PARENTAL PERSPECTIVES ON FEEDING ISSUES IN CHILDREN WITH AUTISM SPECTRUM DISORDERS

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CERTIFICATE

This is to certify that the dissertation entitled **'Parental perspective on feeding issues in children with Autism Spectrum Disorders'** is a bonafide work submitted in partial fulfillment for the degree of Master of Science (Speech-Language Pathology) of the student registration number: P01II22S123038. It has been carried out under the guidance of a faculty of this institution and has not been submitted earlier to any other university for the award of any diploma or degree.

Mysore

July 2024

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CERTIFICATE

This is to certify that the dissertation entitled '**Parental perspective on feeding issues in children with Autism Spectrum Disorders'** has been prepared under my supervision and guidance. It is also certified that this dissertation has not been submitted earlier to any other university for an award of any diploma or degree.

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DECLARATION

This is to certify that the dissertation entitled '**Parental perspective on feeding issues in children with Autism Spectrum Disorders'** is a result of my own study done under the guidance of Dr. Jayashree C Shanbal, Professor of Language Pathology, Department of Speech-Language Pathology, All India Institute of Speech and Hearing, Mysore. This dissertation has not been previously submitted to any other university for the award of any diploma or degree.

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TABLE OF CONTENTS

List of Tables

List of Figures

CHAPTER I

Introduction

Autism Spectrum Disorder (ASD) is a condition which is characterized as a group of life-long neurodevelopmental conditions whose main core features are deficits in the area of social communication domains and also restrictive, repetitive, and ritualistic patterns of behaviour, interests, or activities (American Psychiatric Association (APA),2013)ASD is classified in the 11th revision of the International Classification of Diseases *(*ICD-11) as a neurodevelopmental disorder because the condition results from dysregulation of the brain's development.

In recent years, the general prevalence of ASD has increased dramatically. According to the research (Zeidan et al., 2022), the most recent WHO update indicates that 1 in 100 children suffer from autism. Also, according to (Shabnam & Swapna, 2023) (2014), ASD is one of the most frequent developmental impairments among children in India, affecting future generations. A recent study (Marella et al., 2021) conducted in a tertiary care hospital attached to a medical college aimed to assess the socio-demographic profile of ASD patients. Out of 600 children, 28 (4.66%) were found to have ASD. While this figure is lower than the 10.2% (200 out of 1957) found in a study (Ahearn et al., 2001)conducted at NIMHANS (Kommu et al., 2017), it is higher than the 1.6% (46 out of 2942) found in a study from PGIMER (Juneja et al., 2012).

However, the risk factors for ASD remains disputed and cannot be linked to a single source. Some genetic variables, family history of autism, perinatal difficulties, older parental age at conception, intrauterine drug exposure, consanguinity, and a few

others are thought to be risk factors for ASD (Mamidala et al., 2013). Many studies have been conducted in India to confirm these potential risk factors. Mamidala et al. conducted a retrospective case-cohort study in India, the first of its kind in the country to examine factors contributing to ASD. They studied children under the age of 10 with ASD, comparing them to an equal number of control subjects, and examined various pre-, peri-, and neonatal factors, evaluating a total of 25 different factors. The findings revealed that some variables, such as advanced mother age, fetal distress, and gestational respiratory illnesses throughout the perinatal period, were linked to ASD.

When it comes to the characteristics of ASD, one of the most important hypotheses was proposed by Firth (2003). Firth proposed that cognitive and linguistic difficulties in children with ASD are attributable to a lack of a theory of mind. According to this hypothesis, typically developing children have an understanding of the mental states of others. If this ability is impaired, as seen in children with ASD, they struggle to understand behaviours, including communication behaviours, from others' perspectives.

One of the factors affecting verbal communication development in autistic children is the abnormal perception of external sensory stimuli (Patten et al., 2013). Approximately 25-50% of autistic children are unable to communicate verbally to express their desires (Baghdadli et al., 2012; Liss et al., 2006; Sigman & McGovern, 2005), often developing these difficulties after the age of five (Pickett et al., 2009). Although children with ASD may use language to meet needs and answer questions, they comment less frequently (Jones & Schwartz, 2009). They use language functionally, such as requesting items (Chiang & Lin, 2008) and often express needs without expecting others to engage (Noens & van Berckelaer-Onnes, 2004). The frustration of being unable to communicate effectively can result in behavioural

outbursts, which can range from aggressive physical actions and self-harm to loud vocalizations. These challenging behaviours are suggested to be a form of communication when there are breakdowns and the children do not get their needs met (Bronsard et al., 2010).

When addressing behavioural issues in children with ASD, they exhibit distinct patterns and challenges that complicate daily functioning and interactions. Dominick et al. found that ASD children with more atypical behaviours (capricious, aggressive, and self-harming attitudes) often have lower nonverbal IQ, reduced communication skills, greater social interaction impairment, and more stereotyped behaviours (Dominick et al., 2007). Problem behaviours typically emerge early and persist, dominating the child's behaviour(Einfeld & Tonge, 1996) Identifying contributing factors to behaviour problems is crucial. One significant challenge is dealing with changes in routine or transitions between activities. Children with ASD often find comfort in consistency and may struggle with new or unexpected situations. These behaviours are common and can lead to issues like poor social adjustment and increased use of pharmacotherapy, particularly antipsychotics (Hartley et al., 2008; Matson & Dempsey, 2008). Emotional regulation is particularly challenging. Stereotypical and repetitive motor mannerisms, known as "self-stims," are also common and include behaviours like finger or hand flapping, twisting, rocking, or head banging. Specific repetitive behaviours include staring at lights, repetitive blinking, moving fingers in front of the eyes, and hand-flapping. These behaviours often serve to either stimulate or calm the child. Their frequency can increase when the child is overly excited, bored, or tired. Additionally, children with ASD often struggle with self-management, impacting their ability to plan, organize, and execute tasks independently.

Sensory issues are a key diagnostic feature in children with ASD, who often exhibit unique and complex responses to sensory stimuli, significantly impacting their daily lives and interactions (Yack et al., 2015). These children may struggle to register and modulate sensory inputs across one or more systems. They may be over-responsive, under-responsive, or show mixed responses to environmental sounds, smells, light, tactile stimulation, movement, visual clutter, and social stimuli like touch and voices. Such atypical sensory responses can cause discomfort or distress in seemingly normal situations (Patten et al., 2013), potentially hindering verbal communication development. Sensory issues also influence food acceptance or rejection based on presentation or texture. Children with ASD may display strong preferences or aversions to certain textures, leading to selective eating habits. Picky eating, food refusal, and food selectivity are common, often linked to ASD symptoms and based on the colour, shape, texture, or temperature of food (Postorino et al., 2015). They may insist on specific foods, sometimes choosing to go hungry rather than eat disliked foods, resulting in nutritional deficiencies and mealtime stress. These sensory challenges contribute to feeding problems in ASD children. Over-responsiveness to textures and smells can lead to food rejection based on sensory input rather than nutritional value, while under-responsiveness may drive them to seek out foods with intense flavours or textures to meet their sensory needs. Mixed responsiveness creates unpredictable eating habits, complicating the establishment of consistent feeding routines.

Similar to how sensory issues lead to feeding issues, communication difficulties and behavioural challenges can also contribute. Children with ASD may struggle to express food preferences or request food, leading to frustration and behavioural problems during mealtimes. Their difficulty in interpreting social cues can exacerbate

feeding issues, resulting in inadequate nutrition. Behavioural challenges, such as a need for routine and consistency, can cause rigidity around mealtimes and distress if expectations are unmet. Anxiety and emotional dysregulation can further complicate feeding. Recognizing that communication, behavioural, and sensory issues in ASD can all lead to feeding problems is crucial.

Need for the Study

It has been reported in literature by various researchers that found that more than 60% of children with ASD have micronutrient deficiencies as a result of their dietary habits (Siddiqi et al., 2019). These nutrients are essential for growth and development, and a lack of them might worsen ASD-related issues or symptoms. This highlights the necessity of treating feeding issues in children with ASD.

Feeding and mealtime challenges in ASD can have serious consequences. According to (Matson & Fodstad, 2009), these difficulties can be connected to issues with communication, behaviour, and sensory processing. According to research, children with ASD frequently struggle to communicate their eating needs, including hunger, fullness, and food preferences (Nygren et al., 2021). Furthermore, they may have unique requirements for dishes, utensils, meal presentation, and sitting, which mirror their repeated behaviours and ritualistic routines (Schreck et al., 2004).

Eating encompasses a variety of sensory sensations, including look, smell, texture, taste, and social contact. For children with ASD, these sensory components, as well as the motor planning necessary for posture and utensil usage, might be very difficult. Children with ASD are more likely to have oral hypersensitivity than normally

developing children (Rogers et al., 2003). Sensory defensiveness, which has been associated to eating difficulties in normally developing children, is comparable to that reported in children with ASD (Smith et al. 2005). Children with ASD are prone to picky eating behaviours such as avoiding vegetables, disliking food that comes into contact with other food, and rejecting specific tastes and textures. Sensory processing abnormalities, including oral hypersensitivity, frequently impact these behaviours.

Eating disorder research stresses the significance of taking sensory processing into account when designing food therapies. Recognizing that meals require several sensory modalities is critical for treating feeding challenges in children with ASD. Interventions should include communication, behaviour, and sensory processing to promote positive mealtime contexts. Chistol et al. (2018) investigated the oral sensory processing of children with ASD vs normally developing children. It was found that children with ASD had unusual oral sensory sensitivity, rejected more meals, and ate fewer vegetables. Those with ASD and food selectivity consume fewer whole vegetables and fruits and more empty calories, which has a negative impact on their overall health. Understanding their dietary choices can help create successful feeding strategies.

The importance of such research is obvious, since they reveal insights that can significantly enhance the nutritional health and general well-being of children with ASD. Caregivers can better address these difficulties by investigating the feeding challenges these children have and speaking with their parents.

Aim and Objectives of the Study

To investigate parental perspective on feeding issues in children with autism spectrum disorders (ASD). In order to provide insightful information for improving support and treatments for parents and children, the study explores communication, mealtime behavioural issue, and sensory issue during mealtimes.

Objectives of the study

1. To examine parental perspectives on feeding issues in children with ASD.
2. To determine the relationship between feeding issues and sensory issues in children with ASD
3. To determine the relationship between feeding issues and mealtime behavioural issues in children with ASD
4. To determine the relationship between feeding issues and communication in children with ASD.
5. Investigate the interrelation between communication, mealtime behavioural issues, and sensory issues in the context of feeding.

Null Hypothesis: The following null hypothesis was proposed for the current study.

$H_0$1 There is no significant correlation between feeding and sensory issues in children with ASD.

$H_0$2 There is no significant correlation between feeding issues and mealtime behaviour issues in children with ASD

$H_0$3 There is no significant correlation between feeding issues and communication in children with ASD

$H_0$4 There is no significant inter-correlation between communication, mealtime behavioral issues, and sensory issues in the context of feeding.

CHAPTER II

Review Of Literature

Feeding in children is a complex process requiring the development of both motor and sensory skills, reflecting neurological progress through the integration of several systems. The central and peripheral nervous systems ensure proper signal transmission for feeding. The oropharyngeal mechanism manages the physical actions of sucking, swallowing, and breathing (Meyer et al., 1994). The cardiopulmonary system delivers oxygen to feeding muscles, while the GI tract, with the nervous system, regulates digestion, hunger, and satiety. Proper alignment of craniofacial structures like the jaw, tongue, and palate is crucial for effective feeding.

Sensory skills, such as taste, smell, and texture recognition, are vital for developing food preferences and a balanced diet. Children with Autism Spectrum Disorder (ASD) face eating challenges impacting their nutrition, development, and health. These challenges involve physiological, sensory, and behavioural factors, highlighting the need to understand the prevalence and nature of feeding difficulties in ASD.

2.1 Prevalence of Feeding Difficulties in Children with ASD.

Currently, investigations on the occurrence of eating issues in children with autism spectrum disorders have repeatedly shown that more than half of these individuals limit their food intake (Ahearn et al., 2001; Schreck et al., 2004). These were the first among the few studies that investigated the prevalence of eating difficulties in children with ASDs. Children with ASD are found to have increased feeding problems than children who are typically developing (Allen et al., 2004).

According to Seiverling et al. (2018), Children with ASD had noticeably more feeding issues.

One of the Indian study "Feeding Problems Among Children with Autism in a Clinical Population in India" by Bandini et al. (2014) aimed to explore the prevalence and characteristics of feeding problems in children with autism compared to the Indian research "Feeding Problems Among Children with Autism in a Clinical Population in India" by Bandini et al. (2014) sought to investigate the prevalence and features of eating difficulties in children with autism vs those with intellectual impairments. The study, which included 100 male and female children aged 3 to 16 years old, assessed eating practices using parent surveys and clinician exams. The Sensory Profile Questionnaire and the eating Behaviour Questionnaire were important tools for determining the types and frequency of eating disorders, sensory processing impairments, and nutritional intake.se with intellectual disabilities. Conducted with 100 children aged 3-16 years, both male and female, the research utilized parent questionnaires and clinical evaluations to assess feeding behaviours. Key instruments included the Sensory Profile Questionnaire and the Feeding Behaviour Questionnaire, which helped extract parameters such as the types and frequency of feeding problems, sensory processing issues, and nutritional intake.

The findings found that feeding problems were substantially more common in children with autism, with 70% suffering from feeding difficulty compared to 50% of children with intellectual disability. Specifically, 53% of children with autism reported selective eating behaviours, and 44% had texture issues, compared to 36% and 20%, respectively, among children with intellectual disability. Sensory processing abnormalities were strongly related to these eating concerns, particularly in younger

children with autism, indicating a link between sensory disorders and feeding complications.

The study revealed that eating issues in autistic children are both widespread and severe, and are frequently associated with sensory processing abnormalities. This highlights the need to conduct extensive evaluations and implement interdisciplinary treatments to address these difficulties successfully. Given the high frequency of eating challenges among children with autism, the researchers stressed the significance of targeted therapies to address their nutritional and developmental needs. Overall, the study emphasizes the crucial need for focused solutions to address eating problems in children with developmental difficulties.

Similarly, another study, “Atypical Eating Behaviours in Children and Adolescents with Autism, ADHD, Other Disorders, and Typical Development" by Mayes & Zickgraf (2019), analysed the prevalence of atypical eating behaviours in children and adolescents with autism compared to those with ADHD, other disorders, and typical development. The sample included 2102 children: 1462 with autism, 327 with other problems (e.g., ADHD, intellectual impairment, language disorder, and learning disability), and 313 typically developing children aged 1-18 years (mean 7.3). The study analysed unusual eating behaviours using the Autism Spectrum Disorder Checklist, based on standardized parent interviews done by certified psychologists. The collected parameters included the prevalence and kinds of eating habits, such as limited food choices, hypersensitivity to food textures, and more. It was reported that atypical eating practices are substantially more common in children with autism (70.4%) than in children with other disorders (13.1%) or normally developing children (4.8%). The

most prevalent abnormal eating behaviour seen in children with autism is restricted food choices (88%), followed by hypersensitivity to food textures (46%). Other notable behaviours include a predilection for a specific brand of food (27%), pocketing food without swallowing (19%), and pica (12%). 92% of autistic children with restricted dietary choices choose grain products and chicken (typically in the form of nuggets).. Notably, 25% of children with autism who display atypical eating behaviours exhibit three or more such behaviours, in contrast to 0% of children with other disorders or typical development. Pica and food pocketing were behaviours observed exclusively in children with autism.

These findings highlight the unique number and types of atypical eating behaviours in children with autism, underscoring the importance of considering autism as a potential diagnosis and conducting thorough evaluations to ensure early identification and access to evidence-based interventions. However, limitations of the study include potential biases due to reliance on parent-reported data and the cross-sectional design, which limits causal inferences.

2.2 Characteristics and Predictors of Feeding Issues in Autism Spectrum Disorder

The studies mentioned above show a notable diversity in the characteristics and types of behaviour exhibited by autistic children experiencing persistent difficulties. This section explores various studies mentioned in the literature to gain a broader understanding of the types of difficulties or traits they exhibit.

So ,in one of the study conducted by Mayes and Zickgraf (2019) of research titled "Atypical Eating Behaviours in Children and Adolescents with Autism, ADHD, Other Disorders, and Typical Development" The primary objective of the research was to examine and contrast the prevalence of restricted food preferences and other unusual eating behaviours in children and adolescents with autism against those with other disorders (such as ADHD) and typical development, within a sample comprising children with autism. The study included 2,102 children aged 1 to 18 years (mean age 7.3). They were separated into three groups: 1,462 with autism, 327 with other illnesses (e.g., ADHD, intellectual handicap), and 313 generally developing children.

The Checklist for Autism Spectrum Disorder (CASD)(Sansosti & Powell, 2008), one of the 30 items within is feeding problems which has five sub-items which is used to assess the prevalence and types of atypical eating behaviours through standardized parent interviews. Parameters extracted included limited food preferences, hypersensitivity to food textures, peculiar eating patterns, pocketing food, and pica. The important findings revealed from the study include in the child Diagnostic clinic sample, Unusual eating behaviours were most frequently observed in children aged 0-2 years (78.5%), followed by those aged 3-5 years (72.6%), and those aged 6 years and older (67.1%).also, in terms of unusual eating practices, findings revealed that 70.4% of children with autism engaged in unusual eating practices, compared to 13.1% of children with other disorders and 4.8% of generally developing children. 88% of people with autism reported restricted food preferences this was consistent with other studies in the literature(Cermak et al., 2010; Lane et al., 2014; Leiva-García et al., 2019); 46% were hypersensitive to food textures; 27% had unusual eating habits, 19% pocketed food, and 12% experienced pica. Furthermore, 25% of children with autism had three

or more abnormal eating behaviours, a pattern not found in children with other diseases or usual development. When combining the findings from the 2102 children in the child diagnostic clinic and CASD standardization samples, atypical eating behaviours were found to be five times more prevalent in children with autism (70%) compared to those with other disorders (13%) and 15 times more common than in typically developing children (5%).

The study suggests that the distinct and many unusual eating patterns observed in children with autism should warn doctors about the likelihood of autism, supporting early detection and intervention. Similarly (S. Shabnam & Swapna, 2023)validated the Feeding Handicap Index((S. Shabnam & Swapna, 2023),2014) in children with ASD and ID, and their findings revealed that the ASD group obtained significantly higher mean scores compared to the typical group in both total FHI and for each section and these results signify that children with ASD exhibited feeding problems and the physical feeding problems observed included inadequate chewing, difficulty eating with fingers and spoons, trouble drinking from a cup or sucking through a straw, holding food in the mouth, restricted tongue movement, and difficulty with rinsing and spitting. There were also issues like inappropriate weight gain, difficulty swallowing, and some instances of nasal regurgitation and vomiting during meals. Functional feeding problems included consuming smaller amounts of food, food spillage, aversion to specific food items, needing a particular position while eating, longer mealtimes, and needing liquids to swallow food. Emotional feeding problems were characterized by refusal to open the mouth while eating, temper tantrums during feeding, and a tendency to avoid eating with peers or in social settings. Also it was found that in their study most of the children with ASD (50-55%)experienced greater difficulties in

neophobia,(Kral, 2018) also reported similar findings that among autistic children, the ones with oral sensitivity issues found to report more regarding food neophobia difficulties, food aversion specific to taste/temperature/texture/smell, difficulty in eating using spoon independently, inability to clear the food particles stuck in teeth and gums using the tongue.

