). The chi-square test was used to check if there was a significant difference between the groups for each parameter. To assess inter-rater reliability, videos of 10% of the sample from each group were analysed and rated by five different speech-language pathologists. This data was then tested for reliability, and Cronbach's alpha was derived.

RESULTS

The results obtained for each section of the developed checklist are summarised below.

Demographic Characteristics of the Study Participants

The study included children aged 2-10 years, with nearly comparable age distributions in both groups, with a majority (66.7% CP, 60.9% TD) falling within the 2-5.11 years age range. Both groups showed comparable gender distributions, with males representing 55.6% of the CP group and 56.5% of the TD group.

Notable differences were found in feeding independence, where 94.1% of children with CP were dependent feeders compared to 100% independence in the TD group (χ^2 = 41.0, $p < 0.001$). Food consistency preferences also differed significantly between groups: semisolids were most common in the CP group (58.8%), while solids predominated in the TD group (56.5%). Both groups included all three food consistencies (liquids, semisolids, and solids) in their spoon-feeding repertoire, though liquid consumption was relatively low in both groups (CP: 11.8%, TD: 13.0%) [see Table 1].

Table 1: Demographic Details of the Participants

Demographics		Group	
		CP (in %)	TD (in %)
Age	2 to 5.11 years	66.7	60.9
	6 to 10 years	33.3	39.1
Sex	Male	55.6	56.5
	Female	44.4	43.5
Feeding dependency	Independent	5.9	100.0
	Dependent	94.1	0.00
Food consistency	Liquid	11.8	13.0
	Semisolid	58.8	26.1
	Solid	29.4	56.5

Body posture during spoon feeding

The chi-square test revealed significant differences between the feeding posture of neurotypicals and children with CP ($p < 0.01$) during spoon feeding [see Table 2].

Among TD children, 91.3% maintained an upright head position and 95.7% an upright trunk position. However, in children with CP, this postural control was less common, with 44.4% and 66.1% maintaining upright head and trunk position, respectively. The most pronounced difference was in hip positioning, where only 27.8% of children with CP demonstrated proper hip flexion with buttocks back in the seat compared to 100% of TD children.

Table 2: Comparison of Body Posture during Spoon feeding between Children with CP and TD Children

Parameter		Group		Chi-square (N, df)
		CP (%)	TD (%)	
Head position	Upright	44.4	91.3	10.710 (41,1)**
	Others(Upright/Forward/ Backward/Sideways/ Variable/Inconsistent)	55.6	8.7	

Trunk position	Upright	61.1	95.7	7.671 (41,1)**
	Others (Upright/Forward/ Backward/Sideways/ Variable/Inconsistent)	38.9	4.3	
Hips flexed, buttocks back into the seat	Yes	27.8	100.0	24.323 (41,1)***
	Others (No/Not sure)	72.2	0.0	

Note.

**<0.01; ***0.000

Spoon characteristics

The two groups exhibited similar trends in spoon characteristics, such as material, handle size, and handle thickness. In both groups, children used steel spoons with long (adult-sized) and thin handles. However, other features, such as spoon size and bowl depth, differed between the groups. Children with CP tended to be fed using teaspoons with shallow bowls, while TD children used tablespoons with deeper bowls during spoon feeding.

The chi-square test revealed a significant difference ($p < 0.05$) in handle length and bowl depth ($p = 0.000$) of the spoon between groups [see Table 3].

Table 3: Comparison of Spoon Characteristics Used during Feeding between Children with CP and TD Children

Parameter		Group		Chi-square (N, df)
		CP (%)	TD (%)	
Spoon material	Plastic	0.0	4.5	0.793 (41,1)
	Steel	100	95.5	
Spoon size	Teaspoon (5ml)	70.6	18.2	0.681 (41,1)
	Tablespoon (15ml)	29.4	81.8	
Spoon handle length	Short (child-sized)	41.2	13.6	3.815 (41,1)*
	Long (adult-sized)	58.8	19	
Spoon handle thickness	Thin	88.2	81.8	0.303 (41,1)
	Thick	11.8	18.2	
Spoon bowl depth	Shallow	94.1	31.8	15.384 (41,1)***
	Deep	5.9	68.2	

Note. *<0.05; **<0.01; ***0.000

Spoon placement

Children with CP frequently used inadequate spoon placement techniques, such as placing the spoon between the teeth, scraping against the upper lip and teeth, or dumping food into the mouth. In contrast, TD children demonstrated better placement, with 45.5% positioning the spoon correctly on the lower lip or anterior tongue compared to only 17.6% in the CP group.

However, despite this observed trend, the chi-square test did not reveal a statistically significant difference in spoon placement between the groups ($p = 0.06$) [see Table 4].

Table 4: Comparison of Spoon Placement during Feeding in Children with CP and TD Children

Spoon Placement	Group		Chi-square (N, df)
	CP(%)	TD(%)	
On the lower lip/ anterior tongue	17.6	45.5	3.33 (41,1)
Others (between teeth/ scrape on upper lip or teeth/ dumping in mouth)	82.4	54.5	

Normal Spoon-Feeding Patterns

Analysis of normal spoon-feeding patterns revealed significant differences between children with CP and TD children. While TD children demonstrated adequate performance (>90%) in most feeding patterns, four specific skills showed lower proficiency: bringing the upper lip down and forward over the spoon (54.5%), pulling the lower lip inward under the spoon (59.1%), keeping lips closed during swallowing (68.2%), and clearing excess food off lips with tongue (45.5%).

In contrast, children with CP showed markedly impaired performance across all normal feeding patterns. Only two skills - alerting to the spoon (70.6%) and jaw closing (64.7%) - were adequate in more than half of CP cases, while most other skills were either emerging or absent in the majority of participants.

Chi-square analysis demonstrated statistically significant group differences ($p < 0.05$) for all oral motor skills except maintaining lip closure during swallowing ($\chi^2 = 3.819$, $p > 0.05$) [see Table 5].

Table 5: Normal Patterns Exhibited during Spoon-feeding in Children with CP and TD Children

Parameter	CP (%)			TD (%)			χ^2
	Adequate	Emerging	Absent	Adequate	Emerging	Absent	
Alerting to spoon	70.6	17.6	11.8	100	-	-	7.422*
Holds head steady, slightly forward in midline	52.9	11.8	35.3	95.5	-	4.5	9.893**
Bring the head forward to the spoon	41.2	11.8	47.1	95.5	4.5	-	14.938 **
Graded jaw opening	17.6	64.7	17.6	95.5	4.5		24.597***
Keeps tongue still on the floor of the mouth	35.3	17.6	47.1	100	-	-	19.828***
Bring the upper lip forward and down over the spoon	5.9	23.5	70.6	54.5	18.2	27.3	10.845**
Pulls the lower lip inwards under the spoon	-	5.9	94.1	59.1	22.7	18.2	22.597***
Holds jaw stable	23.5	52.9	23.5	90.9	9.1		18.789***
Keeps lips closed during swallowing	47.1	11.8	41.2	68.2	18.2	13.6	3.819

Jaw closing	64.7	23.5	11.8	100	-	-	9.176*
Normal swallow	17.6	23.5	58.8	100	-	-	28.264***
Clears excess food off the lips with the tongue	-	-	100	45.5	4.5	50	11.839**
Head - jaw dissociation	29.4	58.8	11.8	95.5	4.5	0	18.879***

Note. *<0.05; **<0.01; ***0.000

Abnormal Spoon-feeding Patterns

Children with CP exhibited significantly higher frequencies of abnormal spoon-feeding patterns compared to TD children. In the CP group, suckle swallow (82.4%), anterior spillage (70.6%), and head extension (41.2%) were prevalent (>40%), while bites spoon (29.4%), jaw assist to clear (29.4%), and tongue protrusion (29.4%) occurred in approximately 30%. In contrast, the TD group showed high rates of bite of the spoon (45.4%) and clearings with teeth (50%), with jaw assisting to clear (27.3%) occurring at a similar frequency to the CP group. Notably, patterns such as gag (CP: 5.9%; TD: 4.5%), jaw assist to clear (CP: 29.4%; TD: 27.3%), and chin tuck (CP: 11.8%; TD: 10%) did not differ significantly between groups.

