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The Development, Content Validation, and Clinical Utility of Mealtime Screening for Schools (MEALSS)

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The Development, Content Validation, and Clinical Utility of Mealtime Screening for Schools (MEALSS)

Abstract

Background: This study aimed to determine the initial content validity and clinical utility of Mealtime Screening for School (MEALSS), a new screening tool that measures mealtime participation in students with intellectual and developmental disabilities 5 to 10 years of age.

Methods: To determine the content validity of MEALSS, the researchers recruited five participants identified as pediatric occupational therapists and/or feeding experts to review the MEALSS. Item level content validity index (I-CVI) and scale level validity (S-CVI) were calculated, as well as modified kappa indices to reduce the probability of chance agreement. MEALSS was then revised based on feedback from the content experts. To determine the clinical utility of MEALSS, 20 school-based occupational therapists were recruited to assess the clinical usage of the revised version of the tool. The responses were thematized and analyzed.

Results: Content experts rated 17 out of the 18 MEALSS items essential in assessing mealtime participation in the school setting. The majority of the clinician participants indicated a favorable response to the clinical utility of the tool, ease of use, and accuracy in identifying and measuring mealtime challenges in the school setting.

Conclusion: The study provided useful perspectives on how the tool can be further improved to measure mealtime participation in school-aged children.

Comments

The authors declare that they have no competing financial, professional, or personal interest that might have influenced the performance or presentation of the work described in this manuscript.

Keywords

mealtime participation, screening tool, school-based practice, feeding, eating, mealtime

Cover Page Footnote

The researchers would like to thank the content experts and clinicians who participated in this research study. The researchers would also like to thank Columbia University Irving Medical Center for its support during this project.

Credentials Display

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The Mealtime Screening for School (MEALSS) was developed to assist school-based occupational therapists identify the influences or factors that support or inhibit mealtime participation in students with intellectual and developmental disabilities (IDD). The need for MEALSS is rooted in an identified gap in available assessments and interventions or strategies for occupational therapists to address mealtime participation in the school environment where children spend a significant portion of their lives. To date, the literature has only identified occupational therapy's role in addressing feeding difficulties in hospitals, clinics, and homes (Ausderau et al., 2019; Lukens & Silverman, 2014; Poppert et al., 2015). MEALSS attempts to bridge this gap by identifying mealtime challenges beyond the apparent oral motor, fine motor, and sensory-motor deficits. Coster (2008) asserted that occupational therapy measures are needed to capture human beings' complex and subjective nature. Feeding and eating are complex self-care occupations that involve integrating the nervous system, musculature, and environmental variables; therefore, MEALSS assesses environmental and cultural factors, social participation during mealtimes, and mealtime behaviors that could impact the successful performance of feeding and eating skills in the school environment (Gal et al., 2011). This tool helps identify specific mealtime barriers and challenges so that appropriate strategies, modifications, treatment goals, and referrals can be made.

Students with IDD are more likely to experience significant feeding and eating challenges and behaviors in the school setting than their peers ((Baraskewich et al., 2021). Feeding disorders are among the most common childhood developmental delays (Benjasuwantep et al., 2013). Evidence has shown that disordered feeding is seen in 25% of all children and 90% of children with disabilities (Estrem et al., 2018; Maynard et al., 2020). These problems can include picky eating, restrictive diets or a limited variety of foods, refusals of non-preferred or novel foods, and an overall lack of mealtime engagement and participation (Ledford & Gast, 2006). The potential impact of inadequate hydration and nutrition on learning includes decreased concentration, low energy levels, and difficulty with problem-solving (Ausderau et al., 2019).

It is known that as a child grows, the social component of eating extends beyond participation in family meals to eating at school with peers (Liu & Stein, 2013; Mason, 2019). School is an important setting to promote healthy behaviors, as children typically spend a 6 to 8 hr at school (Cohen et al., 2021). The literature suggests that children's eating behaviors often influence feeding and eating behaviors in adulthood (Scaglioni et al., 2018). Hence, the school environment can provide meaningful opportunities to promote and establish healthier diets through access to nutritious foods, including breakfast and lunch (Cohen et al., 2021). It is known that children with developmental disabilities participate less than children without disabilities in school-related activities (Grajo et al., 2020). Therefore, school-based occupational therapists can play a critical role in evaluating and addressing mealtime challenges as they consider the cognitive, social, physical, emotional, and cultural aspects of eating and feeding (AOTA, 2003).