In 2018, Leila Cherif et al. conducted a similar study aimed at assessing the frequency and types of feeding problems in children with autism spectrum disorders. They used a cross-sectional and comparative study on 114 children, dividing them into two groups. The ASD group consisted of 57 children with autism spectrum disorder, randomly selected from those free of diseases or disorders affecting dietary habits (such as diabetes, celiac disease, and other chronic gastrointestinal illnesses) and aged 2 to 12. This age range was chosen in accordance with the Children's Eating Behaviour Inventory (CEBI)(Archer et al., 1991) norms, the tool used to evaluate eating behaviours in children for this study. The control group was randomly selected from two kindergartens from those near the hospital. So, the parents were given questionnaires to complete at home.

The findings revealed significant disparities in feeding behaviours between children with ASD and the control group. Specifically, 82.4% of children with ASD exhibited feeding problems, compared to 56.1% in the control group. Among the identified issues, pica habits and a preference for starchy foods were notably more prevalent among children with ASD than their peers without the disorder similar findings are reported in the literature(Zimmer et al., 2012) that children with ASD may exhibit atypical feeding behaviours compared to their peers like exhibiting issues like

food denial, interest for particular tastes or smell, and a limited variety These feeding issues were documented using the CEBI(Archer et al., 1991), highlighting specific challenges such as food selectivity and dietary habits unique to the ASD group.

Furthermore, the severity of autistic symptoms was found to correlate with the occurrence of feeding problems, suggesting a potential relationship between the core symptoms of ASD and eating behaviours. The study also noted that children with ASD consumed a significantly narrower variety of foods compared to those without ASD (22.8% versus 3.5%), further emphasizing the impact of the disorder on dietary diversity. Other studies in the literature (Cermak et al., 2010a) also suggested that sensory sensitivity can be seen as a mechanism to explain food selectivity after noticing a connection between feeding issues and sensory defensiveness. Emmons & Anderson (2005) found that most children with ASD also faced issues in tactile sensitivity, and almost 60 % disliked their hands/face being dirty and another study by Ernsperger & Hanson (2004)found that children that exhibit sensory issues may be less likely to use their hands while having meals, these studies revealed that sensory issues are major concerns in Children with ASD and similarly, one of the most recent study was done in 2024(St. John & Ausderau, 2024)the title of the study was The characterization of feeding challenges in autistic children the main aim of the study The aim of this study was to describe feeding difficulties in children with autism and determine the factors that predict the classification and severity of these challenges, also This research is the first of its kind to determine major predictors of both the classification and severity of feeding challenges in a large nationwide sample.

This study includes a countrywide cross-sectional survey of caregivers of autistic children aged 2 to 12 years who have eating difficulties. Caregivers conducted seven evaluations throughout the survey, which included the Feeding and Eating in Autism Together (FEAST) questionnaire (Ausderau, 2022). The FEAST test was used to describe feeding problems and find indicators of their severity. A total of 426 main caregivers of autistic children with eating issues took part. To be eligible, respondents had to be the primary caregiver (living with the kid at least 50% of the time) of an autistic child aged 2-12 years with documented eating issues. Caregivers described the child's autism diagnosis and feeding difficulties. Children were excluded if they had a co-occurring developmental disorder such as Rett syndrome, Childhood Disintegrative Disorder, primary sensory impairment (e.g., blindness), a genetic condition (e.g., Down syndrome), or physical disabilities such as cerebral palsy. Participants in the Interactive Autism Network (IAN) registry was selected if their Social Communication Questionnaire score was more than 15, suggesting a strong possibility of an autism diagnosis.

The study's findings revealed that eating issues in autistic children varied in severity, with some children facing considerable and continuous difficulty. These difficulties usually occur early in childhood, particularly during the earliest stages of shifting to different types of food. Importantly, these eating challenges frequently occur before the children are formally diagnosed with autism. The data revealed that the age at which eating issues emerge is significantly younger than the age at which autism is diagnosed.

Furthermore, the study found that certain early eating obstacles, such as difficulty transitioning from milk to solid meals or adopting a range of textures, were substantially associated with the severity of subsequent feeding disorders. These early abnormalities also helped predict the categorization of eating difficulties, indicating that early intervention may be critical. 33% of the children investigated had difficulty with at least one early feeding transition regularly or consistently. Furthermore, 44.5% of families said that their children's nutrition remained restricted over time, demonstrating the persistence of these issues. This emphasizes the need for early detection and specific therapy for autistic children's eating issues.

Also, one other important thing is that the study identified sensory-based feeding challenges as the most prevalent among autistic children in the sample, with the Sensory Subscale mean item scores significantly higher than those on other subscales. Specifically, 84.5% of participants exhibited sensitivity to food texture, 61.8% to taste, and 56.9% to smell. Only a small fraction, 2.8%, reported no sensitivity to any sensory properties of food. These findings underscore the prominent role that sensory sensitivities play in feeding difficulties among autistic children. The significant prevalence of sensory sensitivities suggests a strong correlation between sensory issues and feeding challenges in children with autism spectrum disorder (ASD).

So, this paper thoroughly categorized feeding issues, including sensory-based obstacles, and discovered that sensory sensitivities are quite common. In conclusion, these studies highlight that the multisensory nature of feeding issues in children with ASD is evident it indicates that there is a chance of a certain area that should be handled regarding feeding concerns. Similarly, as stated in the introduction, other fields have

analogous possibilities. Let's look at studies on correlations between other domains, such as behaviour, communication, and sensory domains, concerning Feeding issues.

2.3 Associations between feeding issues, sensory issues, behavioural issues, and communication difficulties

As previously stated, persons with ASD frequently experience food challenges, which have a substantial influence on their nutritional condition and general health. Furthermore, these challenges frequently manifest as severe food selectivity, unwillingness to consume specific textures, and strict mealtime routines, resulting in nutritional shortages and development concerns. Sahan et al., (2021), compared across typically developing children and children with autism, and found that children with autism had greater feeding issues, troublesome feeding patterns, and limitations in accepting particular food groups and novel foods. It was also observed that sensory-based eating issues are the most common among autistic children (St. John & Ausderau, 2024), relationships between sensory impairment and feeding issues are also suggested by Suarez et al. (2012). The textures, flavors, or odors of particular meals might be overpowering for individuals. Furthermore, communication challenges can compound food issues since people with ASD may fail to convey their preferences or discomfort, resulting in frustration and poor mealtime behaviours. Also, If a child's food and utensils always have the same flavor and texture, they might not learn to accept new foods, which is termed Food Neophobia (FN), and FN is consistent throughout the studies in the literature (de Almeida et al., 2022; Ismail et al., 2020; Stafford et al., 2017). Also, they might not acquire the skills needed to handle and carry new foods safely through the pharynx (Gisel et al., 2000). Behavioural rigidity and devotion to rituals common in ASD can affect mealtimes, making it difficult for caregivers to

introduce new meals. These eating issues can lead to a cycle of tension and anxiety around mealtimes for both people with ASD and their families. Understanding the complex association between eating difficulties and ASD is critical for establishing effective therapies that are customized to these specific challenges. It is also mentioned in the literature that(Rouphael et al., 2023) children with ASD exhibit more aggressive behaviours during meals; gagging and spitting food was also observed; the presence of such disruptive behaviours are also reported in other studies (Gentry &Luiselli, 2008; Şahan et al., 2021)Also mostly the child does not consistently remain seated until the meal is finished and will be unwilling to try new foods and preference of crunchy foods is also observed in children with ASD (Huxham et al., 2021).

A study done by Johnson et al., (2014) this is the first and most significant study to date from validated tools to explore feeding behaviours, behavioural correlates of ASD, and diet quality in children with ASD so the main of this study is to describe the correlations between core and associated behaviours of ASD with feeding and mealtime behaviours in a large sample of well characterized children with ASD as well as their connections to feeding and nutritional well being

The study involved a substantial sample of 256 well-characterized children aged 2-11 years, with an average age of 5.43 years, recruited from five Autism Speaks Autism Treatment Network (AS ATN) sites. These sites were part of a study focused on diet and nutrition. The study employed several assessment tools, including the Brief Autism Mealtime Behaviour Inventory (BAMBI) by Lukens and Linscheid (2008) to evaluate ASD-specific mealtime behaviours. The Autism Diagnostic Observation Schedule (ADOS) by Lord et al. (1999) was used to place children in naturalistic social

scenarios that required specific social, communication, and repetitive responses. Intellectual functioning was estimated through a cognitive evaluation conducted as part of the ATN protocol. The Repetitive Behaviour Checklist Revised (RBSR) by Bodfish and Lewis (2002) measured restricted and repetitive behaviours, while the Short Sensory Profile (SSP) by McIntosh et al. (1999) assessed sensory responses to various stimuli, such as olfactory, gustatory, vestibular, auditory, and visual. Additionally, the Child Behaviour Checklist (CBCL 1–5 & CBCL 6–18) by Achenbach and Rescorla (2001) and Achenbach (2002) was used as a broad-spectrum behaviour rating tool. The study also utilized the Healthy Eating Index (HEI) (U.S. Department of Agriculture & National Cancer Institute, 2010) from a three-day food record (3DFR) to quantitatively assess diet quality based on alignment with federal dietary guidelines.

In this study, a significant relationship was found between feeding problems and other characteristics in children with ASD. The study revealed that high scores on the RBSR (Bodfish & Lewis,2002) strongly predict parent-reported feeding issues, indicating that repetitive and ritualistic behaviours are linked to mealtime challenges. This finding aligns with the commonly reported impact of repetitive behaviours on feeding routines. Similarly, sensory sensitivities were found to have a related effect. Higher scores on the BAMBI (Lukens & Linscheid,2008), indicating more feeding and mealtime issues, could be predicted by lower scores on the SSP (McIntosh et al. ,1999), which reflect greater sensory impairments. Additionally, there were strong associations between feeding and mealtime behaviours and both externalizing and internalizing behaviours, as measured by the CBCL (Achenbach, 1991). The study also found high correlations between internalizing behaviours, the RBSR, and the SSP, suggesting an interaction among these behavioural patterns. Children with anxiety may exhibit more

repetitive behaviours and sensory symptoms, which in turn hinder their willingness to try new or less preferred foods. Alternatively, sticking to a limited diet might help manage their anxiety. Furthermore, the ADOS (Lord et al., 2002) severity score, which indicates the severity of diagnostic symptoms, was not associated with BAMBI scores or cognitive functioning levels. This suggests that the severity of social, communication, and cognitive deficits does not predict feeding and mealtime behaviours. Even when we consider these findings. The absence of a correlation between the severity of core symptoms aligns with the findings proposed by another author, Schreck & Williams (2006).

Overall, we can infer from the study that it highlights strong links between higher rates of repetitive behaviours, sensory differences, externalizing and internalizing behaviours, and increasingly problematic feeding and mealtime behaviours, regardless of functioning level. Additionally, a negative association was found when examining the Healthy Eating Index (HEI) to determine the relationship between diet quality and feeding behaviours. This indicates that as feeding and mealtime behaviours improved in children with ASD, so did the quality of their diet. This finding was particularly significant given the challenges in evaluating this relationship.

Similarly, Padmanabhan & Shroff's (2020) study in the journal of The British Society of Developmental Disabilities sought to investigate the relationships between dietary intake, nutritional status, mealtime behaviours, and sensory integration in children with ASDs in a large metropolitan area in India. This study used an observational cross-sectional study design. Mothers or caregivers of children with ASD

submitted baseline demographic information and details regarding eating and feeding habits, sensory processing, and dietary intake. The key inclusion requirements for participants were that the children be between the ages of 3 and 11 years old and have a valid ASD diagnosis(Mayes & Zickgraf, 2019).

This study's data was acquired from participants in Mumbai, India, totalling 146 responses. There were 72 youngsters aged 3-6 and 74 children aged 7-11. A standardized closed-ended interview schedule was used to acquire sociodemographic information as well as the child's medical history. A semi-structured interview schedule was used to obtain information about the child's eating and nutrition throughout early infancy, as well as his or her current diet. Assessment techniques used in the study included the Short Sensory Profile (SSP) (McIntosh et al.,1999) and the Brief Autism Mealtime Behaviour Inventory (BAMBI)(Lukens & Linscheid, 2008). A 24-hour dietary recall was undertaken to document the food and drinks (except water) ingested by the kid in the 24 hours prior to the interview, using standardized measuring cups for accuracy. Dietary diversity was assessed by counting the number of food groups ingested by the kid, with fewer denied food groups indicating more dietary diversity. Macronutrient intake, comprising calories, protein, and fat, was calculated. Anthropometric measures were conducted to assess the child's height and weight, and the BMI was determined. The BMI z-scores were obtained and used to categorize the children into groups such as 'normal', 'mildly underweight', 'underweight', 'overweight', and 'obese' using descriptive statistics.

The findings revealed a substantial link between sensory integration and food refusal, with children who had better sensory integration declining fewer food types.

The Short Sensory Profile (SSP) examination found that over 50% of the children were classified as having a 'Definite Difference' in sensory integration, indicating that sensory integration is a struggle for children with autism. Textural sensitivity was found as the most often reported concern influencing nutritional intake, with almost 65% of youngsters exhibiting an aversion to chewing food, most likely owing to oral sensory sensitivities.

The study concluded that sensory integration issues may impede food intake, particularly given the nature of Indian meals, which include many dishes with varied textures, tastes, scents, and colours offered concurrently. This may overwhelm children with ASD. The Brief Autism Mealtime Behaviour Inventory (BAMBI) scores revealed a strong association between mealtime behaviours and food group rejection. This implies that children who refused more food groups had more mealtime behavioural difficulties. The most often reported lunchtime behavioural concerns were food refusal and aversion to trying new foods food neophobia. The study claimed that the rigidity in behavioural patterns characteristic of many children with autism might extend to mealtime habits, such as a 'demand for sameness,' which contributes to reluctance to novel meals.

There was also a substantial negative association between the SSP's 'Taste and Smell Sensitivity' domain and total BAMBI scores. This suggests that children with poor taste and smell sensitivity (lower SSP domain scores) are more prone to engage in disruptive mealtime activities (higher BAMBI scores). There was also a large negative association between overall SSP scores and BAMBI scores, indicating that stronger sensory integration (higher SSP scores) is linked to fewer mealtime behavioural

difficulties (lower BAMBI scores). The research addressed this by stating that eating is a multi-sensory activity. Although age-related variations were expected, there were no differences in mealtime behaviour or sensory integration ratings between the two age groups. This is one of the first studies to analyze and compare outcomes across two unique age groups while investigating several factors that may impact food consumption using validated measures.

Padmanabhan and Shroff (2022) conducted a pioneering qualitative study from India that uses an iterative method to investigate educators' perspectives on mealtime behaviours in children with ASD in schools. The primary goal of the study is to look into educators' experiences with the mealtime behaviours of children diagnosed with ASD in school settings and to evaluate the measures used in schools to improve nutrition among these children. This qualitative study included 13 educators from several special schools in Mumbai, India, including trust and private institutions. The study included educators who work with children aged 3 to 11 who have been diagnosed with ASD. The technique of inquiry was in-depth interviews with 13 educators. The interviews covered various topics, including educators' roles and responsibilities at school, their experiences with mealtime behaviours in children with ASD, strategies for addressing eating concerns, perceptions of the causes of disruptive mealtime behaviours, and their school's food and nutrition policies. The study found that educators identified many triggers for disruptive mealtime behaviours in children with ASD. One major trigger was when children despised the food in their snack or lunch boxes, which caused them to choose to stay hungry and resulted in behavioural problems. Furthermore, changes in food items from their regular diet caused difficulty for some youngsters. Children with ASD were also shown to struggle with flexibility

in routines, notably interruptions in their break-time schedules, which frequently led to behavioural issues.

Educators identified sensory integration issues as major factors to disruptive mealtime behaviours. Sensitivity to scents and sounds in the classroom was especially problematic, with some students scrutinizing or rejecting food solely on smell. High hearing sensitivity also influenced eating patterns during loud breaks, with children frequently requiring a quieter setting to eat comfortably. Children with tactile sensitivity preferred dry snacks or finger foods while eating alone.

Furthermore, communication difficulties were found as a potential source of disruptive mealtime behaviours in children with ASD. Educators saw that children struggled to articulate their hunger, which contributed to restlessness and violence in the classroom. To sum up, lunchtime behavioural difficulties were common among children with ASD in school settings, caused by a variety of reasons, including sensory stresses. These stressors included not just sensory aspects of food but also ambient stimulation, such as loud sounds and strange odours in the classroom.

In another study in the literature by Khaledi et al.(2022),the investigator assessed the relationship between communication skills, sensory difficulties, and anxiety in children with ASD so this particular study included 53 children with ASD 6-12; they used materials like SSP(McIntosh et al., 1999),The Spence Children's Anxiety Scale (SCAS) (Spence, 1998) and Children's Communication Checklist (CCC) (Bishop, 1998) and the results revealed that the overall sensory score of children with ASD was significantly and positively correlated with most communication skills i.e.,

higher sensory issues will have more communication issues as well and also found that sensory processing patterns play an important role in determining severity of ASD symptoms. This study also revealed that most of the sensory subscales of the SSP have a negative correlation with all subsets of anxieties i.e.; in assessing and treating anxiety in children with ASD, It is best first to identify and modify the sensory processing pattern, also in terms of the relationship between anxiety and communication they found that a significant negative correlation exists between social relationship score and subsets of anxiety i.e. if anxiety is reduced even children with ASD establish a better social relationship. Overall, the study emphasizes the importance of considering sensory processing patterns in the treatment of anxiety and as well as communication difficulties in children with ASD, however, there are certain study in literature (Raj et al.,2024) revealed that there is no relationship between communication and sensory issues as the results showed no significant relationship.