Chi-square test revealed statistically significant differences for suckle swallow and anterior spillage (p=0.000), head extension (p<0.01), tongue protrusion and clears with teeth (p<0.05) [see Table 6].

Table 6: Frequency of Abnormal Spoon-Feeding Patterns in Children with CP and TD Children

	Parameter	CP (%)		TD (%)		χ^2
		Absent	Present	Absent	Present	
Spoon feeding	Suckle swallow	17.6	82.4	95.5	4.5	24.529***
	Bite reflex	88.2	11.8	100	-	2.728
	Bites spoon	70.6	29.4	54.5	45.4	1.043
	Gag	94.1	5.9	95.5	4.5	0.035
	Jaw thrust	100	-	100	-	-
	Force jaw abduction	94.1	5.9	100	-	1.328
	Jaw clench	100	-	100	-	-
	Jaw assist to clear	70.6	29.4	72.7	27.3	0.22
	Lip retraction	94.1	5.9	100	-	1.328
	Anterior spillage	29.4	70.6	86.4	13.6	13.142***
	Tongue thrust	94.1	5.9	100	-	1.328
	Tongue protrusion	70.6	29.4	95.5	4.5	4.555*
	Clears with teeth	82	18	50	50	4.362*
	Head extension	58.8	41.2	95.5	4.5	7.892**
	Chin tuck	88.2	11.8	90	10	0.074

Note. *<0.05; **<0.01; ***0.000

Mealtime Problem Behaviours

The analysis revealed distinct patterns of mealtime problem behaviours between the two groups. Among children with CP, messy eating was the most prevalent behaviour (76.5%), followed by head turning away from food and lack of interest during mealtimes (11.8% each), and spitting food (5.9%). In contrast, TD children primarily exhibited distractive feeding (e.g., using phones) and getting out of their seats (4.5% each). Notably, several behaviours (crying/screaming, throwing food/utensils, and falling asleep) were absent in both groups.

While observable differences existed in the frequencies of certain behaviours between groups, chi-square tests indicated no statistically significant differences (p> 0.05)in any of the mealtime problem behaviour parameters [see Table 4].

Table 7: Frequency of Mealtime Problem Behaviours during Spoon feeding in Children with CP and TD Children

Parameter	Spoon feeding				χ^2
	CP (%)		TD (%)		
	Present	Absent	Present	Absent	
Head turn	11.8	88.2	-	100	2.72
Cries or screams	-	100	-	100	-
Spit food	5.9	94.1	-	100	1.32
Throws food and utensils	-	100	-	100	-
Get out of the seat	-	100	4.5	95.5	0.79
Lack of interest	11.8	88.2	-	100	2.72
Messy eater	23.5	76.5	-	100	5.76
Falls asleep	-	100	-	100	-
Distractive feeding	-	100	4.5	95.5	0.79

Reliability

To evaluate the reliability of the newly developed questionnaire, Cronbach's alpha was calculated. The overall alpha coefficient was .979, indicating a very high level of internal consistency between items.

DISCUSSION

This study aimed to compare spoon-feeding skills in children with cerebral palsy (CP) and typically developing (TD) children, providing insights into the variations in feeding patterns and the challenges in children with CP. The results highlight significant differences between the two groups across multiple parameters of spoon feeding: body posture, spoon characteristics, and normal and abnormal patterns.

Proper postural alignment is crucial for effective swallowing and oral motor skills (Overland, 2011; Prathima et al., 2015). The findings demonstrated that most TD children maintained their optimum position. A few did not maintain adequate head-trunk position despite mature sitting because of their behaviour to stoop and eat. Children with CP were often fed in a supine position by their caregivers as this position reduces gravity, minimises abnormal reflexes, and allows caregivers easier access to feeding. However, this position poses a significant risk for the aspiration of food (Arvedson & Brodsky, 2020).

The consistency of food consumed using the spoon varied. Semi-solid consistencies predominated in the CP group's diet due to safety considerations, as these textures present lower aspiration risk for children with unmastered chewing skills. Spoon feeding of liquids was also used, as this method allows better volume control compared to cup drinking, thereby reducing choking hazards. Within the Indian cultural context, spoon feeding of solid foods was commonly observed in the TD group, particularly for rice-based preparations such as lemon rice and khichdi, which are traditionally consumed with a spoon or hands.

The analysis of spoon-related characteristics, including material, size, handle dimensions (length and thickness), and bowl depth, revealed significant differences between groups, particularly in handle length, bowl depth, and placement. While the majority of Indian caregivers in both groups used steel spoons (both teaspoons and tablespoons), the suitability of these utensils varied based on the child's feeding abilities. TD children could adapt their oral structures to accommodate adult-sized spoons, but children with CP often struggled to clear food efficiently from larger tablespoons, leading to spillage and incomplete intake. Notably, spoon handle and thickness did not play a significant role for children with CP, as they were dependent feeders relying on caregiver assistance. However, bowl depth emerged as a critical factor: caregivers of children with CP predominantly used shallow-bowled spoons, whereas those in the TD group favoured deeper bowls. Using a shallow spoon promotes active cheek and lip movements (Alexander, 1987). These findings underscore the importance of spoon selection in clinical counselling for caregivers of children with CP. Educating families about adaptive spoons could lead to greater independence and self-confidence in children with CP.

Spoon placement patterns observed in both groups included positioning between the teeth, on the tongue, scraping along the upper lip/teeth, and placement on the lower lip. While the recommended ideal placement is on the lower lip or anterior tongue (Stainback et al., 1976; Hall, 2001), TD children frequently exhibited non-optimal techniques such as scraping the spoon against the teeth or placing it between the upper and lower incisors. These suboptimal patterns among TD children may reflect learned behaviours acquired through home feeding practices. Notably, carers of children with CP also utilised similar placements, as many children with CP had difficulties in using their lips to clear the spoon. This likely stems from compensatory strategies adopted due to the children's impaired lip function, which hinders effective spoon clearance. The persistent use of improper techniques may exacerbate spoon-feeding difficulties over time (Almond et al., 1994; Arvedson et al., 2020). Both the CP and TD groups used wrong spoon placements, and this could be the primary reason why a significant difference was not found between the TD and CP groups for spoon placements. The absence of a significant difference in spoon placements between the TD and CP cohorts can be primarily attributed to the observation that both groups employed inappropriate spoon placements, as described.

Most TD children exhibited normal feeding patterns, including graded jaw opening, lip movements, and normal swallowing during spoon feeding. Interestingly, only half of the TD children exhibited adequate lip movements on the spoon and cleared excess food from their lips using the tongue. This deviation from expected patterns was because many children ate from spoons by scraping on their teeth or lips, which restricted their need to use upper and lower lip movements as specified in the assessment tool, and most of the children cleared excess food from their lips using their teeth. In contrast, children with CP showed deficits in these areas, corroborating existing evidence of impaired oral motor coordination, lip movements and jaw stability in children with CP (Andrews et al., 2012; Benfer et al., 2013; Yilmaz et al., 2004). The prevalence of TD children clearing using teeth versus lips for spoons could be examined by using various food consistencies for each child in future studies.