School-based occupational therapists possess extensive knowledge and expertise to facilitate participation in mealtimes and school routines (Cohn & Lew, 2010). Occupational therapists acknowledge feeding and eating as crucial developmental milestones for children as the acquisition of feeding skills has potential medical implications, including getting adequate hydration and nutrition to participate in chosen occupations. Occupational therapists also recognize the potential impact feeding and eating can have on developing social interactions and communication skills, as they are involved in many parts of American culture (AOTA, 2003). Lastly, because participation in feeding and eating in the school setting for children

requires active engagement to fulfill the role of being a student, a child, and a peer, there are potential self-esteem implications when participation is inhibited (AOTA, 2020).

The Development of MEALSS

The commonly used standardized pediatric inventories and assessments that measure feeding and eating skills do not measure participation or consider the impact of context, person, habits, and the environment in the school setting. In contrast, the available assessments that measure children's participation tend to focus on specific areas of participation or use particular methods for gathering data. Still, one that specifically targets mealtimes does not exist. For example, the Children Assessment of Participation and Enjoyment (CAPE) and the Preferences for Activities of Children (PAC; King et al., 2004) are self-report or interviewer-assisted assessments that assess recreational and leisure activities. The School Functional Assessment (SFA; Coster et al., 1998) is an observation-based assessment designed to measure the performance of functional tasks that support participation in academic and social aspects of elementary school. However, again, there are very few items addressing feeding and eating. While these assessments help determine a level of skill or function during feeding and eating tasks, they do not aim to identify the factors inhibiting or supporting occupational performance during meals. Therefore, there continues to be a need to developt and use a mealtime participation assessment to examine a child's functional participation in the core occupation of feeding and eating.

AOTA's (2020) *Occupational Therapy Practice Framework* (OTPF-4) is vital in measurement development. MEALSS focuses on the occupational therapy domains of occupation, context, performance patterns, and performance skills specific to participation in mealtimes in the school environment (AOTA, 2020). The OTPF-4 defines occupations as everyday activities that people do as individuals, in families, and with communities to occupy time and bring meaning and purpose to life (AOTA, 2020). The OTPF-4 identifies a variety of occupations, including activities of daily living (ADLs). Occupational therapists must consider the person's perspective on the importance of the occupation and the cultural values attached to that occupation (Wilcock & Townsend, 2019). The OTPF-4 defines context as the environmental and personal factors that affect occupational participation and engagement. These can include physical contexts, social contexts, age, culture, and more (AOTA, 2020). Dennis et al. (2015) encouraged occupational therapists to consider how occupational performance is embedded in environments and contexts. This ties directly to students with IDD, as often the environmental context influences successful participation in meals. The OTPF-4 defines performance patterns as habits, routines, roles, and rituals that can inhibit or facilitate performance in the occupation of feeding and eating (AOTA, 2020). Eklund et al. (2017) state that assessment tools should address indicators and limitations of performance patterns on occupational engagement and participation. MEALSS considers these performance patterns to identify the deficits and strengths of children in their roles and engagement. Lastly, performance skills are the observable, goal-directed actions of children with IDD that affect occupational performance and consist of motor skills, process skills, and social interaction skills (AOTA, 2020). MEALSS aims to identify the factors and performance skills that inhibit or promote mealtime participation.

Evidence-based practice (EBP) is essential in measuring occupational therapy-specific domains. Numerous evaluation tools are available to evaluate performance-based tasks (fine motor skills, handwriting) in the school environment. These assessments often take a bottom-up approach by using outcome measures to analyze specific skills or identify deficits and delays in children and then compare

them to norm-referenced or criterion-referenced standards (Coster, 1998). School-based occupational therapists play a critical role in evaluating and addressing mealtime challenges as they consider the cognitive, social, physical, emotional, and cultural aspects of the eating and feeding process (AJOTA, 2003).

Occupational therapists possess extensive knowledge and expertise to facilitate participation in mealtimes and school routines and acknowledge feeding and eating as crucial developmental milestones for children as the acquisition of feeding skills has potential medical (nutrition), social (communication), and emotional implications (self-esteem) (AOTA, 2020; Cohn & Lew, 2010). Occupational therapists use myriad strategies and interventions, including sensory approaches, desensitization, operant conditioning, and other oral motor techniques (Cermak et al., 2010; Howe & Wang, 2013). Prior research indicates that mealtime concerns are most effectively addressed as an interdisciplinary team, including an occupational therapist, speech-language pathologist, and physical therapist (Spear et al., 2017). Occupational therapists are integral to students with IDD's educational team, as our expertise in environment and activity analysis supports students' access to curricular and extracurricular activities.