Another study in the literature which investigated the relationship between aggressive behaviour and verbal communication skills in ASD(De Giacomo et al., 2016) for this study they included 88 children with ASD and the main aim of the study was to investigate the relationship between aggressive behaviour, such as self-aggression and other-aggression, with verbal communication ability and IQ level in children with ASD the tools used in this study were Autism Diagnostic Interview-Revised (ADI-R) (Lord, Rutter, & Le Couteur, 1994),Autism Diagnostic Observation Schedule(ADOS) (Lord, Rutter, DiLavore, & Risi, 2002) to confirm ASD diagnosis and evaluate their language, social interaction, stereotypes and aggression and other tools which were used to calculate IQ and distinguish high functioning(HF) and low functioning(LF) were Leiter-R (Roid & Miller, 1997)and Wechsler Intelligence Scale

for children(3rd edition) (Wechsler, 1991) and Wechsler Preschool and Primary Scale of Intelligence(3rd edition) (Wechsler, 2002) and after assessing these tools the major findings were children with limited verbal communication skills tend to display more aggression towards others compared to verbal children, but results were not statistically significant also regarding other aggression and self-aggression there is not statistical difference between HF and LF similar findings were reported in the literature by other studies(Matson et al., 2009, 2013).

2.4 Parental Perspectives on feeding issues in children with ASD &their Complications

Parents of children with autism spectrum disorders (ASDs) frequently experience more stress than those of usually developing children or children with other developmental and psychiatric issues unrelated to ASD (Estes et al., 2009; Griffith et al., 2010; Schieve et al., 2007). They may also be more likely to develop psychological problems such as anxiety and depression (Estes et al., 2009; Sawyer et al., 2010). According to research, parents of younger children with ASD may be more stressed than those of older children (Schieve et al., 2011). The first longitudinal research with very young children discovered that parents of toddlers aged 18 to 33 months reported greater levels of depressive symptoms, which remained for many women even after two years (Carter et al., 2009).

So, this study by Carter et al. (2009) investigated the developmental patterns of mother depression symptoms in the early years following an ASD diagnosis. The researchers examined both general group trends and individual variations to determine

whether any protective or risk variables impacted the intensity of depression and its progression over time.

The sample for this paper consisted of 143 women who took part in a longitudinal study that looked at developmental trajectories in toddlers newly diagnosed with ASD, as well as parental adjustment and well-being. The study included children whose mothers reported depressive symptoms at least twice during the first three years of examinations. To guarantee independent mother observations, families with multiple children enrolled utilized data from the first (and oldest) kid. Data were collected at three time periods, starting with a phone screening to determine eligibility. Following the screening, a child visit and parent interview were planned, and women were given questionnaire booklets covering child behaviour, maternal emotions, and family dynamics.

Adult depression symptoms, coping strategies, maternal efficacy, and family environment were assessed using a variety of measures, including the Center for Epidemiologic Studies Depression (CES-D) Inventory, the Profile of Mood States (POMS), the Coping Orientations to Problems Experienced (COPE), the Maternal Efficacy Scale, and the Family Environment Scale (FES). Additionally, autism-related evaluations such as the Autism Diagnostic Observation Schedule (ADOS-G) and the Autism Diagnostic Interview-Revised (ADI-R) were used. So what they primarily discovered is that, while there was individual heterogeneity in depression symptoms, the aggregate group had a surprising stability of higher depressive symptoms. For this highly educated group of mothers parenting a young child with ASD, the average depression score was initially and stayed in the moderately elevated range, with

between 28% and 42% of mothers reaching depression ratings in the clinical range. Despite the idea that parental depression symptoms would decrease as parents adjusted to the major challenges of having a child with ASD, mothers on average continued to exhibit significantly increased depressed symptoms throughout their children's preschool years. Higher anxiety and poorer parenting efficacy were related to more severe depression symptoms throughout the research period, whereas lower anxiety symptoms and higher parenting efficacy were associated with an increase in depressed symptoms. Overall, this study emphasizes the need to assist mothers of children with ASD in managing depressed symptoms as an early result. It implies that parents with autistic children are more prone to experience sadness, anxiety, and other types of mental stress.

Estes et al. (2009) reported a similar association. Families with children aged 18 to 30 months were recruited from the Seattle region for a randomized clinical study at the University of Washington to evaluate the effectiveness of the Early Start Denver Model (NIH STAART). This parental stress study included ninety-six households. The children were divided into three groups depending on their diagnosis: ASDs (46), developmental delay (DD) (25), and usual development (TYP) (25). The moms completed questionnaires that assessed their personal psychological discomfort, parental stress, toddler problem behaviours, and daily living abilities.

The major findings showed that mothers of children with ASDs had considerably higher parental stress levels than mothers of children with DD and TYP. There was no difference in psychological distress, as judged by anxiety and depression levels, between mothers of children with ASDs and those with DD or TYP. In this

group of very young children (18-30 months), mothers of toddlers with ASD reported higher levels of parenting-related stress than mothers of toddlers with non-ASD developmental delays (DD) or usual development. Despite this, there was no significant difference in psychological discomfort, as measured by anxiety and depressive symptoms, between mothers of children with ASD and those with DD or TYP. Additionally, child problem behaviour significantly contributed to parenting-related stress and psychological distress in mothers of children with ASD and DD, even though children with ASD exhibited more problem behaviours than those in the DD group.

To summarize, mothers of children with ASD experience significantly more parenting stress than mothers of children with developmental delays (DD) or typical development (TYP), despite the fact that their psychological distress levels (anxiety and depression) are not significantly different from the other groups. Furthermore, child issue behaviour causes significant parental stress and psychological anguish in moms of children with ASD and DD.

As previously noted, feeding challenges are widespread in children with ASD, often leading to selective eating behaviours and dietary limitations (Cermak et al., 2010; Cherif et al., 2018; Chistol et al., 2018; Mayes & Zickgraf, 2019; St. John & Ausderau, 2024). These problems can add to parenting stress and raise the risk of micronutrient deficiencies owing to a lack of dietary diversity. Because children with ASD are more likely to exhibit problem behaviours, which contribute considerably to parental stress, addressing food difficulties and related nutritional deficiencies is critical to reducing some of the pressures these families encounter.

In examining how food selectivity impacts dietary adequacy, Bandini et al. (2010)'s study "Food Selectivity in Children with ASDs and Typically Developing Children" stands out. The primary goal of this study was to define food selectivity, compare food selectivity indices between children with ASDs and normally developing children, and evaluate the effect of food selectivity on nutritional adequacy. The Children's Activity and Meal Patterns Study (CHAMPS) included children aged 3 to 11 with ASDs as well as generally developing youngsters. The study included 53 children with ASD and 58 generally developing children. Children were weighed and measured while wearing light clothes and no shoes, using a Seca portable scale and a wall-mounted stadiometer. BMI was determined based on height and weight data (kg/m^2). Parents were asked about their children's eating habits and any special diets they followed. They also filled out a demographic and medical questionnaire, and a modified food frequency questionnaire (FFQ), and were taught by a registered dietitian or nutrition graduate student to keep a three-day meal record on two weekdays and one weekend day. To account for the food consumed at school, parents got a second food record for the teacher to write everything the kid ate at school.

Food refusal was determined as the percentage of foods the child would not eat relative to the total number offered. The 3-day food records were analyzed using the Nutrition Data System for Research (NDSR; Nutrition Coordinating Center, University of Minnesota, Minneapolis, Minnesota) to establish each child’s food repertoire, which is the count of unique foods and beverages consumed over the 3-day period. The major findings of the study revealed that children with Autism Spectrum Disorders (ASDs) rejected more foods and a greater percentage of those provided than normally developing children. Parents of children with ASDs stated that their children ate

considerably fewer meals over three days than typically developing children. The main conclusion of nutritional insufficiency and food selection was that children with ASDs had a higher number of nutrients with insufficient consumption than normally developing children. This relationship between a limited food repertory and nutrient deficiency suggests that an extremely restricted diet may put any child at risk of nutritional inadequacies. The major findings of the study revealed that children with ASDs rejected more foods and a greater percentage of those provided than normally developing children. Parents of children with ASDs stated that their children ate considerably fewer meals over three days than typically developing children. Similar findings have been observed, showing that selective or picky eating patterns and sensory sensitivities in children with ASDs lead to restricted intakes, resulting in vital mineral or vitamin insufficiencies (Ahearn et al., 2001; Levy et al., 2007).

As stated in the introduction, previous ASD research in India focused mostly on clinic-based case reports, case series, or retrospective chart reviews. Anthropometric measures of children with ASD remain mainly unknown in India, with limited information on their nutritional components. In 2019, Siddiqi et al. researched Mysore to investigate the nutritional condition of children with ASD. This pilot research was the first to investigate the somatic state and eating patterns of children with ASD in this location.

A total of 53 children (45 boys and 8 girls) aged 2 to 13 years were recruited via convenient sampling. This examination was component of an observational cross-sectional study conducted from the month of January to the end of April 2016, at the All India Institute of Speech and Hearing (AIISH) in Mysuru, India. Various standardized methods have been developed to diagnose and assess the severity of

autism spectrum disorder (ASD), including the Childhood Autism Rating Scale (CARS), Gilliam Autism Rating Scale (GARS), Autism Diagnostic Observation Schedule (ADOS), and Autism Disorder Inventory-Revised. The authors designed a semi-structured questionnaire to gather information on the socio-demographic profile, history of ASD, during pregnancy history of the impacted children's mothers, related issues (such as delivery type, whether normal or C-section), and current medical issues of the children with ASD. Food records were kept for three non-consecutive days (two weekdays and one weekend), and a food frequency questionnaire (FFQ) was used to assess the dietary intakes reported by parents, guardians, or caregivers of children with ASD. The Children's Eating Behaviour Inventory was used to collect information on the eating habits and mealtime behaviours of children with autism spectrum disorder.

The main findings of the study indicated significant diversity in vitamin and mineral consumption across participants, with specific concerns regarding inadequate intake of critical micronutrients. Vitamin B1 (thiamine) and B2 (riboflavin) were significantly low ($p \leq 0.05$). The majority of respondents consumed inadequate calcium, iron, and zinc, with calcium shortage occurring in all age groups (100%) and riboflavin inadequacy (100%). Iron intake was significantly lower ($p \leq 0.05$) across all age categories, with sufficiency at just 21% for children aged 2-4 years. Zinc consumption was considerably lower than required levels ($p \leq 0.05$), with just 13% of children aged 8-10 years consuming appropriate amounts and 100% deficient in other age groups.

Pulses were consumed once or twice a week, but fruits, green leafy vegetables, and other vegetables were taken less frequently, reducing consumption of B-complex vitamins and other micronutrients. Children's chosen eating habits led them to consume

meat and poultry primarily on weekends. Compared to usually developing youngsters, those with ASD consumed fewer bakery and fast meals and preferred regular diets with no alterations. Overall, the study found that individuals' eating behaviours were repetitive and selective, with typical difficulties including a lack of food diversity (food selectivity), food refusals, meal skipping, delayed eating, and seeking attention during meals. To summarize, children with ASD are at high risk of acquiring micronutrient deficiencies, which can impair growth and development and perhaps aggravate health or ASD-related symptoms. More than 60% of individuals showed micronutrient deficiencies, emphasizing the dietary problems unique to this demographic.

As a result, children with ASD should have a full nutritional examination to determine their baseline health state. Nutritional aspects are important in ASD therapy because dietary treatments can supplement therapeutic techniques. Choosing proper items to include or exclude from their diet can improve the general health and well-being of children with ASD. Understanding parental perspectives on feeding issues in children with ASD and their complications is crucial. By these studies above, it is clear that addressing these feeding challenges is vital. This current study provides valuable insights that can inform better support strategies, ultimately improving the quality of life for both parents and their children with ASD. By tackling these feeding difficulties, we can foster healthier eating habits and reduce stress during mealtimes, promoting overall well-being for the entire family.

CHAPTER III

Method

The primary aim of the study was to understand the parental perspectives on feeding issues in children with Autism Spectrum Disorders (ASD). The objectives of the study were to explore communication, mealtime behaviour, and sensory issues during mealtimes in children with ASD.

Research Method and Design

The present study involved a survey based research method and a single-group correlational research design to understand the parental perspectives on feeding challenges in children with ASD.

3.1 Participants

The participants of the study were primary caregivers of 30 children (who were between the ages of 3 and 8 years) and were diagnosed with ASD with feeding difficulties were included as participants in the present study.

3.1.1 ***Inclusionary Criteria*****:** The following inclusionary criteria were adopted.

a) Primary Caregivers i.e., the parents responsible for a child's well-being were included.

b) Children receiving care from these caregivers who had confirmed diagnosis of ASD by Speech- Language Pathologist (SLP) and Clinical Psychologist. The diagnosis of ASD was made based on the International Scale of

Assessment of Autism (ISAA; NIMH, 2009).

c) Primary caregivers as parents with children between 3 and 8 years who were encountering feeding issues were included.

d) Minimal education of parents/caregivers with at least 10^{th} grade were included.

3.1.2 ***Exclusionary Criteria:*** The following exclusionary criteria were adopted

a) Children with ASD who have other comorbid issues were excluded

b) Children with other structural anomalies or any obvious Neurological deficits leading to feeding issues were excluded from the study.

3.2 Test Materials and Procedure

3.2.1 ***Test Materials:*** The following test materials were included

a) Feeding Handicap Index (S. Shabnam & Swapna, 2023)

FHI is a parent assessment questionnaire that assesses how parents perceive their children`s feeding issues. Shabnam,(2014) developed the FHI, gathering information from the literature and complaints from parents of children with communication issues. It was standardized by administering it to 60 typically developing children and then validated on 61 children with ASD and 59 children with Intellectual Disability (ID) aged 2 to 10 years. The FHI thoroughly explains a child's physical, functional, and emotional eating needs. It comprises 38 items, with 21 addressing the physical domain, 10 focused on the functional domain, and five on the emotional domain. These items are rated on a 3-point scale: 0 indicating "Never has this problem," 1 indicating "Sometimes has this problem," and 2 indicating "Always has this problem." and the severity rating mentioned for ASD is for the age 2-5.11years

is 13.6±3.5 (mild) and 33.1±12.8(moderate to severe) and for 6-10 years is 11.0±4.0(mild) and 25.0±4.6(moderate to severe).

b) Short Sensory Profile (SSP) (McIntosh et al., 1999),

SSP is used in clinical and research settings to detect impairments in sensory processing in children with and without autism spectrum disorder (ASD). It enables medical professionals and researchers to recognize children with sensory processing issues more rapidly. The SSP has seven sections: under responsive/seeks sensation (7 items), auditory filtering (6 items), poor energy/weak (6 items), taste/smell sensitivity (4 items), tactile sensitivity (7 items), movement sensitivity (3 items), and visual/auditory sensitivity (5 items). These items are rated on a 5-point Likert scale (1-always,2-often,3-sometimes,4-seldom,5-never) Each section's answers are added together, according to severity it can be divided into 'Typical Performance'(total score:190-155), 'Probable Difference'(score:154-142), and 'Definite Difference'(score:141-38),so in SSP lower the scores, indicative of greater sensory issues.

c) Brief Autism Mealtime Behavioural Inventory (BAMBI) (Lukens & Linscheid, 2007)

Brief Autism Mealtime Behaviour Inventory is an 18-item questionnaire that rates mealtime behaviours common to children with ASD (e.g., 'Is disruptive during mealtime, 'Prefers to have food served in a particular way'). A total frequency score is calculated, with higher scores reflecting more problematic mealtime behaviours. The BAMBI was standardized with caregivers of 40 typically developing children and 68 children with ASDs. The BAMBI correlated highly with the Behavioural Paediatric Feeding Assessment Scale (BPFAS) (Crist & Napier-Phillips, 2001) but was designed to measure ASD-specific mealtime behaviours, also according to one of the study titled

Psychometric Properties of Brief Autism Mealtime Behaviours Inventory(DeMand et al., 2015)a cut-off score of 34 on the BAMBI was used, resulting in a sensitivity of .758 and a specificity of .241. This cut-off scores successfully identified 81% of problematic feeders based on both the BAMBI and parent reports, correctly identifying 178 out of 219 children.

d) Communication Matrix (Rowland & Fried-Oken, 2010)

The Communication Matrix helps to collect data on communication skills. This tool enables professionals to evaluate a child's communicative abilities as early as 0–2 years old. It is also used to determine whether a child has a language delay, even if they are older than two years. Moreover, it identifies areas where the child's communication repertoire needs strengthening. The matrix comprises 80 questions distributed across seven levels; Level 1: Pre-intentional Behaviour - This level indicates reflexive behaviour associated with specific states of well-being (e.g., hunger, wetness) interpreted by the caregiver rather than purposeful actions. Level 2: Intentional Behaviour - At this level, behaviour is intentional but not communicatively purposeful. Children do not realize they can use these behaviours to control another person’s behaviour. Parents may interpret some of these behaviours as communicative. Level 3: Unconventional Communication - Children communicate intentionally using unconventional methods such as body movements, actions on people and objects, and vocalizations. These behaviours are unconventional because they are not socially acceptable means of communication in the adult world. Level 4: Conventional Communication - Children communicate intentionally using conventional (socially acceptable) gestures and vocalizations. The child shows 'dual-orientation,' acting on or orienting toward both a person and the topic of communication simultaneously. Level 5: Concrete Symbols - Limited use of concrete symbols, such as 'natural' or 'depictive'

gestures (e.g., gestures for "mine," "sit," "come") to represent specific entities with a 1:1 correspondence between symbol and referent. Level 6: Abstract Symbols - Children can represent environmental entities using abstract symbols, such as speech, manual signs, Braille, written words, abstract graphic symbols, or three-dimensional symbols. Symbols are used one at a time. Level 7: Language-rule-bound use of a symbol system, with two or three symbol combinations, according to grammatical rules or syntax. Within these levels, specific questions are posed, and the responses are scored as 'Not used' (score 0), 'Emerging' (score 1), or 'Mastered' (score 2).

3.2.2 Procedure of the study

The study was conducted in the following 3 phases:

Phase 1: Enrollment of participants based on FHI

Phase 2: Administration of SSP, BAMBI, and Communication Matrix

Phase 3: Scoring, Interpretation and Analysis

Phase 1: Enrollment of Participants based on FHI

Participants who met the inclusion criteria were identified and recruited. The inclusion criteria of the study were unambiguously stated, ensuring the recruitment process adhered to ethical guidelines. The recruited target population was screened using the Feeding Handicap Index (FHI) ((S. Shabnam & Swapna, 2023), to confirm feeding issues, so if the FHI score is above '10' then such individuals are identified and recruited for the study

Phase 2: Administration of SSP, BAMBI and Communication Matrix

The data collected were focused on parental perspectives regarding feeding challenges, with particular attention given to sensory, behavioural, and communication aspects.

The following questionnaires were used to assess each domain: sensory issues were evaluated through the Short Sensory Profile (McIntosh et al., 1999), mealtime behavioural issues were assessed through the Brief Autism Mealtime Behaviour Inventory (Lukens & Linscheid, 2007), and Communication levels were assessed through Communication Matrix (Rowland & Fried-Oken, 2010)

Phase 3: Scoring, interpretation and analysis

The scoring for the data obtained was based on the respective scoring system and rating scales of the tools such as SSP, BAMBI, and Communication Matrix. The interpretation of the data was done in terms of group data and individual data. Illustrations of qualitative analysis were also carried out to substantiate quantitave statistical analysis. The statistical analysis was conducted using Statistical Package for the Social Sciences (SPSS software, Version 27.0).