The CP group demonstrated higher frequencies of abnormal patterns compared to the TD group, including suckle-swallow, anterior spillage, tongue protrusion, clearing with teeth, and head extension. This aligns with reported literature (Bahr, 2003; Bebayal et al., 2024; Ganz, 1988; Sheppard, 1964). While these patterns are well-documented in CP populations (Bahr, 2003; Ganz, 1988), their presence in some TD children (4.5-13.6%) suggests potential undiagnosed oral myofunctional disorders (Merkel-Walsh, 2020). Other patterns like gagging and jaw-assisted clearing (which also implies using the teeth for clearing) and chin tuck occurred comparably in both groups. The gagging could be due to a dislike of the food, fear of the food due to a history of force feeding, or hypersensitivities to the spoon or texture properties of food (Ernsperger & Stegen-Hanson, 2004). Jaw-assisted clearing and chin tuck could be compensatory strategies adopted in the CP group (Gellert-Jones, 2020) and learned behaviours in TD counterparts.

Interestingly, no significant differences between-group differences emerged in mealtime problem behaviours. TD children were distracted or left their seats, potentially due to sensory preferences or typical developmental restlessness (Little et al., 2017; Fathima et al., 2024). Conversely, children with CP exhibited behaviours like messy eating, lack of interest, spitting food, turning head away and sleeping during feeding, likely stemming from motor impairments or negative feeding histories (Reilly, 1993; Serel Arslan et al., 2018).

In conclusion, this study demonstrates significant differences in spoon-feeding skills between children with CP and TD children. It underscores the importance of understanding these differences to tailor interventions that can enhance feeding outcomes for children with CP. Additionally, the research reveals that various factors, such as feeding positions and spoon characteristics, substantially influence feeding efficacy. Notably, the presence of certain atypical patterns in both groups suggests that clinical diagnoses of feeding disorders should not rely solely on normative benchmarks but rather incorporate comprehensive functional assessments. Overall, this study contributes valuable insights that have direct implications for therapeutic practice to enhance the feeding experiences of children with neurodevelopmental disorders.

Limitations and Future Research

This study was limited by its retrospective design and small sample size, which may restrict the generalizability of the findings. Additionally, cultural differences in feeding practices across various states of the country were not explored, which could influence feeding behaviours and utensil use. Future research should focus on studies with larger samples and include diverse populations to better understand the interplay of cultural factors and feeding development in children with CP. Future studies could be carried out to investigate what factors the placement of the spoon changes, such as food consistencies or types of spoons.

Data Availability Statement

The data will not be shared due to ethical concerns. Only the output of data analysis is made publicly available for readers.

Statements & Declarations

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Author Contributions

KBJ and MK are responsible for the conception of the study. Data acquisition and analysis were performed by KBJ and MK. The method section of the manuscript was written by MK, and the introduction and discussion sections were written by KBJ. NS edited the manuscript critically and reviewed the final manuscript.

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Original Research Article

Cell Phone Addiction and Its Association with Socio-Environmental Factors among Children with Neurodevelopmental Disorders

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ABSTRACT

Cell phone addiction has emerged as a critical behavioral concern, especially among children with neurodevelopmental disorders. However, exposure to smartphone addiction in this group remains scarce, especially in the context of Bangladesh. This study aims to explore the cell phone addiction level among children with NDDs and associated factors in Dhaka, Bangladesh. In this study, an analytical cross-sectional design and a criteria-based purposive sampling technique were implemented. Socio-demographic questions and the Digital Addiction Scale for Children (DASC) were used to collect necessary data. A descriptive statistic, the Pearson Chi-square test, and Regression analysis were applied to achieve the study objective. Among 182 samples, 66.8 were boys and 33.2% girls with a mean age of 6.83 years. The findings revealed that 43.5% exhibited moderate levels of addiction and 37% showed severe levels, while fewer than 20% were categorized as mildly addicted. The study found parenting time [OR = 2.34], mother's occupation [OR = 2.24], family income [OR = 2.55], and disorder type [OR = 2.18] as risk factors for cell phone addiction ($p < .05$). Cell phone addiction was prevalent among children with NDDs, particularly children with autism spectrum disorder and attention disorder/ hyperactivity disorder are at higher risk. Several socio-demographic factors are significantly associated with addiction severity, aligned with the Social Cognitive Theory, which emphasizes the role of environmental influences and behavioral characteristics in shaping individual perspectives. In addition to parents' monitoring, the development of public health policies could be a crucial initiative to combat the issue.

Keywords: Neurodevelopmental Disorder, Parenting time, Cell Phone Addiction, Socio-demographic factors.

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Highlights:

The prevalence of cell phone addiction is notably higher among children with neurodevelopmental disorders, especially in the context of Dhaka city.

Proper parenting is strongly linked to managing children's behavioral addiction and fostering healthier development.

Individuals diagnosed with autism spectrum disorder and attention deficit/hyperactivity disorder are at a greater risk of excessive digital media exposure when compared to those with cerebral palsy, developmental delay, and Down syndrome.

INTRODUCTION

Digital devices, though highly useful in modern times, have silently become a significant public health concern (Shah & Phadke, 2023; Sun et al., 2020). Nowadays, children are becoming highly dependent on smartphones and other electronic devices due to the growing integration of digital tools into the modern education system. Previous studies estimated nearly 30 hours of device usage per week among children (Al-Amri et al., 2023). In the past five years, the prevalence of smartphone addiction has been reported to range between 42% and 74% across Asian countries (Chakraborty et al., 2024; Bakar, 2021; Sulaiman et al., 2021). Alarmingly, the prevalence has been reported as high as 86% in Bangladesh, especially among children under five years old (Abdulla et al., 2023). However, cross-regional comparative data remain scarce, and most evidence relies heavily on self-reported instruments, which may limit accuracy (Gutiérrez et al., 2016). Reportedly, excessive mobile phone use negatively affects children's social interaction, cognitive development, and sleep (Jennifer, 2018; Begum & Hussain, n.d.; Viola, 2021). Moreover, screen media addiction is found to be influential for physical consequences such as vision problems, painful upper extremity, and psychological health deterioration (Geng & Liu, 2025; Mokhtarinia et al., 2022).

Children with neurodevelopmental disorders appear to be more susceptible to cellphone addiction due to specific behavioral characteristics. Individuals with autism spectrum disorders (ASD) frequently exhibit rigid behavioral patterns when using smartphones; for instance, they may repeatedly watch the same video. In addition to that, they often rely on digital devices to cope with psychological distress, a behavior explained by the Compensatory Internet Use Theory (Lu et al., 2022; Zhou et al., 2024). Similarly, existing traits in children with Attention-Deficit/Hyperactivity Disorder (ADHD), such as lack of attention, lack of control, and impatience, may increase their tendency to use smartphones. In addition, children with ADHD often find screen media more stimulating and rewarding than their peers (Zeyrek et al., 2024).

Beyond individual traits, family and social factors also play a significant role in this context. Previous studies identified that bonding between child and parent, emotional factors, and social interaction have a strong relationship with cell phone addiction, particularly among kids with NDDs (Hong et al., 2021; Sun et al., 2020). In Bangladesh, one study highlighted the gadget addiction among children with NDDs and reported an average of 3–5 hours of daily use, with findings linking this excessive use to delayed motor development, impaired verbal communication, and reduced cognitive functioning (Kundu et al., 2024). However, in Bangladesh, studies investigating the issue of mobile phone addiction among children with NDDs remain limited, highlighting the need for further investigation.

Excessive smartphone use is considered a form of behavioral addiction (Andreassen et al., 2013). According to Social Cognitive Theory (SCT), developed by Bandura, human behavior is shaped by the reciprocal interaction of personal, behavioral, and environmental determinants. In this context, factors such as parenting time, mother's occupation, and family income function as environmental determinants, reflecting the level of social support, family culture, and access to digital resources. The type of disorder represents a personal determinant, indicating cognitive abilities, emotional regulation, and psychological characteristics. Together, these personal and environmental factors interact with behavioral patterns to influence the severity of addiction, consistent with SCT (Bandura et al., 1961; Warje, 2024). While several studies have examined behavioral determinants of cell phone addiction, there is a notable gap in understanding how personal characteristics (e.g., age, gender) and environmental factors (e.g., parenting time, family economic status) contribute to this phenomenon, particularly among children with NDDs (De et al., n.d.; Nawaz et al., 2025; Zhu et al., 2025). Considering the background and existing gaps, this study seeks to address the following research question: What is the level of cell phone addiction among children with neurodevelopmental disorders, and which socio-demographic and environmental factors are associated with this addiction?