Intended Population and Setting

MEALSS is a screening tool for children with IDD, 5 to 10 years of age, who consume their nutrition by mouth. Since the assessment targets mealtime participation in the school setting, the target population includes students receiving special education services with established Individualized Education Plans in the public school setting. MEALSS can be used for students with reported mealtime concerns by teachers, classroom staff, and related service providers to identify barriers and influences on successful mealtime participation. The results of MEALSS can provide the information needed to guide interventions and determine if further evaluations are warranted or required by related services providers, including speech-language pathology, psychology, and community-based medical providers.

Theoretical Background

MEALSS is guided by the principles of the Occupational Adaptation (OA) model (Grajo, 2019; Schkade & Shultz, 1992). The holistic and person-centered approach of the OA model aligns with assessing the barriers children encounter during mealtimes to facilitate successful participation in feeding and eating. The OA model can be directly applied to children with IDD, as various impairments with sensorimotor, cognitive, and psychosocial skills often disrupt their development and acquisition of feeding and eating skills. This disruption may ultimately affect the individual's ability to adapt to or gain mastery in desired occupations and roles (Grajo, 2019). There are four primary constructs of the OA model: (a) the person who has an intrinsic desire for mastery; (b) occupational environment (demand for mastery), which consists of the settings as well as contexts that impact occupational performance and participation; (c) occupational participation, which includes ADLs, education, work, leisure/play, and social participation; (d) press for mastery, which is a transactional process between the person and the occupational environment (Grajo, 2019). Wilcock (1998) describes adaptation as the product of participation. Therefore, it is imperative to assess participation if adaptation is to be examined.

Adaptation is measured by the concepts of adaptive capacity and relative mastery (Schkade & Shultz, 1992). Grajo (2019) used the analogy of tools in a toolbox to describe adaptive capacity. Adaptive capacity refers to one's ability to identify occupational challenges and then change, modify, or refine responses to related challenges (George-Paschal & Grajo, 2019). Measures of adaptive capacity assess the typical responses to an occupational challenge, the effectiveness of strategies used, the means of

responding to failed strategies, and the variety of strategies used (George-Paschal & Grajo, 2019). Comparatively, the self-evaluation of one's response to these demands is termed relative mastery. Relative mastery is measured in terms of efficiency, effectiveness, and satisfaction (Schkade & Shultz, 1992).

Primary school-aged children with IDD may present with participation challenges that affect the performance of the occupation of feeding and eating. There may be psychosocial deficits in self-regulation, communication skills, anxiety (history of negative mealtime experiences), social judgment, interpretation of social cues, low self-esteem, and maladaptive behaviors surrounding meals. Students with IDD demonstrate sensory processing deficits, including an aversion to certain foods, textures, and smells. This often leads to picky eating, a restricted diet, and delayed development of oral motor skills. The grading of fine and gross motor movements impacts the student's ability to obtain and set up their meal, use utensils and feed themself, and maintain an upright posture.

The OA model was used to guide MEALSS to not only promote a child-centered approach to understanding children with IDD but also to build a person's adaptive capacity and relative mastery to support engagement in desired occupations and fulfill life roles (Grajo, 2019; Schkade & Shultz, 1992). A valuable aspect of MEALSS is that it is an occupation-focused screening tool that determines how a child's skills, environment, and mealtime behaviors facilitate or restrict mealtime participation in the school setting. MEALSS supports the distinct value of occupational therapy services because it is based on the four constructs of the OA model: the student, who has an intrinsic desire for mastery; the occupational environment, which consists of the settings as well as contexts that impact occupational performance and participation; occupational participation; and the press for mastery (Grajo, 2019). Coster (2008), in her Slagle lecture, discusses the importance of ensuring that our chosen assessment measurements capture the client's richness and complexity. MEALSS can capture this "richness" by assisting the occupational therapist with not only identifying inhibitory and supporting factors of mealtime participation but also helping with the development of a comprehensive occupational profile that includes the child's occupational history, experiences, patterns of daily living, interests, values, and needs (AOTA, 2020; Bowyer et al., 2008).