CHAPTER IV

Results

The present study was conducted to investigate the feeding difficulties in children with Autism Spectrum Disorders (ASDs) by examining their connections with sensory, mealtime behavioural issues, and communication issues during mealtimes.

Thirty parents of children with ASD were enrolled in the current study. The Feeding Handicap Index (FHI) (S. Shabnam & Swapna, 2023)was used, which included 38 questions to assess feeding challenges (Appendix A for details on FHI). A Short Sensory Profile (SSP; McIntosh et al., 1999), was used to evaluate sensory issues, and lower scores indicated greater problematic sensory issues (Appendix B for details on SSP). The Brief Autism Mealtime Behaviour Inventory (BAMBI; Lukens & Linscheid, 2008)was used to evaluate mealtime behavioural issues, and higher scores indicate more problematic behaviours (Appendix C for details on the BAMBI). A Communication Matrix (CM; Rowland & Fried-Oken, 2010) which consisted of 80 questions was administered to evaluate communication skills (Appendix D for details for details on CM). The data obtained from the parents was statistically analysed using SPSS software (version 27.0).

The data was subjected to Shapiro-Wilk's test of normality, and the results indicated that on FHI, SSP, and BAMBI, the data showed normal distribution ($p>0.05$). Hence, parametric tests were used for further statistical analysis for FHI, SSP, and BAMBI. However, results on CM indicated anon-normal distribution ($p<0.05$); thus, non-parametric tests were used for CM.

The statistical analysis of the data was done using the following statistical procedures:

1. Descriptive statistics was carried out to obtain the mean, median standard deviation (SD), and interquartile range for all the parameters, including FHI, SSP, BAMBI, and CM scores.
2. Correlational analysis between the FHI, BAMBI, and SSP using Pearson's correlation.
3. Correlational analysis between the FHI and CM was carried out using Spearman's correlation.
4. Inter-correlation analysis between CM, BAMBI and SSP using Spearman's correlation

The results of the current study are elucidated in the following sections

4.1 Parental perspectives on feeding issues in children with ASD.

4.2 Relationship between feeding issues and sensory issues in children with ASD

4.3 Relationship between feeding issues and mealtime behavioural issues in children with ASD

4.4 Relationship between feeding issues and communication in children with ASD

4.5 Inter-relationship between communication, mealtime behavioural issues, and sensory issues in the context of feeding.

4.1 Parental perspectives on feeding issues in children with ASD.

Results under this section are reported from the scores obtained from parents of children with ASD on FHI(S. Shabnam & Swapna, 2023) Descriptive statistics were computed to obtain the mean and SD for FHI. Table 4.1 shows overall mean, SD, median and Interquartile range (IQR) for the results obtained from the responses of parents of children with ASD.

Table 4.1

Overall mean, SD, median, and IQR for the results obtained from the responses of parents of children with ASD on FHI, BAMBI, SSP, and CM (N=30).

	Mean	SD	Range	Median	IQR
FHI [a]	19.70	6.47	11-33	-	-
BAMBI [b]	44.57	10.54	24-69	-	-
SSP [c]	129.10	21.02	82-177	-	-
CM[d]	-	-	-	29.00	27

[a] FHI=Feeding Handicap Index; [b]BAMBI= Brief Autism Mealtime Behaviour Inventory; [c]SSP = Short SensoryProfile ;[d]CM= Communication matrix

The analysis of the results, as shown in Table 4.1, revealed that the scores of responses from parents on FHI indicated an overall mean score= 19.70 with SD=6.47: indicative of greater feeding issues on FHI. The table also shows that the scores of parents on BAMBI was mean=44.57, SD=10.54. This is indicative of higher mealtime behavioural issues found on responses obtained for BAMBI. For SSP the results showed mean=129.10, SD=21.02 which is indicative of higher sensory issues on SSP. The results on CM showed median=29.00, IQR=27, which indicates that greater IQR values show greater variability in the communication scores obtained for responses on CM.

4.2 Relationship between feeding issues and sensory issues in children with ASD

In the current study, FHI(S. Shabnam & Swapna, 2023) scores were used to analyze parental reports on feeding issues, and SSP (McIntosh et al.,1999) were considered to examine sensory problems in children with ASD. As shown in Table

4.1, the SSP indicated a mean score of 129.10 with a SD=21.02.

Pearson's correlation was used to find the correlation between FHI and SSP. Table 4.2 below shows the Pearson's correlations between scores obtained for parental reports on feeding issues (on FHI), sensory issues (on SSP), and mealtime behaviour issues (on BAMBI).

Table 4.2

Pearson correlation (r) FHI, SSP, and BAMBI scores

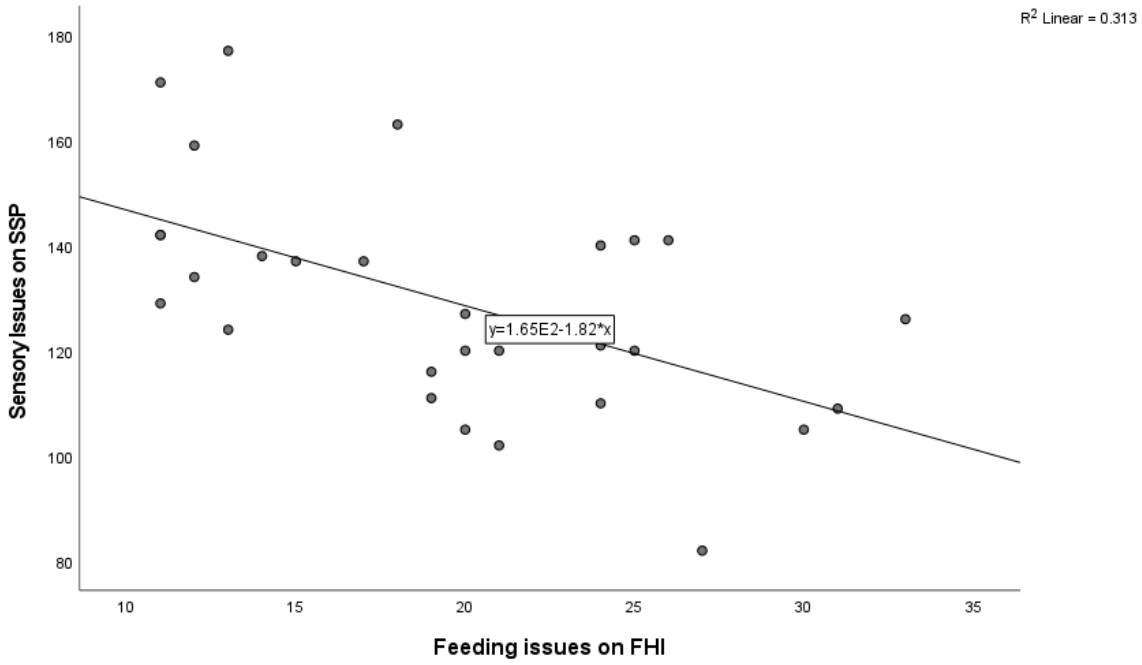
	FHI	**SSP**	**BAMBI**
FHI	1	-0.560**	0.416*
SSP	-0.560**	1	-0.497**
BAMBI	0.416*	-0.497**	1

*** p<0.01;* p<0.05*

The analysis of results as shown in Table 4.2, revealed a significant high negative correlation [r= -0.560, p=0.001] between the FHI and SSP scores. This suggests that as FHI scores increase, SSP scores tend to decrease, and vice versa (Figure 4.1) i.e., when feeding issues increases(high FHI scores) Sensory issues also tends to increase(low SSP scores)

Figure 4.1

Scatter plot for correlation between parental report of sensory and feeding issues in children with ASD.



The above scatterplot as in Figure 4.1 shows the relationship between sensory issues on SSP (y-axis) and feeding issues on FHI (x-axis). Each point represents a pair of SSP and FHI values. The SSP values range from 80 to 180, while the FHI values range from 10 to 35. The R-squared (R^2) value for the regression line equation (y=165E2−1.82x) is 0.313. Overall, the plot demonstrated a moderate inverse relationship between SSP and FHI which means if sensory issues increase (low SSP scores) feeding issues also tends to increase (high FHI scores).

Similarly, when the data was further explored on qualitative analysis, it was observed that there was a potential relationship between feeding difficulties and sensory processing issues when both FHI and SSP responses were analyzed. Responses from three parentsP1, P2 and P3 were considered and it was observed that average

scores on SSP for P1 was 129, P2 was 177, and P3was 82. (Appendix A for details on the FHI).

On qualitative analysis of the data, it was observed that the responses forP1 showed a relationship between feeding and sensory issues. For e.g., on FHI, feeding issues that were observed were for e.g., Q1 ‘My child has/had difficulty in sucking from the feeding bottle/breast milk’ (score 2), and Q15‘My child’s weight gain is inappropriate(under/overweight) and/or has nutritional deficiency due to feeding issues also(score-2) also Q17, ‘My child has difficulty in swallowing solid /semi-solid or mashed/liquid food’ (score 1). Moreover, from SSP, sensory issues were found to be lesser, with increasing feeding issues. For, e.g., on SSP, in Item no-8, ‘Avoids certain tastes or food smells that are typically part of children’s diet’ (score 2), and For Item no -11, ‘Picky eater, especially regarding food textures’ (score 1) it was observed that as feeding issues become higher (higher scores on FHI), the sensory issues also tend to be greater (lower scores on SSP).

Similarly, for the qualitative analysis of responses for P2 (Highest score in SSP), the FHI responses such as Q19 ‘My child gags when given solid or liquid food is given’ (score 1), for P-25 My child strongly refuses newly introduced food or certain foods based on taste, temperature, texture, or smell (score 2), and E-34‘My child refuses to open his/her mouth while feeding’ (score 2),Further exploring the SSP it was found that the findings in FHI closely align with the SSP finding, as in a few SSP questions, Item no 1, ‘Expressing distress during grooming’(score 3), and Item no 6, ‘Difficulty standing in line or being close to other people’(score 3)also Item no 4, ‘Reacting emotionally or aggressively to touch’(score 4).By exploring these responses, it was

observed that while P2 showed significant feeding challenges, the sensory issues, although moderate, still showed a relationship with increased feeding difficulties.

On qualitative analysis of responses for P3(Lowest score on SSP), it was observed that the significant issues reported from FHI responses were, ‘My child is not able to clear food from a spoon when held near the lips’ (score 2), and P-17 ‘My child has difficulty in swallowing solid/semi-solid or mashed/liquid food (score 2), alsoP-19 ‘My child gags when solid/liquid food is given’(score 2),and parallelly in SSP, some of the responses which were in close agreement with FHI responses were Item 1 ‘Expresses distress during grooming’ such as haircuts, face washing, or fingernail cutting (score 1), Item 4 ‘Reacts emotionally or aggressively to touch’ (score 1)and Item 7 ‘Rubs or scratches out a spot that has been touched’ (score 1).By exploring these responses, it is observed that while P3 has significant feeding issues(higher FHI scores), the sensory issues also tend to be greater. The quantitative and qualitative analysis indicated that there exists a relationship between greater feeding difficulties and greater sensory issues.

4.3 Relationship between feeding issues and mealtime behavioural issues

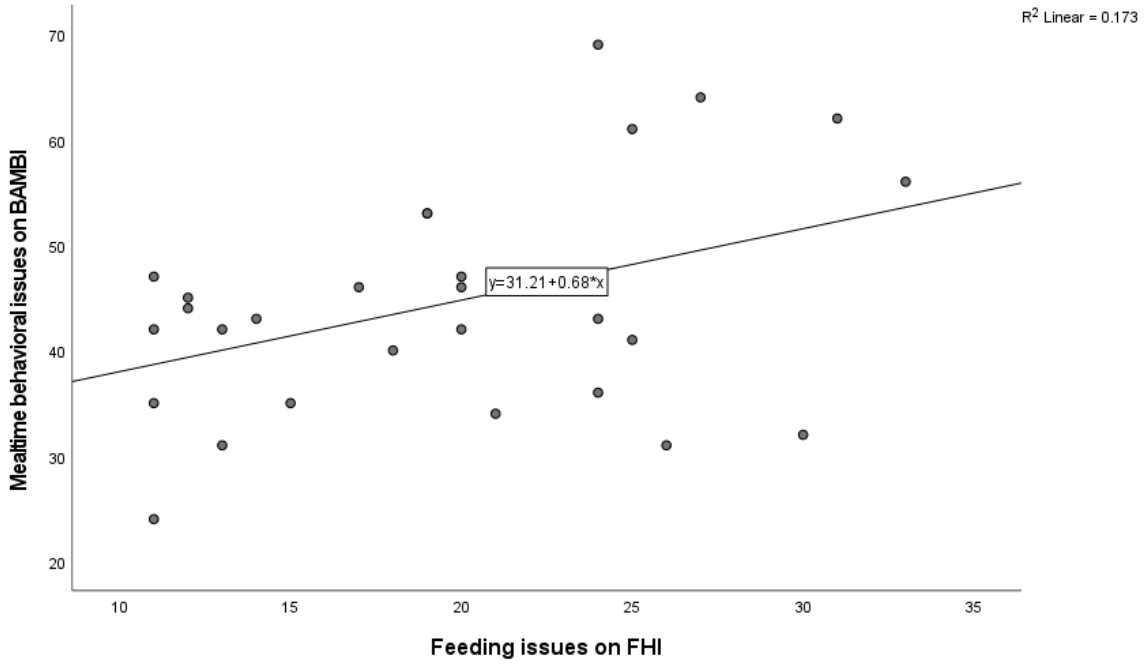
In the current section, FHI (S. Shabnam & Swapna, 2023) scores were used to analyze parental reports on feeding issues, and BAMBI (McIntosh et al., 1999) was considered to examine mealtime behavioural issues in children with ASD. As shown in Table 4.1, the BAMBI indicated a mean score =44.57 with a SD= 10.54.

Pearson’s correlation was used to find the correlation between FHI and BAMBI scores. As shown in Table 4.2, Pearson’s correlations between scores obtained for parental reports on feeding issues on FHI and mealtime behavioural issues on BAMBI

and the analysis of the results revealed a moderate positive correlation [r= 0.416, p=0.022] between the FHI and BAMBI scores. This suggests that as FHI scores increase, BAMBI scores also increase moderately, and vice versa (figure 4.2).

Figure 4.2

Scatter plot for correlation between parental report of mealtime behavioural issues and feeding issues in children with ASD.



Each point here corresponds to a pair of BAMBI and FHI values. The BAMBI values vary from 20 to 70, whereas the FHI values range from 10 to 35. The regression line equation is y=31.21+0.68x and has an R-squared (R^2) value of 0.173. This implies that as the FHI score increases (showing higher feeding issues), the BAMBI score also tends to improve (more problematic mealtime behaviours).

Similarly, when the data was further explored on qualitatively analysis, it was observed that there was a potential correlation between feeding difficulties and mealtime behavioural issues when both FHI and BAMBI responses were analyzed.

Responses from three parents (P1=parent score on mean value, P2=parent who scored highest, P3=parent who scored lowest) were considered and it was observed that average scores on BAMBI for P1 was 44, P2 was 69, and P3was 24. (Appendix C for details on BAMBI)

On qualitative analysis of the data, it was observed that the responses for P1 showed a relationship between feeding and mealtime behavioural issues. For e.g., on FHI ,feeding issues that were observed were Q29, 'My child takes longer to be fed' (score-2) and Q31, 'My child needs special/specific (his own spoon, plate, etc.)utensils and /or a different way of feeding' (score-2)also Q35 'My child exhibit frustration or temper tantrums before/during feeding' (score-2) similarly few responses from BAMBI, as in (Q3) 'My child remain seated at the table until the meal is finished'(score-5) and Q5 'My child is aggressive during mealtimes (hitting, kicking, scratching others)(score-3) also Q9 'My child is flexible about mealtime routines'(score-5) it was observed that as feeding issues become higher (higher scores on FHI) the behavioural issues also tend to be greater (higher scores on BAMBI)

Similarly, for the qualitative analysis of responses for P2, it was observed that some of the responses indicating a relationship between feeding and mealtime behavioural For e.g., on FHI, feeding issues that were observed were, Q16 'My child keeps the food in the mouth without swallowing for a long time'(score-2) and Q29 'My child takes longer to be fed' (score-2) also Q35 'My child exhibit frustration or temper tantrums before/during feeding' (score-2). Moreover while analyzing BAMBI, it was observed that there were specific responses that showed an agreement with the FHI responses like Q1, 'My child cried or screams during mealtimes' and Q3, 'My child remains seated at the table until the meal is finished'(score-5) also Q7 'My child is disruptive about mealtime routines(e.g., times for meals, seating arrangements, place

settings).(score-5)similar to C1 it can be observed that positive correlation is very evident in this particular P2 because here also as feeding issues become higher (higher scores on FHI) the behavioural issues also tend to be greater(higher scores on BAMBI).

Similarly, for the qualitative analysis of responses for P2, it was observed that after exploring both FHI and BAMBI responses that there is no apparent relationship that can be formed from both, although there were few responses that revealed that there might be a likely relationship up to some extent., such as, in FHI;P-1 ‘My child has difficulty in sucking from the feeding bottle’(score-2) and P-4 ‘My child is not able to eat independently with his fingers’(score-2) also P-22 ‘My child eats less because of the feeding problem’(score-1) and with BAMBI responses like Q10 ‘My child is willing to try new foods’(score -3) and Q11 ‘My child dislikes certain food and won’t eat them’(score-3) and also Q12 ‘My child refuses to eat foods that require a lot of chewing’(score-3),By exploring these responses, it's observed that there is no clear relationship but still it’s not normal there exist feeding issue as well as mild mealtime behavioural issue also even though it’s not high it’s still present so even this relationship indicates a potential link between feeding and mealtime behavioural issue.

4.4 Relationship between feeding issues and communication

In the current section, FHI(S. Shabnam & Swapna, 2023) scores were used to analyze parental reports on feeding issues, and CM(Rowland & Fried-Oken, 2010)were considered to examine communication issues in children with ASD. As shown in Table 4.2, CM indicated a median score of 29 and an IQR=27

Spearman correlations were used to find the correlation between FHI and CM. Table 4.2 below shows the Spearman’s correlation between scores for parental reports on feeding issues on FHI and communication issues on CM.