By addressing this question, the study aims to provide theory-driven evidence to provide valuable insights into parents and the Health Ministry, supporting more informed decision-making regarding screen time management and taking necessary initiatives. Furthermore, the research seeks to highlight the significant health consequences of excessive smartphone use in this often underrepresented population.

METHODS

Study Design and Sampling Technique

The study employed an analytical cross-sectional design. A criteria-based purposive sampling technique was used to ensure the inclusion of children meeting specific eligibility requirements. Participants were children diagnosed with NDDs, recruited from a special school (Autism Welfare Foundation) and a child development center (Rainbow Autism Care and Child Development Center). Recruitment was not limited to school-going children. These institutions are non-governmental welfare organizations that provide distinct types of rehabilitation and educational services. The study was conducted in Mohammadpur, a large area in the northern part of Dhaka that includes a mix of high- and middle-income communities and underdeveloped urban settlements. Participants were recruited from diverse socio-economic family backgrounds, which partially addresses concerns regarding the limitations of purposive sampling. An occupational therapist affiliated with both organizations assisted with recruitment to ensure accurate identification of eligible participants. The sample consisted of boys and girls aged between 2 and 11 years with a confirmed diagnosis of NDDs by certified professionals. The study focused on major NDDs prevalent in Bangladesh, including autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder (ADHD), cerebral palsy (CP), developmental delay, and Down syndrome. Children were excluded if their parents or caregivers lacked knowledge of the diagnosis, were unable to provide the required information, or if a smartphone was unavailable in the household. Consideration was also given to comorbidities and external stimuli such as medication use and recent changes in the living environment that may influence behavioral regulation among children with NDDs.

The required sample size was estimated using the single population proportion formula: $n = z\alpha^2 P\,(1\text{-}P)/d^2$, where n denotes the size of the population. A 95% level of significance ($z\alpha = 1.96$), an 8% margin of error ($d = 0.08$), and a 50% expected proportion ($P = 0.50$) were applied. Considering the data collection challenges anticipated in Dhaka city, an 8% margin of error was considered. The final estimated sample size was 165, accounting for an additional 10% to compensate for potential dropouts.

Instrument

The study implemented a survey questionnaire for collecting data, including socio-demographic questions (age, gender, parental time, mother's occupation, father's occupation, and monthly family income). The socio-demographic variables were categorized locally, as standardized or literature-based thresholds were not available for this context. The study included the original version of the Digital Addiction Scale for Children (DASC). Any translation or adaptation in the DASC wasn't required, as most of the parents involved in the study have an adequate educational background and a fair practice in the English language. In addition, direct interviews minimized biases and enhanced the understandability of the questionnaire items. Therefore, the original version of DASC was deemed culturally appropriate for this sample, as it represents universal digital media behavior and is relevant in the context of Bangladesh. DASC is a comprehensive 25-item questionnaire designed to measure the severity of digital or cell phone addiction among children and adolescents. Each item is rated on a 5-point Likert scale ranging from 1 ("never") to 5 ("always"). The total score (25 to 125) is obtained by summing the responses across all items, with higher scores indicating a greater level of addiction. While the DASC does not provide validated severity cut-offs, the categorization used in this study (mild: 25–50; moderate: 51–75; severe: ≥76) was applied solely for descriptive purposes. These locally derived categories facilitated comparison across groups but should not be interpreted as clinically established thresholds. The DASC has demonstrated excellent internal consistency (Cronbach's $\alpha = 0.94$) and robust construct validity, showing satisfactory data-model fit (Hawi et al., 2019).

Procedure

First, the researcher obtained approval from the participating institutions. Next, participants were recruited based on inclusion and exclusion criteria. All data were collected from parents or caregivers, as children with NDDs often struggle to communicate effectively. Online and direct interviews were conducted to gather the data, ensuring respondent convenience. A tablet or mobile phone was used as an assisting device throughout the process. Considering suitability and time constraints, oral informed consent was obtained from parents before each interview. Parents were informed about the study's purpose, data use, and the voluntary nature of participation before providing consent. Interviews were conducted in a private setting to maintain confidentiality, and no identifying information was recorded to protect anonymity. The overall procedure was carried out according to the national research guidelines and institutional policies. The data collection process was assisted by the administrators and health care professionals of the selected institutes. The study involved survey responses provided by parents, posed minimal risk, and there was no direct involvement of the children with NDDs.

Data Analysis

The data was analysed using IBM SPSS Statistics 28.0 software (Chicago, USA). Descriptive statistics were performed to report the data analysis, displayed as means and standard deviations (SD). Categorical data were expressed as frequencies or percentages. The chi-squared test was conducted for categorical data to identify relevant associations between mobile phone addiction and other factors. Finally, a binary logistic regression analysis was conducted to assess the impact of associated factors on cell phone addiction, categorizing it into lower addiction (mild to moderate) and higher addiction (severe). Binary logistic regression was chosen because category sizes were uneven, with a relatively small group of mild addiction. Statistical significance was set at a p-value of < 0.05.

RESULTS

Findings of the Descriptive Statistics

The study included 184 samples for analysis, with a majority of boys (66.8) compared to girls (33.2%). The mean age of the participants was 6.83 years. Nearly 67 % of the participants used to receive proper time from their parents. Regarding mothers' occupation, close to 65% were housewives. According to family income status, the majority (42.8%) of the participants reported a monthly family income of above 45000TK, while the lowest number of students (8.2%) belonged to the income bracket of 15000TK or less. The specific disorders identified in this study were: ASD=44%; ADHD= 22.8%; CP= 14.6%; Developmental delay= 14.3%; and Down syndrome= 4.3%. Finally, results, considering the DASC scores (M = 68, SD = 17.13), indicated that the majority of respondents exhibited moderate (43.4%) and severe (37%) level of addiction to mobile phones.

Table 1: Descriptive statistics of the categorical variables (n=184)

Variable	Category	n (%)
Gender	Boy	123 (66.8%)
	Girl	61 (33.2%)
Proper time	Yes	127 (66.8%)
	No	57 (33.2%)
Mother's occupation	Housewife	119 (64.7%)
	Working woman	65 (35.3%)
Diagnosed disorder	ASD	81 (44%)
	ADHD	42 (22.8%)
	CP	27 (14.6%)
	Developmental delay	26 (14.3%)
	Down syndrome	8 (4.3%)
Family income	15000 or less	15 (8.2%)
	16000 - 30000	38 (20.7%)
	31000 - 45000	52 (28.3%)
	>45000	79 (42.8%)
Addiction Level	Mild	36 (19.6%)
	Moderate	80 (43.4%)
	Severe	68 (37%)

Socio-demographic factors associated with cell phone addiction

According to the chi-square test, cell phone addiction (mild, moderate, severe) was significantly associated with parenting time, mother's occupation, monthly family income, and disorder type (all p < .05). However, no significant association was observed between addiction level and gender.

To further examine the impact of these factors on addiction severity, a binary logistic regression analysis was conducted by categorizing participants into lower addiction (mild to moderate) and higher addiction (severe). The regression model identified that parenting time significantly increased the likelihood of being in the higher addiction category (OR = 2.34, 95% CI [1.23, 4.44], p = .010). Mother's occupation was also a significant predictor (OR = 2.24, 95% CI [1.20, 4.17], p = .012), as was monthly family income (OR = 2.55, 95% CI [1.23, 5.30], p = .012). Lastly, disorder types significantly predicted addiction severity (OR = 2.18, 95% CI [1.18, 4.05], p = .014).

Table 2: Pearson Chi-square analysis results (n=184)

		Cell phone addiction			
		Mild	**Moderate**	**Severe**	**P-value**
Gender	Boy	22%	42.3%	35.7%	0.51
	Girl	14.8%	45.9%	39.3%	
Proper time	Yes	20.5%	48.8%	30.7%	0.02*
	No	17.5%	31.6%	50.9%	
Mother's occupation	Housewife	23.5%	46.2%	30.3%	0.03*
	Working woman	12.3%	38.5%	49.2%	
Family income	15000 or less	46.7%	40%	13.3%	<0.01*
	16000 - 30000	34.4%	39.4%	26.2%	

	31000 - 45000	9.6%	59.6%	30.8%	
	>45000	13.9%	35.4%	50.7%	
Disorder	ASD	22.3%	44.4%	33.3%	0.04*
	ADHD	2.4%	45.2%	52.4%	
	CP	33.4	40.7%	25.9%	
	Developmental delay	19.2%	38.5%	42.3%	
	Down syndrome	37.5%	50%	12.5%	

Table 3: Binary logistic regression analysis findings (n=184)

Predictor	Category	Reference Category	p	OR	95% CI for Exp(B)
Parenting time	Adequate vs Inadequate	Adequate	.009	2.34	(1.23 – 4.44)
Mother's occupation	Working mother vs Housewives	Working mother	.010	2.24	(1.20 – 4.17)
Monthly income	High-income family vs Low-income family	High-income family	.009	2.55	(1.23 – 5.30)
Disorder type	ASD, CP, or Down syndrome vs ADHD or Developmental delay	ASD, CP, or Down syndrome	.013	2.18	(1.18 – 4.05)

DISCUSSION

The present study aimed to evaluate the level of cell phone addiction and its association with socio-demographic factors among children with neurodevelopmental disorders (NDDs). The findings revealed that a large proportion of participants exhibited overuse, with 43.5% exhibiting moderate levels of addiction and 37% showing severe levels, while fewer than 20% were categorized as mildly addicted. The mean DASC score was 68 (Range from 25 to 125), indicating a generally high dependency on mobile phones within this population. These results raise significant concerns for children with NDDs, as excessive reliance on mobile devices may adversely affect the developmental, social, and emotional outcomes.

Notably, severe addiction was prevalent among children with ASD, ADHD, and developmental delay compared to those with CP and Down syndrome. This suggests that specific behavioral characteristics, such as inflexible response, attention difficulties, and difficulties with social interaction and communication, may exacerbate susceptibility to smartphone addiction.

The study further identified several socio-demographic factors significantly associated with addiction severity, including parenting time, mother's occupation, monthly family income, and disorder type. These findings align with the Social Cognitive Theory (Bandura et al., 1961), which emphasizes the role of environmental influences and behavioral characteristics in shaping individual perspectives. Compared to high-income nations, family-centered rehabilitation is undeveloped in low- and middle-income countries (LMICs), such as Bangladesh, where substantial knowledge gaps remain in disability care and support systems. The current findings, which highlight the role of parents and the family environment, may help enhance our understanding of family interaction in disability management and influence strategic approaches to strengthening rehabilitation policies (van Oort, & Jalovčić, 2023) From an inclusive development perspective, these findings are also consistent with the Community-Based Rehabilitation (CBR) Matrix, particularly its social, livelihood, and health components, which highlight primary prevention, social and family support, and the promotion of quality of life and self-reliance (Besoain-Saldaña et al., 2020). Integrating these ideas emphasizes the necessity of building family-and community-centered solutions for long-term inclusion of people with disabilities in LMICs.

Consistent with earlier research, the present findings indicated the primary role of the family environment in managing the behaviors of children with special needs. Rosenbaum and Novak-Pavlic (2021) highlighted that parental involvement and guidance are essential for the healthy development of children with NDDs. The study confirms that children whose parents did not provide adequate time were 2.3 times more likely to be severely addicted than those whose parents did. Similarly, children of working mothers had 2.2 times higher possibility of high addiction compared to children of housewives. A possible reason could be a longer absence of parents, leading to a lack of supervision (Lee, & Kim, 2021). However, studies suggested that family culture or parenting style may pose a greater contribution to cell phone addiction than economic status and parenting time (Li et al., 2024). These findings highlight that parents play a significant role in facilitating children's behavior and fostering a healthy lifestyle (Bowling et al., 2019; Crowell et al., 2019). Previous studies suggest that children who spend more time with parents are more likely to engage in outdoor play and structured activities, which helps in reducing reliance on smartphones. In contrast, lack of parental support may promote feelings of loneliness, a personal factor emphasized in the Social Cognitive Theory (SCT) (Yue et al., 2022). This sense of loneliness can contribute to emotional dysregulation and increase dependence on digital media, aligning with the Compensatory Internet Use Theory (Zhao & Jin, 2023; Zhong et al., 2025). From a CBR perspective, strategies such as providing structured parent training and education, promoting family-oriented activities, and creating inclusive community play spaces are essential for enhancing parent–child interaction and supporting the development of individuals with NDDs. Additionally, the CBR policy emphasizes the importance of supporting parents in balancing work and caregiving responsibilities. Workplace adjustments such as flexible hours, nearby work options, or caregiver-friendly policies may help to mitigate parenting-related challenges and promote healthier digital behaviors among children with NDDs (Kannan, 2024).

The findings also revealed that children from high-income families (earning more than 30,000 BDT per month) had 2.6 times higher chance of being in the severe-addiction group compared to children from low-income families. Interestingly, this contrasts with earlier studies that identified lower family income as a stronger contributor to excessive device use (Zhong et al., 2025). Conversely, another study found no significant relationship between economic status and cell phone addiction (Abdullah et al., 2022). However, findings remain unclear regarding the family income and addiction level, while both low and high income are found to be associated with gadget dependency (Lin & Liu, 2020). Moreover, Previous studies suggest that digital devices are more accessible and adaptable for children from high-income families. Conversely, parents from low-income backgrounds often go through significant hardships and may not prioritize issues such as cellphone addiction. Consequently, both high- and low-income groups may contribute to the development of cellphone addiction, although the underlying mechanisms are different across socioeconomic contexts (Abdullah et al., 2022 & Li et al., 2024).

Compared to children with ASD, CP, or Down syndrome, children with ADHD or developmental delay were 2.2 times more likely to be in the severe addiction group. However, the odds for children with ASD are also not negligible. On the other hand, participants with CP and Down syndrome had a higher level of smartphone dependency as well, though the level was often moderate. The major concern for children with ASD and ADHD is that they are more vulnerable to cell phone addiction due to their traits and behavior patterns, and it's often challenging to control (Lu et al., 2022; Zeyrek et al., 2024; Zhou et al., 2024). Moreover, due to excessive mobile phone usage, children often overlook physical activity (PA). Whereas PA is highly beneficial for children with NDDs, particularly for ASD and ADHD, it is highly beneficial to improve basic child developmental elements such as cognition, socialization, motor function, and self-regulation (Bukvić et al., 2021; Kim et al., 2015). However, the scarcity of accessible and well-equipped playgrounds in Dhaka city may also contribute to limited PA and increased screen use among children with NDDs. Currently, there are no public playgrounds in Dhaka specially designed for children with disabilities (Chiran, 2018). Although a few organizations are promoting inclusive play spaces, they are primarily focusing on rural areas (Humanity & Inclusion UK, 2018). Past studies highlighted that excessive device use was associated with delayed development of verbal communication, memory function and intellectual abilities; however, evidence is still limited regarding the relationship between media addiction and developmental delay (Abu Bakar et al., 2025). Although children with CP and Down syndrome frequently use screens more than their counterparts, no noticeable negative effects were found in previous research. Additionally, a few previous studies revealed that using devices helped individuals with Down syndrome and cerebral palsy, particularly in terms of enhancing social communication and reducing reliance on others (Menezes et al., 2020; Coşkun et al., 2025; Nonis n.d.; Fritz 2017).