Table 4.3

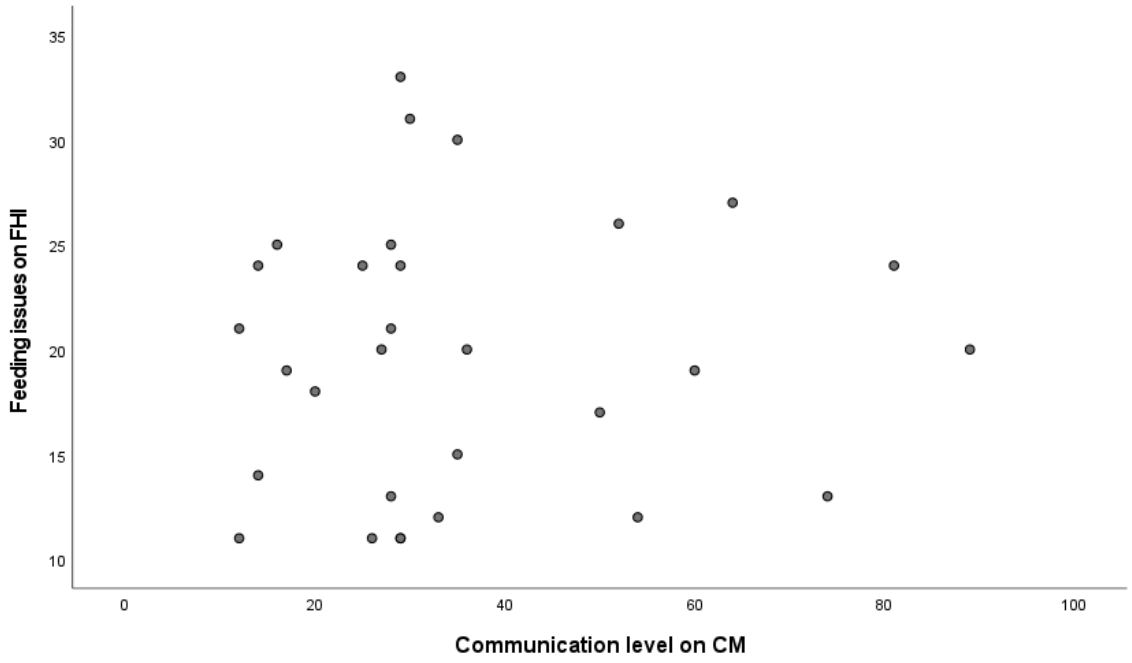
Spearman's Correlation (ρ) CM, FHI, SSP, BAMBI

	CM
FHI	0.098
SSP	-0.093
BAMBI	0.097

The analysis of results as shown in Table 4.2, revealed no significant correlation ($\rho = 0.098$, $p = 0.605$) between FHI and CM scores. Similarly, the scatter plot in Figure 4.3 indicates the relationship between FHI (y-axis) and CM (x-axis).

Figure 4.3

Scatterplot showing the parental report of feeding issues and communication level in children with ASD.



The above scatter plot as in figure 4.3 shows the relationship between the communication issues on CM(x-axis) and feeding issues on FHI(y-axis). The data

points are widely dispersed, indicating considerable variability in the participants scores. With CM scores ranging from approximately 0 to 100 and FHI scores ranging from about 10 to 35, there is no clear linear relationship or distinct pattern between the two variables. This visual representation supports the earlier finding that the Spearman correlation analysis revealed no significant relationships between FHI and CM scores.

Similarly, the data was further explored on qualitatively, and it was observed that there was no potential relationship between feeding difficulties and Communication when both FHI and CM responses were analyzed. Responses from three parents P1, P2, P3 were considered and it was observed that average scores on CM for P1 was 29, P2 was 89 and P3 was 12. (Appendix D for details on communication matrix).

On qualitative analysis of the data, it was observed that the responses for P1,the communication matrix revealed that the child is in Level-4(conventional communication),but still, the child was partially achieving this level; it was observed that the child mastered requesting objects or needs through the ‘unconventional level of communication’ and was able to refuse or reject objects through ‘conventional communication’ as per the findings of CM, it was found that the feeding issues is not related to the reported feeding issues from FHIi.e.,Q4 ‘My child is not able to eat independently with his fingers’(score-2) and Q19 ‘My child gags when solid/liquid is given’(score-1) also Q25 ‘My child strongly refuses newly introduced food or certain food based on taste/texture/smell (score-2).After exploring the responses, it was observed that while the child has developed certain communication skills, these abilities do not appear to have a direct relationship with the feeding issues reported on the FHI.

Similarly, for the qualitative analysis of responses for P2, depicts the child who exhibited strong communication skills based on the available data, i.e., level 7 from the communication matrix that is ‘language,’ so while communicating, itself child uses the language, the child request objects verbally and ‘mastered’ making choices and greeting people but naming things is still ‘emerging’ and there are some other abilities like asking questions verbally and answering questions in Yes/No which is ‘not yet established,’ also similar to P1 it was found that the feeding issues present in P2 were not related to communication issues, some important feeding concerns mentioned through FHI were,Q1, ‘My child has difficulty in sucking from the feeding bottle/breast milk.’(score-2) and Q4 ‘My child is not able to eat independently with his fingers’ (score -2) also Q25 ‘My child strongly refuses newly introduced food or certain food based on the taste /temperature /texture/smell.(score-1) Similar to P1, it was observed that even though P2 has advanced communication skills, these do not appear to impact or relate to the feeding issues reported on the FHI.

Similarly, for the qualitative analysis of responses for P3, the results of communication matrix revealed that the child was still in level 3, i.e., unconventional communication level. Still, the child is almost in the beginning levels of ‘unconventional communication’ to establish the needs, and most of the time, to obtain something, the child doesn’t wait for the response of the parent; instead, the child directly approaches the object, further exploring the feeding issues, it was observed that the current feeding issues are not related to the communication issues, the highly scored feeding issues from FHI wereQ4 ‘My child is not able to eat independently with his fingers’(score-2) and Q5 ‘My child is not able to scoop the food from the bowl/plate with a spoon (score-2) also Q25 ‘My child strongly refuses newly introduced food or

certain food based on the taste/temperature /smell (score-2).As observed findings of P3 is similar to P1 and P2 as reported P3 is developing unconventional communication skills and similarly these abilities do not seem to impact or correlate with the feeding issues reported in the FHI.

4.5 Inter-relationship between communication, mealtime behavioural issues, and sensory issues in the context of feeding.

The inter-correlation between the communication, mealtime behavioural issues, and sensory issues in the context of feeding was analysed and the results are explained in the following sections.

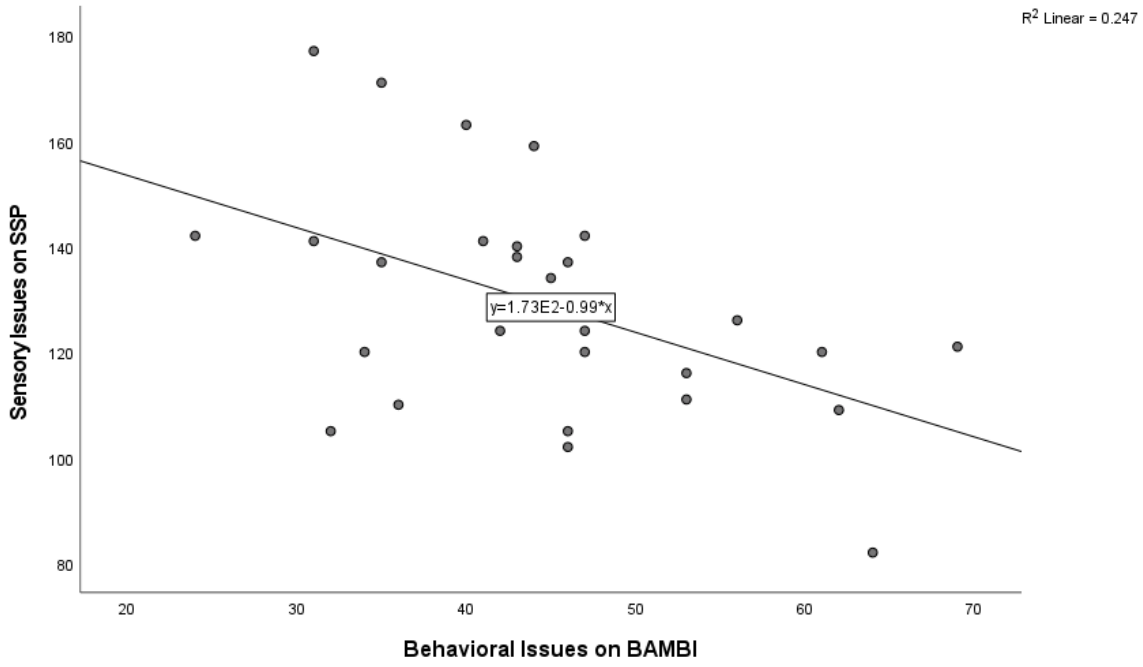
4.5.1 Relationship between mealtime behavioural issue and sensory issues

In the current section, BAMBI (Lukens & Linscheid, 2008) scores were used to analyze parental reports on mealtime behavioural issues, and SSP (McIntosh et al., 1999) scores were considered to examine sensory problems in children with ASD. As shown in Table 4.1, the BAMBI indicated a mean score of 44.57 with a SD10.54, while the SSP indicated a mean score = 129.10 with a SD=21.02.

Pearson correlation was used to find the correlation between SSP and BAMBI.As shown in Table 4.2the Pearson's correlations between scores obtained for parental reports on mealtime behavioural issues on BAMBI and sensory issues on SSP, revealing a high negative correlation [r= -0.497, p=0.005] between BAMBI and SSP scores. This suggests that as mealtime behavioural issues increase (high BAMBI scores) Sensory issues also increases (low SSP scores) and vice versa (Figure 4.4).

Figure 4.4

Scatterplot showing the relationship between parental report of sensory and mealtime behavioural issues in children with ASD.



The above scatterplot in Figure 4.4 signifies the relationship between sensory issues on SSP (y-axis) and behavioural issues on BAMBI (x-axis). Each point represents a pair of SSP and BAMBI values. The SSP values range from 80 to 180, while the BAMBI values span from 20 to 70. The R-squared (R^2) value for the regression line equation ($y=1.73E2-0.99x$) is 0.247. Overall, the plot demonstrates a moderate inverse relationship between SSP and BAMBI.

Similarly, when the data was further explored qualitatively, it was observed that there was a potential correlation between mealtime behavioural issues and sensory issues when both BAMBI and SSP responses were analyzed. Responses from three parentsP1, P2 and P3 were considered and it was observed that average scores on SSP for P1 was 129, P2 was 177, and P3 was 82. (Appendix A for details on FHI)

On qualitative analysis of the data, it was observed that the responses for P1 showed a relationship between mealtime behavioural issues and sensory issues e.g., on BAMBI Item no-8 ‘Avoids certain tastes or food smells that are typically part of children’s diet’ (score 2), and Item no -11, ‘Picky eater, especially regarding food textures’ (score 1) also item no 10 ‘Limits self to particular food textures/temperatures’(score-2).These questions were provided with the lowest score by P1, indicative of sensory issues. Similarly, the responses which showed that the behavioural problems which are in agreement with the sensory issues were, in BAMBI, Q3 ‘My child remain seated at the table until the meal is finished’(score-5(always)) and Q10, ‘My child is willing to try new foods’(score-5) and Q14 ‘My child prefers “crunchy” foods (score 5)so it can be observed that almost all sensory issues have maximum score and in parallel the mealtime behavioural issues also showed maximum score. This is indicating that as sensory issues increases (as indicated with low SSP score) the mealtime behavioural issues also tend to increase (as indicated with high BAMBI scores).

Similarly, for the qualitative analysis of responses for P2,it was observed that there existed a potential relationship between mealtime behavioural issues and sensory issues when both BAMBI and SSP responses were analyzed; the responses in SSP were Item no 1, ‘Expresses distress during grooming’ such as haircuts, face washing, or fingernail cutting (score 3), and Item no 6 ‘Has difficulty standing in line or being close to other people’ (score 3), also Item no 11‘Picky eater, especially regarding food textures’, (score 4)and the most rated behavioural issues in BAMBI were,Q9 ‘My child is flexible about mealtime routines’(score-5) and Q11 ‘My child dislikes certain food and won’t eat them’(score-3) also Q15 ‘My child accepts or prefers a variety of

foods’(score-3), it's observed that there is no clear relationship but still it's not normal there exist a mild behavioural issue even though its not high it’s still present similarly even though the sensory issues reported on SSP is not severe still the issue is presents this indicates a potential link between sensory issues and mealtime behavioural issue.

Lastly On qualitative analysis of responses for P3,when both the scores were analyzed it was observed that the findings were in agreement with each other, like in few of the SSP questions (Appendix B for details on SSP)like Item 1 ‘Expresses distress during grooming’ such as haircuts, face washing, or fingernail cutting (score 1), Item 4 ‘Reacts emotionally or aggressively to touch’ (score 1) and Item 7 ‘Rubs or scratches out a spot that has been touched’ (score 1) is in alignment with the BAMBI responses such as, Q1 ‘My child cries or screams during mealtime’(score-4) and Q2 ‘My child turns his/her face or body away from the food’(score-5) also Q4 ‘My child expels(spits out) food that he/she has eaten(score-5) and even in Q10 ‘My child is willing to try new food’(score-5). By comparing these scores, its observed that as sensory issues increase (low SSP scores) behavioural issue also increase (high BAMBI scores) and vice versa.

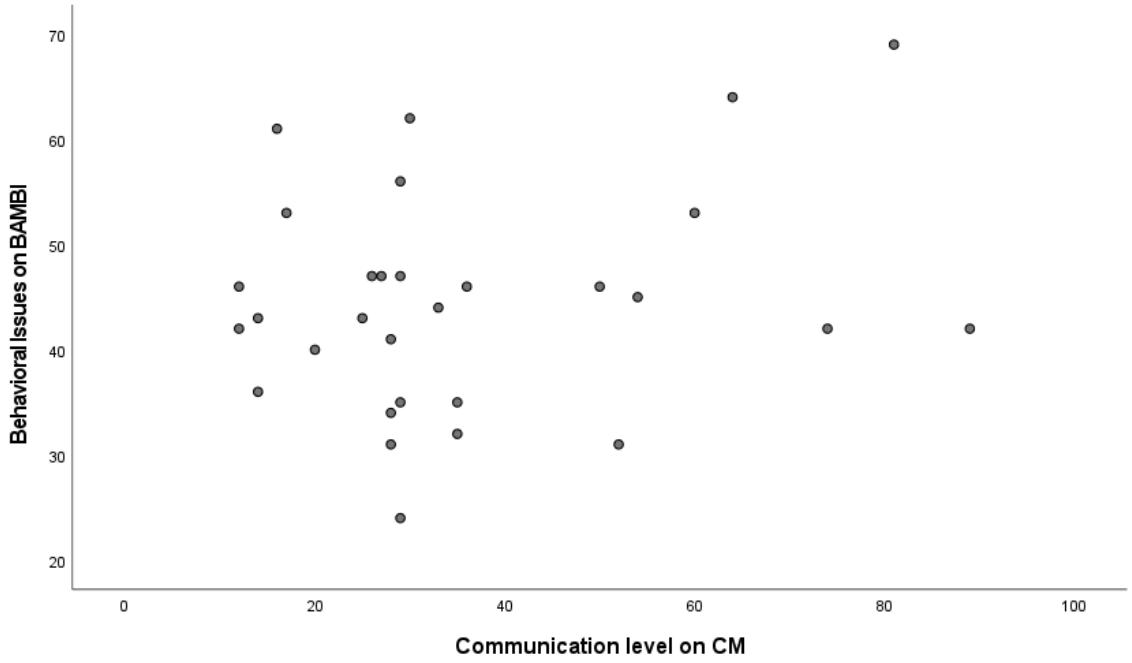
4.5.2 Relationship between communication and mealtime behavioural issues

In the current section, BAMBI(Lukens & Linscheid, 2008) scores were used to analyze mealtime behavioural issues and CM(Rowland & Fried-Oken, 2010) were considered to examine communication issues in children with ASD.As shown in Table 4.3 Spearman’s correlations was used to find the correlation between CM and BAMBI, and the analysis of results revealed no statistically significant correlation ($\rho = 0.097$, $p = 0.612$).

Similarly, the scatter plot below in Figure 4.5 indicates the relationship between BAMBI (y-axis) and CM (x-axis).

Figure 4.5

Scatterplot for correlation between parental report of behaviour and communication issues in children with ASD.



The scatter plot as in Figure 4.5 shows the relationship between communication level on CM(x-axis) and behavioural issues on BAMBI scores(y-axis). In the current sample, the data points are widely dispersed, indicating considerable variability in the participants' CM and BAMBI scores. With CM scores ranging from approximately 0 to 100 and BAMBI scores ranging from about 20 to 70, there is no clear linear relationship or distinct pattern between the two variables. This visual representation supports the earlier finding that the Spearman correlation analysis revealed no significant relationships between CM and mealtime behavioural issues (BAMBI) in this sample.

Similarly, the data was further explored qualitatively; it was observed that there was no apparent correlation between communication and mealtime behavioural issues when both CM and BAMBI responses were analyzed. Responses from three parentsP1, P2 and P3 were considered and it were observed that average scores on SSP for P1 was 29; P2 was 89, and P3was 12. (Appendix D for details on the communication matrix).

On qualitative analysis of the data, it was observed that the responses for P1 ,on CM the child is in Level 4 (conventional communication) and that too the child is almost in the emerging level of this level; it was observed that the child mastered requesting objects or needs through the ‘unconventional level of communication mainly the child communicates intentionally using unconventional methods such as body movements, actions on people and objects, and vocalizations and some of the stages such as the child can refuse or reject objects through ‘conventional communication’ as per the findings of CM also the most of the behavioural issues cannot be related to the communication issues, some of the most problematic behavioural issues mentioned in BAMBI were,Q2 ‘My child turns his/her face or body away from food’(score-4) and Q12 ‘My child refuses to eat foods that require a lot of chewing’(score-4) also Q13 ‘My child prefers the same foods at each meal. It was observed from these responses that these behavioural issues suggest food variety and texture challenges but do not appear to be directly related to the child's communication abilities. Instead, they might be influenced by sensory preferences or aversions, which could be the reason why there was no significant relationship noted.

On qualitative analysis of the data, it was observed that the responses for P2 it was observed, the communication matrix revealed that the child is in Level 7, which is

‘language’; requests objects verbally and has ‘mastered’ making choices and greeting people, but naming things is still ‘emerging,’ and there are some other abilities like asking questions verbally and answering questions in Yes/No which is ‘not yet established also the behavioural issues in the child was not related to communication issues, the most severe behavioural issues found in BAMBI responses were, Q14 ‘My child prefers “crunchy” foods’(score-5) and Q13 ‘My child prefers same food at each meal’(score-4) also Q11 ‘My child dislikes certain food and won’t eat them’(score-4)after exploring these responses it's observed that these behavioural issues indicate significant food preferences and aversions but do not appear to be directly linked to the child's communication abilities. Instead, they are likely influenced by sensory preferences and aversions.