CONCLUSIONS

The study effectively identified parental time, mother's work, family income, and disorder type as major predictors of smartphone addiction in children with NDDs. The findings suggest that adequate time and direction from family members can help reduce the severity of mobile phone addiction and create positive developmental outcomes. Furthermore, children with ASD, ADHD, and developmental delays have been reported to be more likely to develop gadget addiction, underlining a key area of concern that requires designed interventions for this especially vulnerable group.

Strengths and Limitations

This study's primary strength was the involvement of parents, special educators, and physical therapists. Their participation ensured greater accuracy and smoothness in the data collection process by providing perspectives from both home and professional settings. Secondly, the use of face-to-face interviews helped respondents better understand the questionnaire, reducing misinterpretation and minimizing potential response bias. Thirdly, the study applied not only chi-square tests to evaluate associations but also regression analysis to confirm relationships and their effects, thereby improving the robustness of findings.

However, the study has a few limitations. First, the sample distribution across disorder types was uneven, with fewer participants diagnosed with CP, developmental delay, and Down syndrome compared to ASD and ADHD. This imbalance may affect the comparative strength of findings across disorder types, although the higher prevalence of ASD and ADHD in the population also needs to be considered (Koly et al., 2021). Furthermore, the study was unable to provide strong supporting evidence on the relationship between cell phone addiction and certain disorders such as CP, Down syndrome, and developmental delay, due to the scarcity of prior research in these specific groups. This highlights a critical area for future studies to understand disorder-specific vulnerability pathways.

Recommendations and future directions

From a public health perspective, the findings call for the development of standard policies on recommended screen time for children with NDDs, as WHO guidelines are designed only for typical children. Such policies should account for the heterogeneity across disorder types, as this study identified distinct device usage.

Implementation of CBR-focused strategies, such as redesigning play-based environments and strengthening child–family interaction, is strongly recommended. However, improving parents' knowledge of CBR principles and disability inclusion is essential to ensure meaningful participation. CBR programs should extend reach and support victim families by providing practical guidance and offering alternatives to digital entertainment. Additionally, schools should collaborate with CBR specialists to encourage healthy digital habits, structured play, and consistent routines across home and school settings.

Future research should consider longitudinal designs or mixed-methods to establish causal inferences between socio-demographic factors, disorder type, and smartphone addiction that may further guide effective interventions and policy development.

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Review Article

Communication Disorders and Artificial Intelligence: A Short Bibliometric Review

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ABSTRACT

Aim: Due to the quadrupling in publications since 2022, a bibliometric study is a need of an hour. This study offers a thorough analysis of communication disorders across an appropriate time period from 1963-2022.

Methodology: Based on the PubMed database, a total of 8713 papers about communication disorders were examined during the time period. At the end, 6233 publications and 7012 key terms were retained specially related to communication disorders. The inclusion criteria involved the peer reviewed journal articles written in English and individuals with severe or nonverbal communication disabilities were excluded due to insufficient representative datasets.

Result: This study systematically reviews research articles on numerous parameters such as (i) cumulative frequency of keywords (ii) analysis of common key terms, (iii) top 10 research scientists, (iv) research article production of top 10 researchers, (v) co-occurrence of key terms. The number of publications increased by 67.7% (60 in 1980, 4725 in 2022). The findings revealed that Bishop DV has made significant contribution in this field. Psychology has contributed to the maximum number of documents than Medicine.

Conclusion - The paper examines the literature using meta-perspectives to analyses the quantitative traits of communication disorders. The proposed analytical study will be a vital resource for substantive discussion for the upcoming researchers. Future studies should focus on innovative treatments like brain-computer interface technologies, and AI-powered personalised therapies to progress in more accurate diagnosis and treatment of communication disorders.

Keywords: neurological disorders, communication disorders, artificial intelligence, interventions, mental health

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INTRODUCTION

The concept of Neuro Developmental Disorders (NDD) is complex and encompasses a very broad spectrum of neurological and psychiatric conditions, including intellectual disabilities, communication disorders, developmental delay, etc. Communication is essential for the exchange of information, listening, learning, delivering one's thoughts, and establishing social and interpersonal relations. In NDD, communication is one of the major disorders that includes deficiencies in the ability to comprehend and receive verbal, nonverbal, and graphic symbols. The symptoms for the diagnosis of a communication disorder could be identified through deficits in language, speech, sound, childhood fluency (stuttering), social communication, and unspecified deficits (Mahabalagiri N. Hegde, 2021). Deficits in language acquisition and usage, speech, and social communication, along with impairments in motor skills and speech fluency, are the most prevalent features of communication disorders. These can appear as speech blocks, prolonged vowels or consonants, broken or fragmented words, repeated sounds or syllables, or words produced with excessive tension or physical effort. The short review discusses the growing academic and clinical interest in using AI-driven tools for assessment, intervention, and support of communication disorders. Despite the rising scholarly output, the research landscape remains fragmented, with many unexplored areas and emerging themes. This bibliometric review maps the literature, identifies influential contributors, and analyzes keyword trends and thematic clusters. The study will help the study understand current developments and suggest future research directions in the field of communication disorders and AI. The remaining paper is organised as follows: initially, the study offers a comprehensive examination of the prevalence and types of communication disorders, thereby establishing the issue's scope and impact. Subsequently, focus is on the increasing need for technological interventions in the field, and a concentrated analysis of artificial intelligence interventions that have demonstrated potential to enhance communication outcomes is conducted. The paper concludes with a concise bibliometric review that emphasises the most significant publication trends, influential contributors, and emerging research themes at the intersection of AI and communication disorders.

Communication disorders are thought to affect between 5 and 10 percent of the world's population, according to estimates from well-known international groups. In the United States, 5% of people have trouble communicating because they have speech problems, 3.3% have language problems, 1.4% have voice problems, and 0.9% have swallowing problems. In India, on the other hand, 21.5% of people aged 6 to 11 had hearing problems, 6.3% had dyslexia, 5.3% had neurogenic stuttering after a stroke, and 11.08% had speech and language disorders (*Centre for Disease Control and Prevention*, 2022). Communication disorders were caused by a variety of factors, such as aberrant brain development, prenatal factors, palate, exposure to chemicals before birth, and brain injury, in addition to developmental or acquired conditions. Communication disorders are commonly observed in children, and the symptoms are contingent upon the type of disorder and its underlying cause, which may include the misuse of words, repetitive sounds, inability to comprehend messages, or challenges in communicating in a manner that is comprehensible, as well as an individual's articulation, fluency, voice, and resonance quality. Speech, language, and communication abilities must be evaluated in the context of the individual's cultural and linguistic background. Therefore, the assessment protocols encompass morphological, pragmatic, orofacial, and diadochokinetic assessments, among others. According to the Centers for Disease Control and Prevention (*Centre for Disease Control and Prevention*, 2022) and the National Center for Health Statistics (Martin et al., 2014) survey, the prevalence of children aged 3 to 10 years who have experienced more than one type of communication disorder is shown in Figure 1.