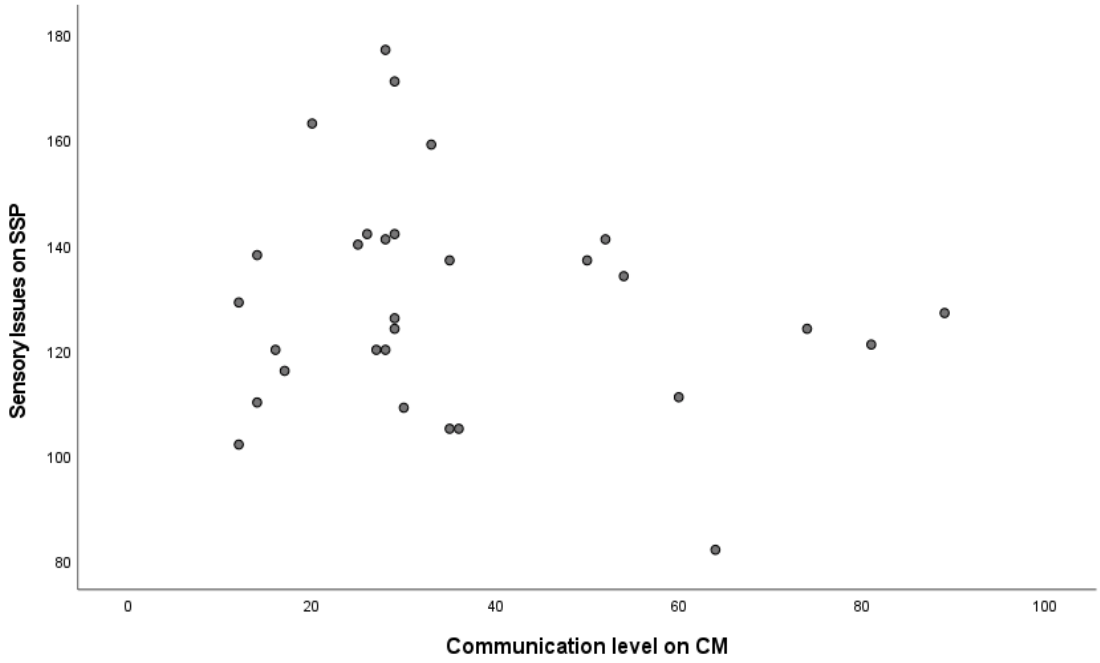
Similarly, for the qualitative analysis of responses for P3, the communication matrix revealed that the child was still in level 3, i.e., unconventional communication level. Still, the child is almost in the beginning levels of ‘unconventional communication’ to establish the needs and, most of the time, to obtain something, the child doesn’t wait for the response of the parent; instead, the child directly approaches the object and the behavioural issues observed were not in alignment with the communication issues, the most problematic behaviour observed in BAMBI were in Q11 ‘My child dislikes certain foods and won’t eat them’(score-5) and Q16 ‘My child prefers to have food served in a particular way’(score-5) also Q12 ‘My child refuses to eat foods require a lot of chewing’(score-3). These responses are also similar to P2. The behavioural issues indicate significant food preferences and aversions but do not appear to be directly linked to the child's communication abilities. Similar to P2, they are likely influenced by sensory preferences and aversions.

4.5.3 Relationship between communication and sensory issues

In the current section, SSP (McIntosh et al.,1999) scores were used to analyze sensory issues, and CM(Rowland & Fried-Oken, 2010) were considered to examine communication issues in children with ASD. Spearman's correlations were used to find correlations between SSP and CM. As shown in Table 4.3, the Spearman's correlations between scores obtained for parental reports on sensory issues on SSP scores and communication issues on CM scores, revealed no statistically significant correlation ($\rho = 0.093$, $p = 0.627$). The below scatter plot in figure 4.6 signifies the relationship between sensory issues on SSP (y-axis) and communication issues on CM (x-axis).

Figure 4.6

Scatterplot for correlation between parental report of sensory and communication level in children with ASD.



As observed in the above scatterplot in Figure 4.6, the data points are widely dispersed, indicating considerable participant variability. With CM scores ranging from approximately 0 to 100 and SSP scores ranging from about 80 to 180, there is no clear linear relationship or distinct pattern between the two variables. This visual representation supports the earlier finding that the Spearman correlation analysis revealed no significant relationships between communication (CM) and Sensory issues (SSP) in this sample. Similarly, the data was further explored qualitatively, and it was observed that there was no apparent correlation between communication and sensory issues when both CM and SSP responses were analyzed, responses from three parents P1, P2 and P3 were considered and it was observed that average scores on SSP for P1was 29, P2 was 89, and P3 was 12 (Appendix D for details on communication matrix).

On qualitative analysis of the data, it was observed that the responses for P1 that the communication matrix revealed that the child is in Level -4(conventional communication) and that the child is almost in the emerging level of this level, it was observed that the child mastered requesting objects or needs through the 'unconventional level of communication mainly the child communicates intentionally using unconventional methods such as body movements, actions on people and objects, and vocalizations and some of the stages such as the child can refuse or reject objects through 'conventional communication' as per the findings of CM and it was observed that the sensory issues exhibited by P2 were not in agreement with the communication issues, the primary sensory issues reported through SSP were Item no 16 'Seeks all kinds of movement and this interferes with daily routines'(score-2) and Item no 17 'Becomes overly excitable during movement activity'(score-2) also Item no 18 'Touches peoples and objects'(score-2) it was observed based on these responses that

these sensory issues suggest challenges related to movement and tactile input but do not appear to be directly related to the child's communication abilities.

Similarly, for the qualitative analysis of responses for P2, after analyzing the responses it was observed, the communication matrix revealed that the child is in Level 7,which is ‘language’; he requests objects verbally and has ‘mastered’ making choices and greeting people, but naming things is still ‘emerging,’ and there are some other abilities like asking questions verbally and answering questions in Yes/No which is ‘not yet established and these communication issues are not in agreement with the sensory issues and major sensory issues observed through SSP were Item no 16 ‘Seeks all kinds of movement and this interferes with daily routines’(score-1) and Item no 17 ‘Becomes overly excitable during movement activity’(score-1) also Item no no 18 ‘Touches peoples and objects’(score-1) similar to P1 these responses also suggests the sensory issues present are related to movement and tactile input but do not appear to be directly related to the child's communication abilities.

On qualitative analysis of responses for P3, the communication matrix revealed that the child was still in level 3, i.e., unconventional communication level. Still, the child is almost in the beginning levels of ‘unconventional communication’ to establish the needs and, most of the time, to obtain something, the child does not wait for the response of the parent; instead, the child directly approaches the object and the sensory issues observed were not in alignment with the communication issues, major sensory issues observed through SSP were Item no 1 ‘Expresses distress during grooming (for example fights or cries during haircutting, face washing, fingernail cutting)(score-1) and Item 6 ‘Has difficulty standing in line or close to other people’(score-1)also Item

no 9 ‘will only eat certain tastes’(score-1)after observing these responses it is the similar finding of that of P1 and P2 that the current sensory issues are primarily related to tactile input but not related to communication abilities.

To summarize the results, the analysis revealed that children with ASD have significant feeding issues. Correlational analysis indicated that feeding issues are highly correlated with sensory and mealtime behavioural issues, but not statistically significant correlation was found between feeding issues and communication issues. Furthermore, intercorrelation analysis showed a significant relationship between sensory issues and mealtime behavioural issues, with no other statistically significant inter-correlations observed among communication, sensory, and mealtime behavioural issues.

CHAPTER IV

Discussion

The findings of the current study are discussed under the following sections:

5.1 Parental perspectives on feeding issues in children with ASD.

5.2 Relationship between feeding issues and sensory issues in children with ASD

5.3 Relationship between feeding issues and communication in children with ASD

5.4 Relationship between feeding issues and mealtime behavioural issues in children with ASD

5.5 Inter-relationship between communication, mealtime behavioural issues, and sensory issues in the context of feeding.

5.1 Parental perspectives on feeding Issues in children with ASD.

The feeding handicap index (FHI)(Shabnam & Swapna, 2023)was used to assess the parental perspectives on feeding issues. As evident in Table 4.1, the mean score for the responses obtained from parents of children with ASD was greater, indicating that feeding issues are shared among the sampled individuals, with some variability in the severity of these issues. These findings are in support of previous studies (Cermak et al., 2010; Mayes & Zickgraf, 2019; Rogers et al., 2012; Schreck et al., 2004; Seiverling et al., 2010; Zimmer et al., 2012) that children with ASD experience feeding difficulties at a greater than neurotypical children.

In the current study, it was observed that the majority of the feeding issues responses reported on FHI include physical feeding problems like difficulty eating with

fingers or a spoon, trouble drinking from a cup or through a straw, holding food in the mouth, restricted tongue movement, and difficulty rinsing and spitting and also many responses observed that functional feeding problems like eating small amounts of food, food spillage, aversion to specific items, also few responses were depicting the emotional feeding problems like exhibiting temper tantrums and refusal to open the mouth during feeding very few reported of gagging and vomiting, These findings were similar to the study of (Shabnam & Swapna, 2023), which also reported higher mean score on FHI for children with ASD than neurotypical. Hence, these findings were in alignment to the current study.

Few other significant studies (Cherif et al., 2018; Mayes & Zickgraf, 2019) reported in the literature provided a comprehensive understanding of feeding issues in children with ASD, indicating a broader pattern of atypical eating behaviours in children with ASD. The current study also revealed atypical eating behaviours such as functional feeding issues like aversion to certain textures and specifically avoidance of a newly introduced variety of food. Similar findings were observed in a few other studies (Johnson et al., 2015; Kral, 2018) in the literature; which highlighted that sensory issues are closely aligned with limited food acceptance particularly neophobia in children with ASD. Another study in the literature(Padmanabhan & Shroff, 2020)suggested that sensory issues might be aggravated by the nature of Indian meals, where simultaneously consumption of various dishes could overwhelm a child due to different tastes, smells, and textures, thereby impacting their diet intake by triggering disruptive behaviour in them.

Whereas there are other studies in the literature (Zimmer et al., 2012)that reported atypical feeding behaviours such as tantrums, food denial, interest for

particular tastes or smell, and a limited variety could be because of the struggles with social interaction as this may impact these children's ability to learn appropriate mealtime behaviours, the current study also identified certain emotional feeding problems, such as temper tantrums and refusing to open the mouth during feeding, it can be observed from these findings that aggression and rigidity around mealtimes are closely related to feeding difficulties similar to findings reported in the literature ,for instance, it was found that children with ASD have difficulty being flexible in routines and most of the time disruptive behaviours during mealtime was exhibited when there was a change of food from what they were used to eat routinely and this leads to behavioural issues (Padmanabhan & Shroff, 2022) which in turn leads to feeding issues as well.

Overall, feeding issue in children with ASD are prominent also it is observed that they are multifaceted. Thus, the findings in the current section have sufficed the first objective of the study; this subsection met the first objective of the study, that parental perspectives gathered through the FHI highlights significant feeding challenges among children with ASD.

5.2 Relationship between feeding issues and Sensory issues in children with ASD

In the present study, as shown in Table 4.1, the results indicated greater instances of sensory issues on SSP. The performance on SSP based on the parental reports indicated that the mean score was lesser than 141, which falls into the group of the highest sensory concerns, and lower SSP values suggest higher sensory issues. Also, the Pearson correlation analysis for the scores between FHI and SSP revealed a high negative correlation [r= -0.560, p=0.001]. This suggests that as feeding issues increase

(higher FHI scores), the sensory issues also increase (lower SSP scores) and vice versa. The findings are in support of various studies conducted and reported in literature (Emmons, 2005; Ernsperger, 2004; Johnson et al., 2014; St. John & Ausderau, 2024).

Also, a qualitative analysis and observation of responses obtained from three parental responses, P1, P2, and P3revealed a potential relationship between feeding and sensory issues. It was observed that inP1, lower scores on SSP, is indicative of greater problematic behaviours. It could thus be expected from the scores on SSP that they have sensory issues and for specific questions like item no 8,11, (Appendix B for details on SSP) it was found to show severe problems, suggesting that these items can be related to feeding issues. The possible observations fromP1 included an aversion to specific tastes and smells and also that textures are the ones that restrict the child and cause feeding issues. Similar to the findings of P1as in the present study, yet another study by Cermak et al.(2010)reported that a component of tactile defensiveness which is oral defensiveness may result in difficulty with food textures and therefore food selectivity in children with ASD ,similar findings related to tactile issues are reported in various studies in the literature(Emmons, 2005; Ernsperger, 2004; Hazen et al., 2014; Huxham et al., 2021; Nadon et al., 201) also in the current study Item no 11 depicted that the child is a picky eater, which can ultimately be related to poor weight gain(Q15)results of nutrient deficiency in children with ASD is evident in the literature(Bandini et al., 2010; Ismail et al., 2020; Johnson et al., 2014; Siddiqi et al., 2019; Zimmer et al., 2012)So, the findings revealed that FHI agrees with the sensory issues that indicated selective eating and taste/smell sensitivity in the SSP.

It was observed that responses obtained from P2, although these scores indicated

that the problems were not severe, closely analyzing FHI and SSP revealed a relationship between the child's tactile sensitivities and their feeding difficulties(Emmons, 2005; Ernsperger, 2004; Hazen et al., 2014; Huxham et al., 2021; Nadon et al., 2011).

It was observed that responses obtained from P3, revealed a relationship between feeding and sensory issues because the FHI responses indicated difficulties such as gagging with different food textures and clearing food from the spoon, suggesting possible tactile or textural sensory sensitivities in the oral region, Similar to the findings of P3 Cermak et al.(2010a) described that children with tactile defensiveness often report of gag and also tends to bite their inner lips and cheeks, the investigator also reported that these children showed narrow variety of diet and severe aversion to textures ,smells and temperatures of food compared to neurotypicals. In the current study also, the SSP scores highlight distress during grooming activities and reactions to touch, indicating sensory issues, specifically related to tactile/textural issues, which overall indicate aversions or discomfort experienced by the child during mealtime, affecting their ability to tolerate and manage different food textures effectively.

It was observed that one of the studies (St. John & Ausderau, 2024) reported that food selectivity, primarily based on the sensory properties of food, especially texture, is the most commonly reported feeding challenge. The current study also found the same; thus, it can be expected that these tactile issues are overall triggering the sensory issues, which ultimately reflect as feeding issues during mealtime. Also, another finding of this study was that continued diet restriction and difficulty

transitioning to table or family foods are significant predictors of increased sensory challenges in children with ASD. Thus, it can be observed that the studies mentioned in the literature and the current study are in alignment with the findings and highlight the critical role of sensory sensitivities in feeding difficulties.

Thus, the findings in the current section have sufficed the second objective of the study, which was to find the relationship between feeding and sensory issues. From the findings of the above section, it is indicative that the null hypothesis proposed Ho1, *"There is no significant relationship between feeding and sensory issues in children with ASD,"* is rejected.

5.3 Relationship between feeding and mealtime behavioural issues in children with ASD

In the present study, as shown in Table 4.1, the results indicated greater instances of mealtime behavioural issues on BAMBI (Lukens & Linscheid, 2008).The results of parental responses obtained on BAMBI indicated mean score was greater than 34, which falls into the group of mealtime behavioural issues (Demand,2015).Also, the Pearson's correlation analysis for the scores between FHI and BAMBI revealed a moderate positive correlation [r= 0.416, p=0.022]. This suggests that as feeding issues increase (High FHI scores), mealtime behavioural issues also increase (High BAMBI scores) and vice versa. The findings are in support of various studies conducted and reported in literature(Gentry & Luiselli, 2008; Johnson et al., 2014; Padmanabhan & Shroff, 2022; Rouphael et al., 2023; Şahan et al., 2021; Shreck,2006).

Also, a qualitative analysis and observation of responses obtained from three parental responses, P1, P2, and P3, revealed a potential relationship between feeding and behavioural issues. It was observed that in P1, specific responses indicate a relationship between feeding and mealtime behavioural issues. For example, the FHI responses, such as taking longer to be fed, needing special utensils or a different way of feeding, and exhibiting frustration or temper tantrums before/during feeding, highlight feeding challenges. Similarly, BAMBI responses such as difficulty remaining seated until the meal is finished, being aggressive during mealtimes, and inflexibility about mealtime routines reflect mealtime behavioural issues (Appendix C for details on BAMBI). So, from the current study it could thus be expected from the responses on FHI and BAMBI findings that behavioural challenges, like aggression and rigidity around mealtimes, are closely related to feeding difficulties. Another study in literature (Johnson et al., 2014) found that children with ASD who exhibited more pronounced repetitive and ritualistic behaviours are more likely to have feeding issues similarly. According to a study by Ledford & Gast (2006), a variety of restrictive and inflexible feeding behaviours were shown by 89 % of children with ASD. These studies in the literature emphasize the interconnectedness of feeding and mealtime behavioural issues in P1.

It was observed responses obtained from P2, the FHI responses, such as the child's behaviour of retaining food in the mouth without swallowing, taking longer to be fed, and expressing displeasure or temper tantrums when feeding, and the response on BAMBI such as crying or screaming during mealtimes, refusing to sit until the meal is done, and disrupting mealtime so this can be most likely the result of the child's bad eating experiences and challenges, so ,it could thus be expected from the responses on FHI and BAMBI findings that, the physical strain of chewing and swallowing, along

with the frustration of lengthy feeding times, can cause anxiety and behavioural outbursts. Feeding issues are making mealtimes uncomfortable, resulting in the child's refusal to sit at the table and disruptive behaviour around mealtime routines. There are contrastive findings considering our findings in literature (Zimmer et al., 2012) reported that these atypical feeding behaviours such as tantrums, food denial, interest for particular tastes or smell, and a limited variety could be because of the struggles with social interaction as this may impact these children's ability to learn appropriate mealtime behaviours also there is another study by Padmnabhan and Shroff (2020),the findings of this study reported that children with ASD have difficulty being flexible in routines and most of the time disruptive mealtime behaviours was exhibited when there was a change of food from what they were used to eat routinely and this leads to behavioural issues in the current study also P2 is showing similar observation As a result, the findings of the current study were in alignment with Padmanabhan and Shroff (2022)that child's feeding challenges and behavioural reactions are interconnected with feeding difficulties, leading to and increasing the mealtime behavioural issues noted during mealtimes.