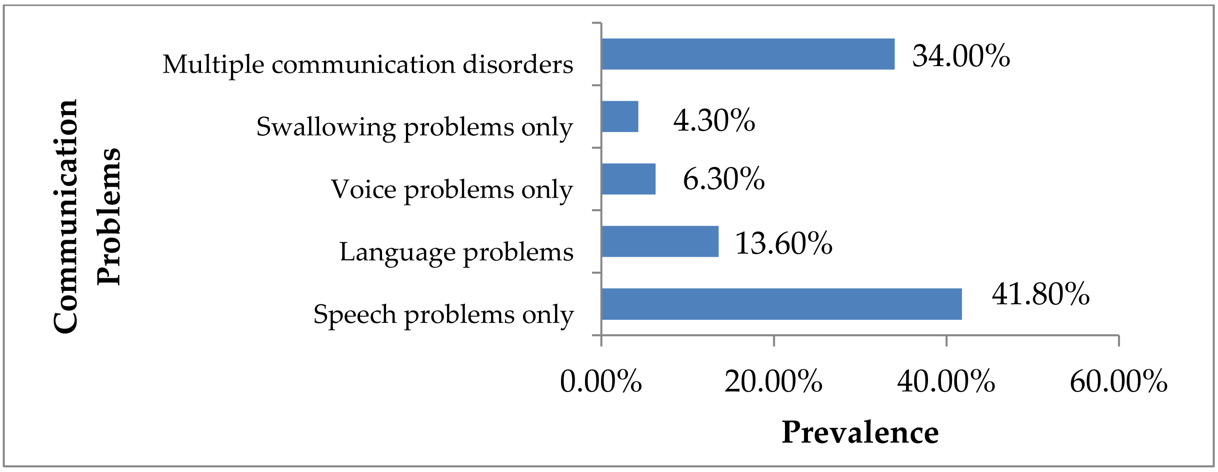

Figure 1. Various types of communication problems and their related prevalence have been reported around the world

The continuous study of literature has also revealed that there are not many gadgets and applications for support. Hence, there is a need to develop interventions to support individuals for the improvement of communication for their livelihood. Therefore, the goal of this short bibliometric review is to understand the concept of communication disorders, their symptoms, and risk factors. In addition to this, the idea is to provide early diagnosis and provide variety of measures or early interventions to support with the help of technologies for individuals suffering from communication disorders. To solve the research problem, the research papers of recent years were searched through various databases. Out of 50, the recent 11 publications were selected and reviewed based on the relevant facts, keywords, and research on technological interventions. The inclusion criteria encompassed peer-reviewed journal articles published in English, while individuals with severe or nonverbal communication disabilities were excluded due to inadequate representative datasets.

In this contemporary era, Artificial Intelligence (AI) is being used for clinical diagnosis of various conditions like communication disorders, Autism Spectrum Disorder (ASD), Parkinson's or Alzheimer's disease, fragile-x syndrome, etc. Present computer-aided diagnosis and interventions in different health fields are primarily utilizing diverse AI approaches for such as machine learning, deep learning, and artificial neural networks. In a broad sense, AI refers to computational systems that can perform tasks with human-like intelligence. Over the past ten years, there have been several systematic studies of AI interventions for individuals with communication deficits (D'Alfonso, 2020). Muskan et al. developed an artificial intelligence-based device to support individuals with communication disorders. The developed application enhanced social communication and social cognition among individuals with communication disorders (Chawla et al., 2024). Attwell et al. reviewed that AI plays a significant role in improving the communication of impaired individuals. With the support of therapists, AI interventions can provide several benefits to individuals with communication disorders (Attwell et al., 2022). In addition, AI has also shown itself to be a very useful method, offering a quick and easy approach to evaluate situations, behaviors, communications, etc. Many researchers implemented AI to provide early and objective diagnosis interventions. AI-based interventions like health screening systems, virtual human avatars, and therapeutic and diagnostic chatbots proved to be beneficial (A. & R., 2023; Bhardwaj et al., 2024; Jia et al., 2022; Zhang et al., 2024). AI interventions showed a huge number of improvements and support individuals to excel in every phase of life (Laacke et al., 2021).

The aim of the study is to provide a comprehensive bibliometric study on neurodevelopmental disorders to examine the publication trends, collaborators, citation impact, and growing research themes over a stipulated time period.

METHODS

This review has been conducted using PubMed data sources. The data was collected and processed using structured information from articles. A general search query was used for title, abstract, and key terms: "(Title-abs-key ("communication" AND "disorder")" in order to find a large number of publications on communication disorders. As of September 8, 2022, the outcome was a list of 8713 articles that were compiled during the period of 1963 to 2022. As the next step, the titles and abstracts were strictly filtered in line with the previously developed inclusion criteria so that only investigations that directly used or tested the methods of artificial intelligence in the assessment, diagnosis, or treatment of communication disorders were selected. The inclusion criteria involved the peer-reviewed journal articles written in English, and individuals with severe or nonverbal communication disabilities were excluded due to insufficient representative datasets. Any non-scholarly communication, textbook chapters, and articles that could not be determined to be intertwined between these fields were then eliminated. Finally, 6233 publications and 7012 key terms about communication disorders were retained. Later, bibliographic entries based on the resulting dataset were loaded into analytic tools, including VOSviewer and Bibliometrix, to deconstruct publication patterns, authorship relationships, collaboration structures, Keyword co-occurrence tables, as well as citation networks.

FINDINGS

The growth rate of annual scientific production is 7.04 %. Figure 2 shows the total number of articles containing the keyword by year. The cumulative occurrence of related keywords such as autism, children, communication disorders, and so on is increasing significantly year after year.

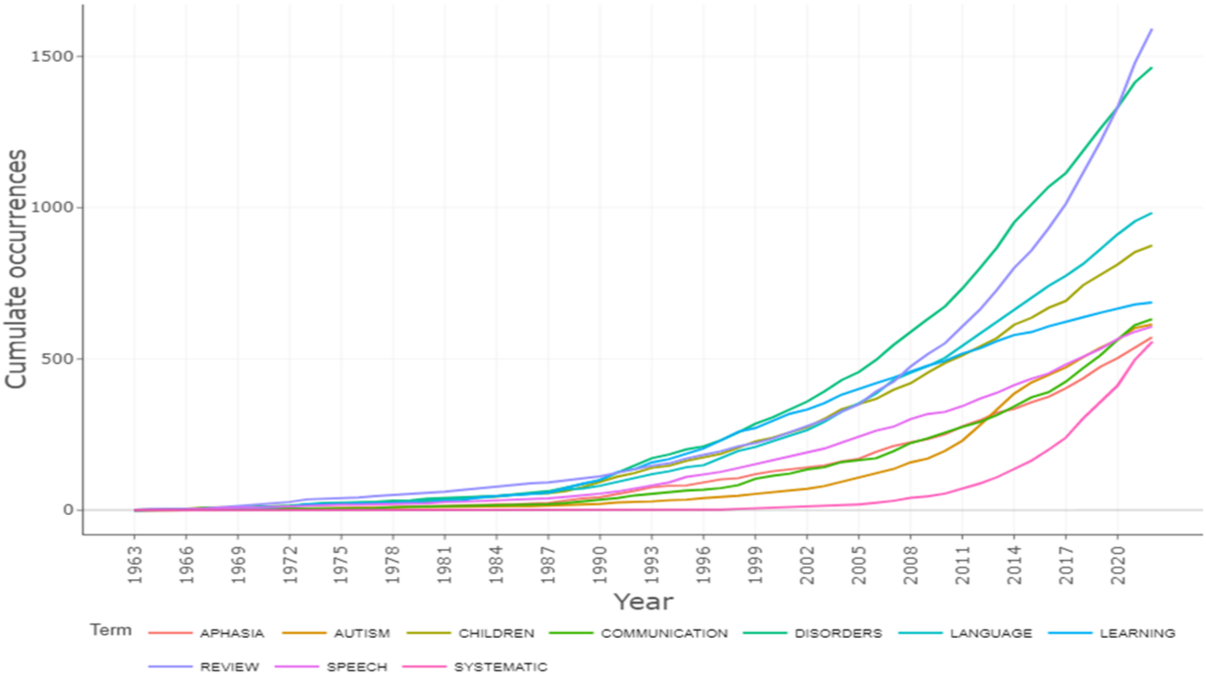

Figure 2. Depicts a rise in the cumulative frequency of keywords in articles

The most highly cited publications were written by Bishop DV and Wang Y (22), followed by Cryan JF (20), Fletcher JM (19), Dinan TG (18), and so forth, are shown in Table 1. Figure 3 shows the article production per year by the top 9 researchers. Through this, researchers can gain insights into the contributions and research impact of these top academics in their field.