It was observed responses obtained from P3 is similar to P1 and P2,it's evident that the child's feeding challenges, such as not eating independently with fingers, trouble sucking, and eating less, are expected to be linked to mealtime behavioural issues, such as occasional reluctance to try new meals, selective eating, and avoidance of items requiring extensive chewing because these challenges can be caused by the child's underlying feeding issues and difficulty sucking and poor independent feeding skills can create negative associations with eating and mealtime, leading to selective eating and food aversions also child's avoidance of meals that require much chewing

might be related to lack of competence or even physical pain, facilitating picky eating tendencies and lowering the child's overall food intake there are contrastive findings in literature that indicated that children with ASD that exhibit sensory issues may be less likely to use their hands while having meals(Ernsperger & Hanson, 2004).Whereas there are other supporting study (Shreck, 2006) which supported the current study findings that children with autism were idiosyncratically selective in the forms of food they accepted. So the findings from this study and the current study is in alignment that feeding issues are likely contributed by the behavioural abnormalities revealed in the BAMBI. Additionally, there is a possibility of a cycle involving feeding and mealtime behavioural issues since the findings show an interconnected relationship between feeding and mealtime behavioural issues.

Thus, the findings in the current section have sufficed the third objective of the study, which was to determine the relationship between feeding and mealtime behavioural issues in children with ASD. From the findings of the above section, it is indicative that the null hypothesis Ho3: "*There is no significant relationship between feeding and Mealtime behavioural issues in children with ASD"* is rejected.

5.4 Relationship between feeding issues and communication in children with ASD

In the present section, the analysis of results as shown in Table 4.1 revealed that the scores on CM based on the parental reports indicated that communication issues differed greatly among the individuals which could be explained from the non-uniform distribution of data. Also, the Spearman's rank correlation analysis for the scores between FHI and CM revealed no significant correlation ($\rho = 0.098$, $p = 0.605$). This

suggests that the severity or presence of feeding difficulties does not predict or relate to the communication abilities of the children. The findings are in support of few studies conducted and reported in literature(Ernsperger, 2004; Johnson et al., 2014).

Also, a qualitative analysis of three parental responses, P1, P2, and P3, revealed no significant relationship between feeding and communication issues. It was observed that responses obtained from P1 that the nature of feeding issues, such as gagging and severe refusal of specific meals, is expected to be caused by sensory issues or even behavioural issues that are unrelated to the child's communicative ability, so even though the child may articulate demands and refusals, the nature of their feeding challenges shows that they are caused by causes other than their communication abilities, indicating that there exists no apparent relation. Contrasting to the current study findings of one of the studies reported in literature by Rouphael et al. (2023)found that children with ASD exhibit behaviours more aggressively during the meals, including gagging and spitting food. They reported that such mealtime behavioural difficulties in ASD children could be related to food phobia and pragmatic deficits, which may affect the child’s understanding of appropriate mealtime behaviour.

Similar to responses from P1, it was observed that responses fromP2, revealed evidence that the child's feeding issues, such as difficulty sucking, eating independently, and refusing particular meals, are most likely caused by sensory or motor obstacles or even behavioural issues rather than communication deficits there are supporting study in literature(Ernsperger & Hanson, 2004).that aligns with findings of current study that children with ASD that exhibit sensory issues may be less likely to use their hands while having meals, so despite the child's good communication skills,

it could be expected from the responses of FHI and CM that there is no apparent relationship between feeding issues and communication ability.

It was observed that responses obtained from inP3, similar to P1 and P2 findings, also revealed that there is likely no evident relationship between the child's feeding issues and communicative ability because the child's feeding difficulties, such as his inability to eat independently or scoop food, as well as his strong refusal of specific meals, are expected to be due to sensory or behavioural issues rather than communication deficiencies. Despite being in the early phases of unconventional communication, the child's unique feeding concerns indicate that the underlying issues are greater connected to acquired behaviour, sensory issues, or oral-motor abilities. Another study by Johnson et al. (2014) also concluded that the severity of communication, social, and cognitive deficits does not predict feeding and mealtime; these findings are in agreement with the findings of the current study.

To conclude, it was observed across these responses (P1, P2, P3), The key finding of this section is that the wide variety of communication abilities, from unconventional communication to advanced language usage, indicates that each child's development in these areas is unique. The feeding issues depicted by children are unrelated to their communication deficits. Thus, the findings in the current section have not sufficed the fourth objective of the study, which was to determine the relationship between feeding and communication issues in children with ASD. From the findings of the above section, it is indicative that the null hypothesis H_O4: "*There is no significant relationship between feeding and communication issues in children with ASD"* is accepted.

5.5 Interrelationship between communication, mealtime behavioural issues, and sensory issues in the context of feeding

5.5.1 Relationship between mealtime behavioural issues and sensory issues

In the present study, as shown in Table 4.1, the results indicated greater instances of mealtime behavioural issues on BAMBI(Lukens & Linscheid, 2008); similarly the greater instances of sensory issues on SSP (McIntosh et al.,1999),thus the elevated BAMBI and lower SSP mean scores indicate a prevalence of both problematic mealtime behaviours and sensory concerns also the potential relationship between the two variables within the current data. Also, The Pearson correlation analysis for the scores between BAMBI and SSP revealed a high negative correlation [r= -0.497, n=30, p=0.005]. This suggests that as mealtime behavioural issues increase (high BAMBI scores), the sensory issues also increase (low SSP scores) and vice versa. The findings are in support of various studies conducted and reported in literature:(Huxham et al., 2021; Johnson et al., 2014; Raj et al., 2024; S. Padmanabhan & Shroff, 2020).

Also, a qualitative analysis and observation of responses obtained from three parental responses, P1, P2, and P3, revealed a potential relationship between sensory issues and mealtime behavioural issues. It was observed in responses obtained from P1, the SSP responses, such as the child avoids certain tastes or food smells typical in children's diets, is a picky eater concerning food textures, and limits themselves to specific food textures or temperatures, was provided with lower scores on the SSP, indicative of greater sensory issues and the major issues reported in the BAMBI responses such as, The child consistently does not remain seated until the meal is finished, is unwilling to try new foods, and prefers crunchy foods(Huxham et al., 2021)

also found that in children with ASD, food texture was found to have a significant influence in food preference, as the majority of participants quickly ate crunchy and dry, as well as smooth puréed food, while just a few of the children consistently refused these textures. It could thus be expected from observing the findings of this study and the current study that sensory issues elevate feeding issues and contribute to maladaptive eating behaviours also the child's unwillingness to try new foods, as well as their preference for certain textures, are most likely indicative of sensory processing difficulties, which can lead to strict eating patterns and limit nutrient intake. Similarly, another study in the literature found similar findings that children with ASD who exhibit oral sensory issues may have food selectivity and restrictive eating behaviour (Raj et al., 2024).

Similarly, it was observed that responses obtained from P2that the most problematic responses in SSP, such as the child manifest distress during grooming activities, difficulty standing in line or being close to others, and being a picky eater regarding food textures. Hence, such issues even though the severity of these sensory issues is moderate as per the scores, they are persistent and likely to have an impact on the child's daily experiences. Additionally, the BAMBI responses indicated that the child is rigid about mealtime routines, dislikes certain foods, refuses to eat them, and has limited acceptance of a variety of foods. It could thus be expected from the responses that sensory issues likely contribute to the child's rigidity and discomfort with new or varied foods, leading to specific mealtime behaviours such as inflexibility and food refusal. A study by Johnson et al. (2014) reported that according to the results a higher BAMBI score (higher mealtime behavioural issues) could be predicted by lower SSP scores (higher sensory issues), which they interpreted as higher mealtime

behavioural issues could be due to higher sensory issues and vice versa and these findings were in agreement with the findings of the current study.

Similar to responses of P1 and P2 it was observed that response obtained fromP3are also similar, so the sensory issues marked severe in SSP, such as The child expressing distress during grooming activities, reacting emotionally or aggressively to touch, and rubbing or scratching out spots that have been touched and the BAMBI responses reflect significant mealtime behavioural issues during feeding, including crying or screaming during mealtime, turning away from food, spitting out food, and an unwillingness to try new foods(food neophobia).Food neophobia in children with ASD was consistent finding throughout the studies in literature (de Almeida et al., 2022; Ismail et al., 2020; Stafford et al., 2017). Considering these responses, it could thus be expected that P3's sensory issues directly influence their negative feeding behaviours. The child's greater aversion to touch and distress in response to sensory stimuli likely exacerbate their aversive reactions to food, leading to severe behaviours such as refusal, expulsion, and emotional outbursts during meals. Padmanabhan and Shroff (2020) support the current study's findings that higher sensory issues (low SSP scores) correlate with greater mealtime behavioural issues (BAMBI). They propose that the multisensory nature of Indian meals, with varied textures, tastes, smells, and colours, may overwhelm children with ASD, triggering disruptive behaviours.

In conclusion, the analysis of parental responses for P1, P2, and P3 reveals a significant relationship between behavioural and sensory issues. These findings suggest a potential cycle where sensory issues exacerbate behavioural problems during mealtimes, which in turn reinforce sensory sensitivities and restrictive eating patterns.

So, these studies support the current findings, emphasizing the importance of addressing sensory and behavioural aspects to improve feeding behaviours in children with ASD.

5.5.2 Relationship between communication and mealtime behavioural issues

In the current section, as shown in Table 4.2, Spearman's rank correlation analysis for the scores between CM(Rowland & Fried-Oken, 2010) and BAMBI(Lukens & Linscheid, 2008) revealed no significant correlation ($\rho = 0.097$, $p = 0.612$). These findings suggests that within this sample, communication issues do not have a meaningful relationship with mealtime behavioural issues. The findings are in support of few studies conducted and reported in literature:(De Giacomo et al., 2016; Matson et al., 2013; Matson & Fodstad, 2009).

Also, a qualitative analysis and observation of responses obtained from three parental responses, P1, P2, and P3, revealed that there is no significant relationship between mealtime behavioural issues and communication issues because, it was observed that responses obtained from P1, P2, and P3 that communication abilities as assessed by the Communication Matrix, do not appear to directly correlate with the mealtime behavioural issues related to feeding, as observed in the BAMBI scores. Despite variations in communication levels(Appendix D for details on Communication matrix)from emerging conventional communication in P1 verbal language in P2 to early unconventional communication in P3, the most severe mealtime behavioural issues related to food preferences and refusals are consistently present across all three children.

Whereas, Huxham et al. (2021) found that children with ASD preferred crunchy, dry, and smooth puréed foods, with few consistently refusing these textures, these findings depict the sensory involvement in the particular behavioural picked up in this study. While from the current study, it could thus be expected from both responses that behavioural feeding issues are likely independent of the child's communication abilities. Therefore, it suggests that factors other than communication, such as sensory sensitivities or specific preferences, may be more influential in shaping these behavioural issues.

However, Padmanabhan and Shroff (2020) presented a contrasting view, suggesting that communication deficits might contribute to disruptive mealtime behaviourals due to difficulties in expressing hunger. Similarly, there are other studies in literature (Matson et al., 2009, 2013)which reported that found that there was no significant relationship between communication and behaviour. Similarly in another study by De Giacomo et al., (2016)it was reported that there was a relationship between aggressive behaviour and verbal communication in children with ASD. The findings of this study also revealed that the communication difficulties were not related to aggressive behaviour in verbal children. This finding was in agreement with the findings of the current study.

Overall, the findings of the current study indicate no significant relationship between communication and mealtime behavioural issues in children with ASD. This conclusion is supported by studies from Matson et al. (2009, 2013) and De Giacomo et al. (2016), which similarly found no correlation between communication difficulties and behavioural issues.

5.5.3 Relationship between communication and sensory issues

In the current section, as shown in Table 4.2, Spearman's rank correlation analysis for the scores between CM (Rowland & Fried-Oken, 2010) and SSP (McIntosh et al.,1999) revealed no significant correlation (ρ = -0.093, p= 0.627). This suggests that, within this sample, communication abilities do not have a meaningful relationship with sensory issues.

Also, a qualitative analysis and observation of responses obtained from three parental responses, P1, P2, and P3, revealed no apparent relationship between communication and sensory issues. It was observed responses obtained from P1 indicate the child is at Level 4 (conventional communication) (Appendix D for details on CM), using unconventional methods such as body movements and vocalizations, with sensory issues mainly involving movement and touch. Similarly, it was observed responses obtained fromP2 is at Level 7 (language), able to request objects verbally and greet people, with minor sensory issues related to movement and touch. Whereas it was observed responses obtained fromP3, indicates the child is at Level 3 (unconventional communication), mainly communicates by directly approaching objects without waiting for a parent's response and exhibits sensory issues such as distress during grooming and selective eating. Thus, it could thus be expected from the response that, despite the differences in communication levels and sensory issues, no consistent pattern or correlation was found between the two domains across the three parental responses. However, contrary to the findings of current study, another study in the literature by Khaledi et al.(2022) found that the overall sensory score of children with ASD was significantly and positively correlated with most communication skills, i.e. children who exhibit higher sensory issues also show communication issues according

to the finding of this study which is contrary to the findings of the current study, however one of the study (Raj et al., 2024)in line with findings of the current study, the findings from this study suggests no definitive relationship between communication and sensory issues in children with ASD. This is because unusual sensory responses may influence some communication signs but are not the sole factor limiting communication development according to their findings and consequently, oral sensory deficits alone cannot be said to cause communication issues. Overall, current study indicates no definitive relationship between communication and sensory issues in children with ASD. This conclusion aligns with the findings of Raj et al. (2024), which suggest that while unusual sensory responses may influence some communication signs.

Thus, the findings in the current section have not sufficed the fifth objective of the study, which was to determine the intercorrelation between communication, mealtime behavioural issues, and sensory elements in the context of feeding. From the findings of the above section, it is indicative that the null hypothesis Ho5: *"There is no significant intercorrelation between communication, mealtime behavioural issues, and sensory issues in the context of feeding in children with ASD"* is accepted. Only a relationship between mealtime behavioural issues and sensory issues was observed, with no other significant intercorrelations observed in other domains.

Chapter VI

Summary and Conclusion

The present study aimed to investigate parental perspective on feeding issues in children with autism spectrum disorders (ASD). In order to provide insightful information for improving support and treatments for parents and children, the study explores communication, mealtime behaviours, and sensory components during mealtimes. The objectives of the study Involve: 1) To examine Parental perspectives on Feeding Issues in children with ASD;2) To determine the relationship between feeding and sensory issues in children with ASD;3) To determine the relationship between feeding and mealtime behavioural issues;4) To determine the relationship between feeding and communication issues;5) To determine the interrelation between sensory issues, mealtime behavioural issues and communication.

The participants of the study included parents of 30 children (who are between the ages of 3 and 8 years) who have been diagnosed with ASD and are having feeding difficulties. The study was carried out in three phases; In phase 1, The recruited target population was screened using the Feeding Handicap Index (FHI) ((Shabnam & Swapna, 2023), to confirm feeding issues so if the FHI score is above '10' then such individuals were identified and recruited for the study; In phase 2, The following questionnaires were used to assess each domain: sensory issues were evaluated through the Short Sensory Profile (McIntosh et al., 1999), mealtime behavioural issues were assessed through the Brief Autism Mealtime Behaviour Inventory (Lukens & Linscheid, 2007), and Communication levels were assessed through Communication Matrix (Rowland & Fried-Oken, 2010),The recorded responses of respective

questionnaires were subjected to descriptive and correlational statistics.

The results of the descriptive statistics indicated that feeding issues are shared among the sampled individuals, with some variability in the severity of these issues. Also, the sampled individual falls into the category of sensory issues and mealtime behavioural issues, and it was also observed that results related to communication are highly variable, indicating the non-uniform distribution of data. The correlational analysis revealed statistically significant difference between for feeding and sensory issues, feeding and behavioural issues, and sensory and mealtime behavioural issues. There was no statistically significant difference found with any domain with respect to communication.

The findings of the current study for the first objective, confirmed that parental perspectives gathered through the FHI highlighted significant feeding challenges among children with ASD. The findings of the current study for the second objective, which explored the correlation between feeding and sensory issues, indicated a strong correlation between the two and thus rejecting the null hypothesis. The results for the third objective, which investigated the relationship between feeding and mealtime behavioural issues, showed a significant relationship and thus were met by rejecting the null hypothesis. However, the results for the fourth objective showed that there was no significant correlation between feeding and communication, thus accepting the null hypothesis. Furthermore, the fifth objective was to assess the interrelation between sensory issues, mealtime behavioural issues, and communication. Only a significant relationship between mealtime behaviour and sensory issues was found, with no other significant inter-correlations observed, thus accepting the null hypothesis.

IMPLICATIONS OF THE STUDY

Families with children diagnosed with ASD may find it extremely difficult to deal with feeding issues. Researchers may find the unique challenges that parents encounter while feeding their children with ASD by investigating their points of view, and this study explored that parental view. The findings of this study have important implications for managing food challenges in children with ASD. First, parental perspectives highlight the necessity for specialized interventions customized to these children's requirements. Significant links between feeding, sensory, and mealtime behavioural issues demonstrated the significance of a multifaceted approach in therapy techniques. Interventions should target feeding issues and sensory and mealtime behavioural concerns to be more successful. The lack of a significant link between feeding and communication challenges implies that communication skills may not require immediate attention in feeding interventions. However, considering individual differences and incorporating communication strategies as needed remains essential.

The research findings on the relationship between sensory and behavioural disorders emphasize the importance of coordinated treatment programs. Collaboration between occupational therapists, speech-language pathologists, and behavioural therapists can result in complete programs that address these interrelated areas. This integrated strategy can help children with ASD live in more interconnected and supportive surroundings, improving their quality of life.

Limitations and Future Directions

Despite the notable findings in the study, certain limitations of the study were identified. The current study needs to be replicated with a larger sample size, which will improve the generalisability of the findings. Also, this study depended on parental reports without any monitoring, which may lead to subject bias. Also, since feeding is a complex process that gradually develops in children and involves the development of both motor and sensory skills, future research should incorporate other types of measures to assess feeding, such as direct observations or clinical assessments, to assess parental perspectives and provide a more comprehensive understanding of feeding issues in children with ASD. Future research should also explore the role of communication in more depth, considering the high variability in communication abilities observed in the study.