Table 1. The top 9 research scientists in the field of communication disorders and ASD

Most relevant authors	No. of documents
BISHOP DV	22
WANG Y	22
CRYAN JF	20
LOGEMANN JA	20
FLETCHER JM	19
DINAN TG	18
FISHER SE	18
HILLIS AE	18
ONSLOW M	18

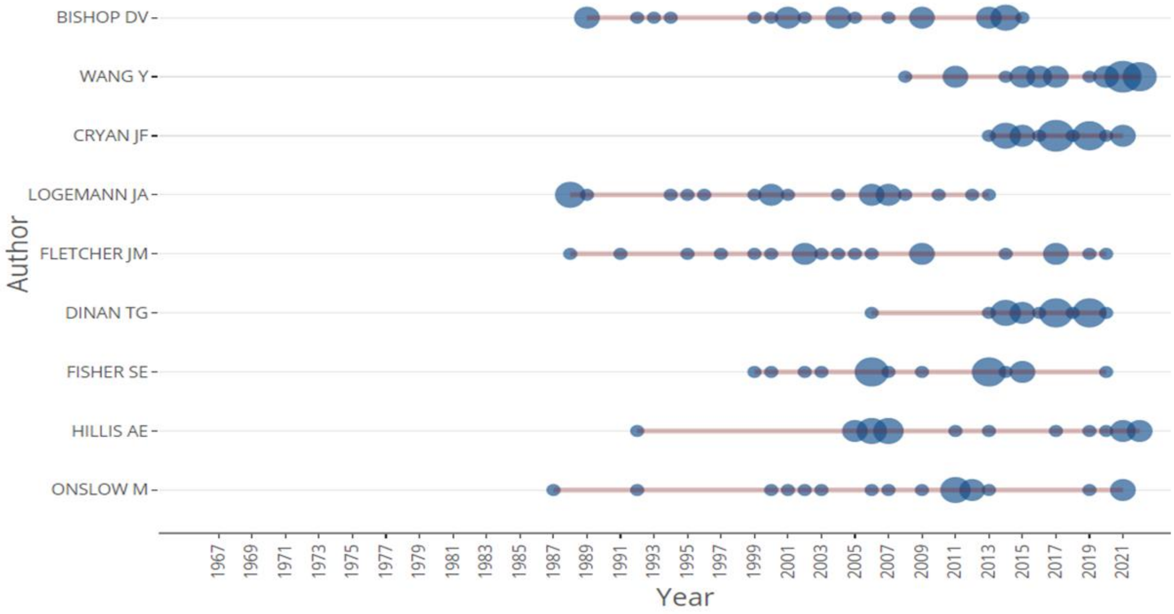

Figure 3. Top 9 authors' research article production per year

Table 2 displays the frequency of a specific keyword. The most often occurring keywords were "communication," "disorders," "infants," "language," and "human." The word "child" is used the most (2,975 times), suggesting that children are a major topic of research. "Female" (1,803) and "male" (1,711) come next, indicating a strong focus on gender-related research. A focus on early childhood and youth populations is further indicated by the inclusion of the terms "child preschool" (1,273) and "adolescent" (1,101).

Table 2. Most relevant keywords with frequency

Most relevant terms	No. of frequency
Child	2975
Female	1803

Most relevant terms	No. of frequency
Male	1711
Child preschool	1273
Adolescent	1101
Adult	1059
Language	506
Aged	485
Diagnosis differential	461
Middle aged	454
Risk factors	416
Neuropsychological tests	400
Infant newborn	306
Age factors	290
Language development	283
Prognosis	272
Phonetics	268
Comorbidity	258
Cooperative behavior	234
Speech therapy	210
Interpersonal relations	207
Speech/physiology	155
Learning disabilities/etiology	178
Cognition/physiology	148
Speech therapy/methods	147

DISCUSSION

In the discussion section, the bibliometric analysis indicates a consistent and escalating rise in research that concentrates on communication disorders, particularly from the late 1990s onwards. The highest cumulative occurrences of terms such as language, speech, learning, and many more are indicative of the primary areas of scholarly focus. The prevalence of terms such as child, preschool, female, and adolescent indicates a significant emphasis on the developmental aspects of communication disorders. The author analysis suggests that Bishop DV, Wang Y, and Cryan JF have made consistent and significant contributions in recent decades. The clustering of publications in the 2000s and beyond suggests that technological advances and clinical demand are driving interdisciplinary collaboration and interest. The patterns are consistent with the global initiative to incorporate AI into diagnosis and intervention. Additionally, the examination of the most relevant terms shows that literature is mainly developmental and age-related in character, with child, preschool child, adolescent, and infant/newborn becoming the most mentioned terms, thus demonstrating a clear focus on the issue of early identification and intervention. The strong number of gender-related words, female and male, indicates that the study of sex-based differences in prevalence and outcomes has been maintained as a scholarly focus. Words used in the core of linguistics and speech-related related (language, language development, phonetics, and speech/physiology) are important to highlight the biggest role of communication mechanisms represented in this sphere. The high usage of clinical terms such as differential diagnosis, risk factors, prognosis, and comorbidity is indicative of a strong clinical orientation that seeks to promote the level of diagnostic accuracy. The results emphasize the necessity of ongoing cross-disciplinary research to capitalize on AI's potential to enhance communication disorder outcomes and address gaps. People with communication disorders are citizens of our society, but they frequently receive unjust treatment and are neglected. Such unique people struggle to fit in and deal with a lot of stress in their daily lives. As a result, there is a need to develop tailored AI-based interventions to improve their communication and help individuals improve their livelihood. The short bibliometric study highlights the increasing work at the crossroads of artificial intelligence and communication disorders to help individuals. The multidisciplinary nature of the field has the potential to transform the diagnosis, assessment, and development of interventions for individuals with communication disorders. Furthermore, the integration of cutting-edge technologies can develop accurate and scalable solutions for the impaired individuals.

CONCLUSION

The review illuminates the growing intersection of communication disorders and the artificial intelligence field, tracing an undeniable upward trend in academic production, an increase in the quality of research methods, and an intellectual fusion across various fields. The analysis indicates the trends in the domain of assessing, diagnosing, and concurring communication disorders, focusing on the use of AI-based methods, including machine learning and natural language processing, as well as advanced signal-processing algorithms. Although the studied literature of knowledge testifies to significant improvement, there are also salient gaps, like the lack of large-scale empirical studies, the diversity of studies on the topic across the globe, and the need to thoroughly verify AI-based assessment and interventional instruments in the context of a real clinical environment. The findings prove that AI carries significant potential in enhancing the accuracy, accessibility, and efficiency of assessments and support systems of therapy in the field of communication disorders. As concluding remarks, AI interventions appear to be beneficial for enhancing the quality of life for those with such neurological disorders. The study also emphasises the value of interdisciplinary approaches, combining AI, psychology, and neuroscience to improve diagnostic and treatment techniques.

RECOMMENDATIONS

Future research should concentrate on cutting-edge interventions like brain-computer interfaces, virtual reality-assisted speech therapy, and AI-driven personalised treatment. Furthermore, cross-cultural research can increase the intervention's global applicability, and longitudinal studies are crucial for monitoring the development of communication disorders over time.

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Declaration of Conflicting Interests

The authors declare that there is no conflict of interest.

Data Availability Statement

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