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APPENDIX-A

Feeding Handicap Index

Item No.	Domain *	Statements	Never has this problem	Sometimes has this problem	Always has this problem	Remarks Please specify
1.	P	My child has/had difficulty in sucking from the feeding bottle/ breast milk.	0	1	2	
2.	P	My child has difficulty in biting hard food (e.g., biscuit, wafer, cucumber etc.) and/or soft food (e.g. cake, bread, dairy milk, banana etc.)	0	1	2	
3.	P	My child has difficulty in chewing the hard food (e.g., chapatti, puri etc.) and/ or soft food (e.g., idli, banana, rice, sweets etc.)	0	1	2	
4.	P	My child is not able to eat independently with his fingers	0	1	2	
5.	P	My child is not able to scoop the food from the bowl/plate with a spoon	0	1	2	
6.	P	My child is not able to clear the food from the spoon when held near the lips	0	1	2	
7.	P	My child is not able to eat with a spoon independently	0	1	2	
8.	P	My child is not able to drink liquid from a glass/cup when held	0	1	2	
9.	P	My child is not able to drink	0	1	2	

		independently				
10	P	My child has a problem in drinking through a straw	0	1	2	
11	P	My child drools while feeding	0	1	2	
12	P	My child has difficulty in holding the solid/ liquid food in mouth (food/liquid leaks from the mouth) in upright position	0	1	2	
13	P	My child is not able to use the tongue to clear the food particles stuck in between the teeth or between the gums and the cheeks	0	1	2	
14	P	My child cannot rinse the mouth and spit the water after eating	0	1	2	
15	P	My child's weight gain is inappropriate (under/over-weight) and/or has nutritional deficiency due to feeding issues.	0	1	2	
16	P	My child keeps the food in the mouth without swallowing for a long time	0	1	2	
17	P	My child has difficulty in swallowing solid/ semi-solid or mashed/ liquid food	0	1	2	
18	P	The food/liquid comes through the nose during swallowing	0	1	2	
19	P	My child gags when solid/liquid food is given	0	1	2	
20	P	My child vomits when solid/liquid food is given	0	1	2	
21	P	My child chokes while feeding	0	1	2	

22	F	My child eats less because of the feeding problem	0	1	2	
23	F	I avoid giving solid food to my child because of feeding difficulty.	0	1	2	
24	F	My child spills a considerable portion of the solid food/liquid during feeding (E.g. spilling the food near the mouth or spilling the food while taking it from the plate).*Specify the quantity of food spilled in percentage.*	0	1	2	
25	F	My child strongly refuses newly introduced food or certain food based on the taste/temperature/ texture/ smell.	0	1	2	
26	F	My child need to be placed in a specific position during feeding (e.g. may be using special chair, bean bag etc.)	0	1	2	
27	F	My child requires smaller meals more often due to the feeding problem	0	1	2	
28	F	I push the food to back of the mouth of my child so that he/she can swallow it easily	0	1	2	
29	F	My child takes longer to be fed	0	1	2	
30	F	I pour water/milk to ensure that the food is swallowed	0	1	2	
31	F	My child needs special/ specific (his own spoon, plate, etc.) utensils and/or different way of feeding (e.g., feeding tube,	0	1	2	

		special feeding bottles etc.)				
32	F	I pinch my child's nose to make him swallow the food	0	1	2	
33	F	I shake the child/close the lips/jaw for easy swallow	0	1	2	
34	E	My child refuses to open his/her mouth while feeding	0	1	2	
35	E	My child exhibit frustration or temper tantrums before/during feeding	0	1	2	
36	E	He doesn't like being dependent on the others for feeding	0	1	2	
37	E	My child feels upset that he can't eat food like the other children/ doesn't like to eat with other children.	0	1	2	
38	E	My child feels embarrassed/ is not comfortable to eat food in social gathering	0	1	2	

*P-Physical, F-Functional, E-Emotional

Other significant findings:

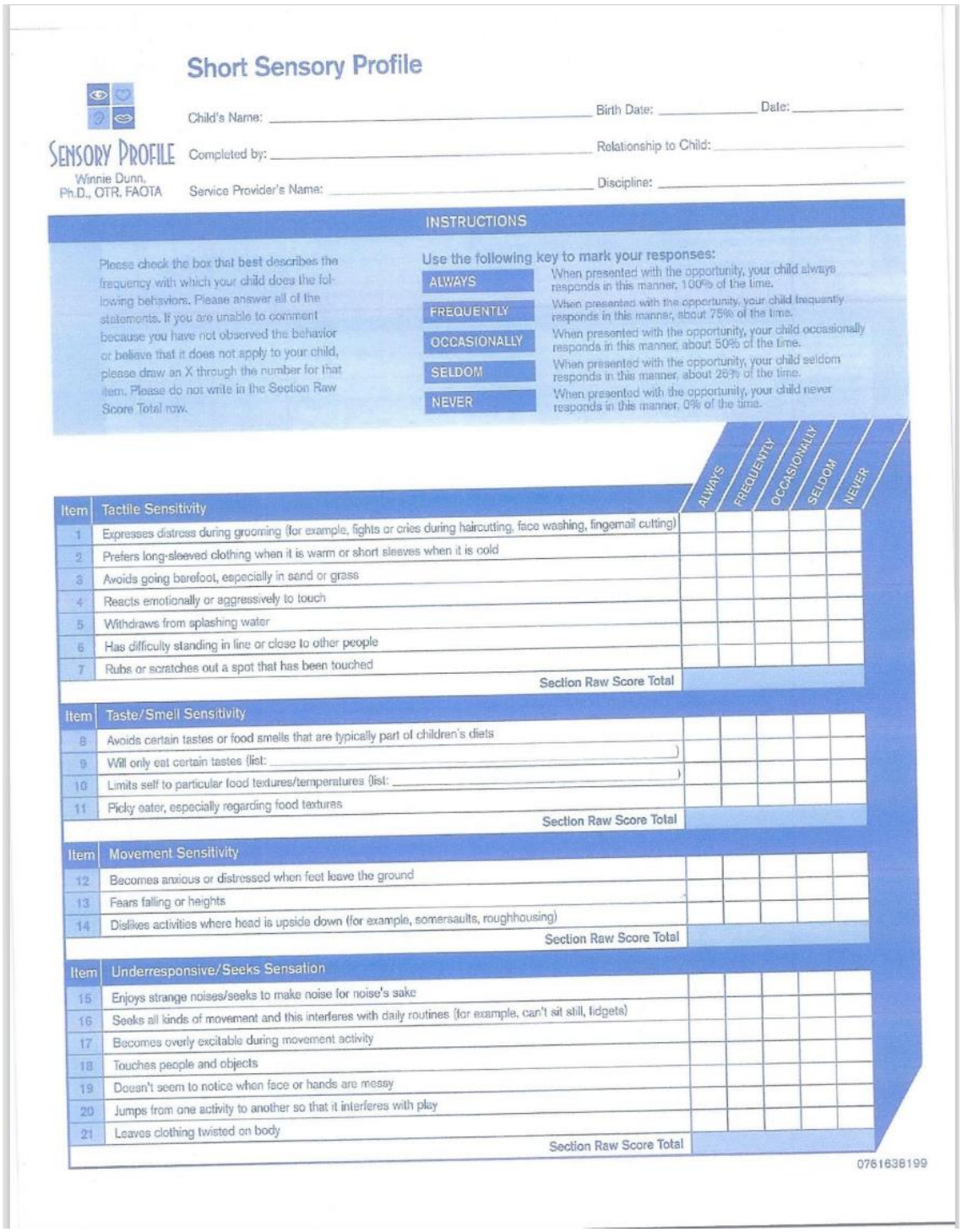
Rating scale for parent/caregivers:

1 2 3 4 5 6 7

Normal Moderate Problem Severe Problem

Please circle the number that matches the severity of your child's feeding difficulty (1- no difficulty at all; 4- somewhat problem is present; 7- the worse problem my child could have)

APPENDIX-B



Short Sensory Profile

SENSORY PROFILE

Winnie Dunn, Ph.D., OTR, FAOTA

Child's Name: _____ Birth Date: _____ Date: _____

Completed by: _____ Relationship to Child: _____

Service Provider's Name: _____ Discipline: _____

INSTRUCTIONS

Please check the box that best describes the frequency with which your child does the following behaviors. Please answer all of the statements. If you are unable to comment because you have not observed the behavior or believe that it does not apply to your child, please draw an X through the number for that item. Please do not write in the Section Raw Score Total row.

Use the following key to mark your responses:

- **ALWAYS** — When presented with the opportunity, your child always responds in this manner, 100% of the time.
- **FREQUENTLY** — When presented with the opportunity, your child frequently responds in this manner, about 75% of the time.
- **OCCASIONALLY** — When presented with the opportunity, your child occasionally responds in this manner, about 50% of the time.
- **SELDOM** — When presented with the opportunity, your child seldom responds in this manner, about 25% of the time.
- **NEVER** — When presented with the opportunity, your child never responds in this manner, 0% of the time.

Item	Tactile Sensitivity	ALWAYS	FREQUENTLY	OCCASIONALLY	SELDOM	NEVER
1	Expresses distress during grooming (for example, fights or cries during haircutting, face washing, fingernail cutting)					
2	Prefers long-sleeved clothing when it is warm or short sleeves when it is cold					
3	Avoids going barefoot, especially in sand or grass					
4	Reacts emotionally or aggressively to touch					
5	Withdraws from splashing water					
6	Has difficulty standing in line or close to other people					
7	Rubs or scratches out a spot that has been touched					
	Section Raw Score Total					

Item	Taste/Smell Sensitivity					
8	Avoids certain tastes or food smells that are typically part of children's diets					
9	Will only eat certain tastes (list: _____)					
10	Limits self to particular food textures/temperatures (list: _____)					
11	Picky eater, especially regarding food textures					
	Section Raw Score Total					

Item	Movement Sensitivity					
12	Becomes anxious or distressed when feet leave the ground					
13	Fears falling or heights					
14	Dislikes activities where head is upside down (for example, somersaults, roughhousing)					
	Section Raw Score Total					

Item	Underresponsive/Seeks Sensation					
15	Enjoys strange noises/seeks to make noise for noise's sake					
16	Seeks all kinds of movement and this interferes with daily routines (for example, can't sit still, fidgets)					
17	Becomes overly excitable during movement activity					
18	Touches people and objects					
19	Doesn't seem to notice when face or hands are messy					
20	Jumps from one activity to another so that it interferes with play					
21	Leaves clothing twisted on body					
	Section Raw Score Total					

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Item	Auditory Filtering	ALWAYS	FREQUENTLY	OCCASIONALLY	SELDOM	NEVER
22	Is distracted or has trouble functioning if there is a lot of noise around					
23	Appears to not hear what you say (for example, does not "tune-in" to what you say, appears to ignore you)					
24	Can't work with background noise (for example, fan, refrigerator)					
25	Has trouble completing tasks when the radio is on					
26	Doesn't respond when name is called but you know the child's hearing is OK					
27	Has difficulty paying attention					
	Section Raw Score Total					

Item	Low Energy/Weak					
28	Seems to have weak muscles					
29	Tires easily, especially when standing or holding particular body position					
30	Has a weak grasp					
31	Can't lift heavy objects (for example, weak in comparison to same age children)					
32	Props to support self (even during activity)					
33	Poor endurance/tires easily					
	Section Raw Score Total					

Item	Visual/Auditory Sensitivity					
34	Responds negatively to unexpected or loud noises (for example, cries or hides at noise from vacuum cleaner, dog barking, hair dryer)					
35	Holds hands over ears to protect ears from sound					
36	Is bothered by bright lights after others have adapted to the light					
37	Watches everyone when they move around the room					
38	Covers eyes or squints to protect eyes from light					
	Section Raw Score Total					

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Summary

Instructions: Transfer the score for each section to the Section Raw Score Total column. Plot these totals by marking an X in the appropriate classification column (Typical Performance, Probable Difference, Definite Difference).*

SCORE KEY

1 = Always	4 = Seldom
2 = Frequently	5 = Never
3 = Occasionally	

Section	Section Raw Score Total	Typical Performance	Probable Difference	Definite Difference
Tactile Sensitivity	/35	35 ------ 30	29 ------ 27	26 ------ 7
Taste/Smell Sensitivity	/20	20 ------ 15	14 ------ 12	11 ------ 4
Movement Sensitivity	/15	15 ------ 13	12 ------ 11	10 ------ 3
Underresponsive/Seeks Sensation	/35	35 ------ 27	26 ------ 24	23 ------ 7
Auditory Filtering	/30	30 ------ 23	22 ------ 20	19 ------ 6
Low Energy/Weak	/30	30 ------ 26	25 ------ 24	23 ------ 5
Visual/Auditory Sensitivity	/25	25 ------ 19	18 ------ 16	15 ------ 5
Total	/190	190 ------ 155	154 ------ 142	141 ------ 39

*Classifications are based on the performance of children without disabilities ($n = 1,037$).

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APPENDIX-C

BAMBI

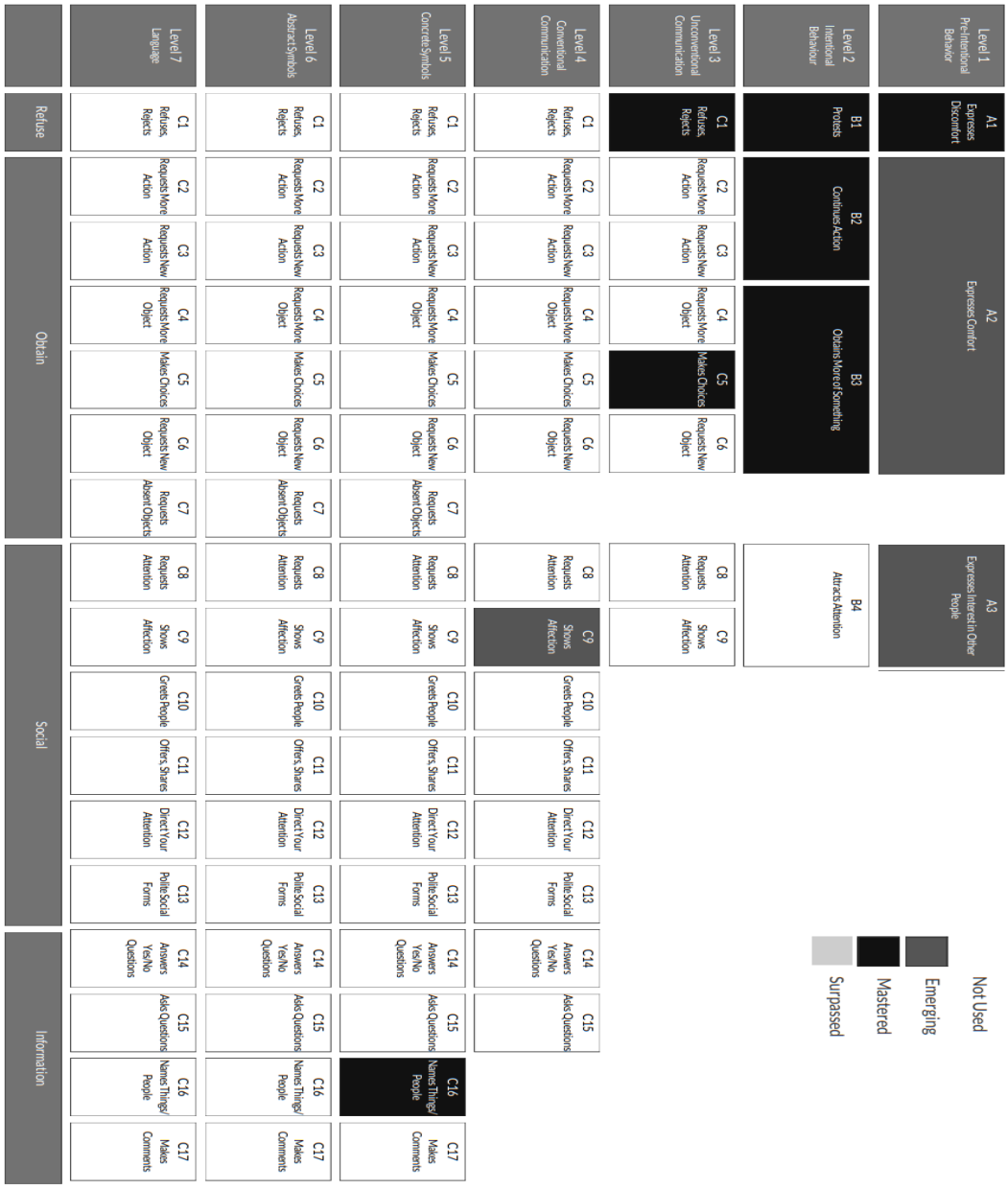
Think about mealtimes with your child over the past 6 months. Rate the following items according to how often each occurs, using the following scale:

Never/Rarely 1 **Seldom 2** **Occasionally 3** **Often 4** **At Almost Every Meal 5**

Circle YES if you think an item is a problem for you or NO if you think it is not a problem.

1.	My child cries or screams during mealtimes.	1	2	3	4	5	YES	NO
2.	My child turns his/her face or body away from food.	1	2	3	4	5	YES	NO
3.	My child remains seated at the table until the meal is finished.	1	2	3	4	5	YES	NO
4.	My child expels (spits out) food that he/she has eaten.	1	2	3	4	5	YES	NO
5.	My child is aggressive during mealtimes (hitting, kicking, scratching others).	1	2	3	4	5	YES	NO
6.	My child displays self-injurious behavior during mealtimes (hitting self, biting self).	1	2	3	4	5	YES	NO
7.	My child is disruptive during mealtimes (pushing/throwing utensils, food).	1	2	3	4	5	YES	NO
8.	My child closes his/her mouth tightly when food is presented.	1	2	3	4	5	YES	NO
9.	My child is flexible about mealtime routines (e.g., times for meals, seating arrangements, place settings).	1	2	3	4	5	YES	NO
10.	My child is willing to try new foods.	1	2	3	4	5	YES	NO
11.	My child dislikes certain foods and won't eat them.	1	2	3	4	5	YES	NO
12.	My child refuses to eat foods that require a lot of chewing (e.g., eats only soft or pureed foods).	1	2	3	4	5	YES	NO
13.	My child prefers the same foods at each meal.	1	2	3	4	5	YES	NO
14.	My child prefers "crunchy" foods (e.g., snacks, crackers).	1	2	3	4	5	YES	NO
15.	My child accepts or prefers a variety of foods.	1	2	3	4	5	YES	NO
16.	My child prefers to have food served in a particular way.	1	2	3	4	5	YES	NO
17.	My child prefers only sweet foods (e.g. candy, sugary cereals).	1	2	3	4	5	YES	NO
18.	My child prefers food prepared in a particular way (e.g., eats mostly fried foods, cold cereals, raw vegetables).	1	2	3	4	5	YES	NO

APPENDIX-D


Not Used
Emerging
Mastered
Surpassed
Refuse
Obtain
Social
Information
Level 1 Pre-Intentional Behavior
Level 2 Intentional Behaviour
Level 3 Unconventional Communication
Level 4 Conventional Communication
Level 5 Concrete Symbols
Level 6 Abstract Symbols
Level 7 Language
A1 Expresses Discomfort
A2 Expresses Comfort
A3 Expresses Interest in Other People
B1 Protests
B2 Continues Action
B3 Obtains More of Something
B4 Attracts Attention
C1 Refuses, Rejects
C2 Requests More Action
C3 Requests New Action
C4 Requests More Object
C5 Makes Choices
C6 Requests New Object
C7 Requests Absent Objects
C8 Requests Attention
C9 Shows Affection
C10 Greets People
C11 Offers Shares
C12 Direct Your Attention
C13 Polite Social Forms
C14 Answers Yes/No Questions
C15 Asks Questions
C16 Names Things/ People
C17 Makes Comments