Test Item Construction

MEALSS is influenced mainly by the following standardized tools: The School Function Assessment (SFA) (Coster et al., 1998), The Brief Assessment of Mealtime Behavior in Children (BAMBIC) (Hendy et al., 2013), The Short Child Occupational Profile (SCOPE) (Bowyer et al., 2008) and The Vineland Adaptive Behavior Scales (VABS-3rd) (Sparrow et al., 2016). The feeding and eating items of the SFA help measure the student's overall level of function in that area but fail to detail all the possible influences on mealtime participation, including contexts and cognition (Coster et al., 1998). The BAMBIC measures inappropriate behaviors reported in children with feeding problems (Hendy et al., 2013). It is a 10-item rating scale completed by parents that looks at three main feeding problems: limited variety, food refusal, and disruptive behavior (Hendy et al., 2013). While it is a helpful screening tool to gain information about a child's eating behaviors, its limitations include that the results depend on the parent's perception of the feeding problem and may not reflect an unbiased picture of the mealtime behavior. The SCOPE helps describe an individual child's occupational participation by assessing their skills, habituation, volition, and the environment (Bowyer et al., 2008). While SCOPE helps to generate a profile of strengths and weaknesses affecting a child's occupation, it very broadly covers activities of daily living, and there are no specific feeding or mealtime items (Bowyer et al., 2008). The VABS-3 assesses

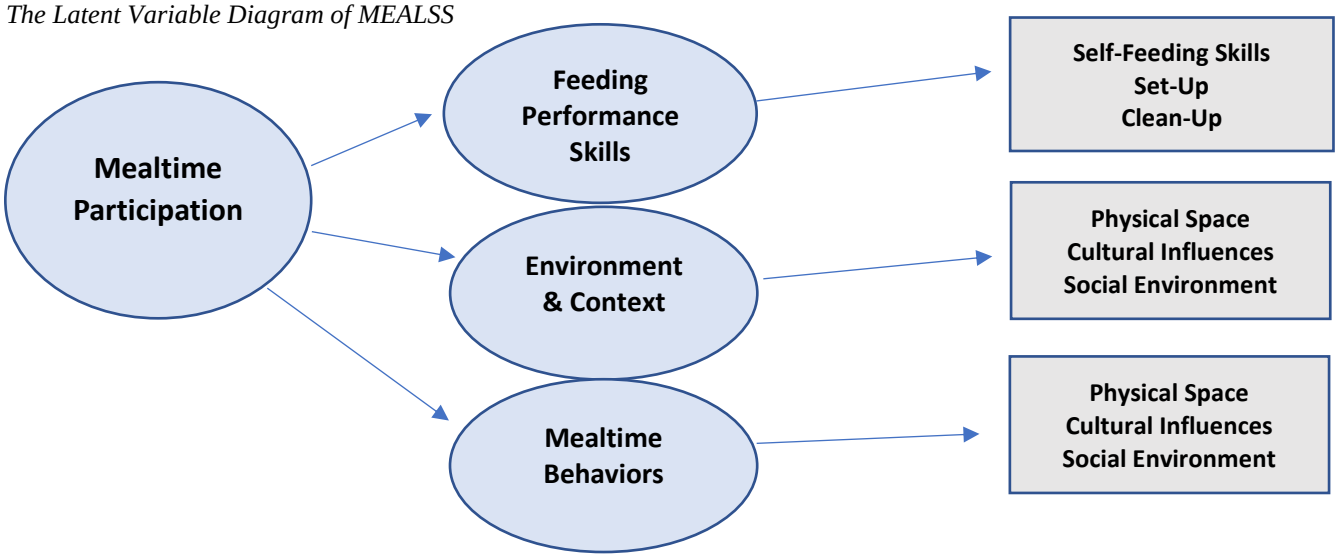
individuals with intellectual, developmental (including autism), and other disabilities (Spear et al., 2017). The VABS-3 assesses the domains of communication, daily living skills, socialization, motor skills (optional), and maladaptive behaviors (optional) (Spear et al., 2017). The daily living skills domain assesses the individual's performance of the practical, everyday tasks of living and measures what the person does in real life vs. in a testing situation. There are parent/caregiver, teacher, and interviewer forms to compare responses. As with the SFA, the VABS-3 also does not possess specific items that capture all that may inhibit mealtime participation within the school setting. Therefore, this further highlights the gap in available assessment tools to evaluate mealtime participation in school.

MEALSS will guide the therapist in identifying the inhibitory and facilitating factors that influence mealtime participation. The latent variable measured by MEALSS is mealtime participation. Multiple sub-latent variables exist, feeding skill performance skills, environment, contexts, and mealtime behaviors. To better understand these sub-latent variables, specific observable variables are described below.

- Feeding performance skills examine inhibiting or supporting factors, including accessing food items, independence with self-feeding skills (utensil use, finger feeding), setting up the meal, opening packages, and cleaning up.
- Environment and Context include an assessment of the physical space, including noise, lighting, temperature, visual distractions, availability of various foods, cultural and social influences, and physical barriers.
- Mealtime Behaviors examine the student's ability to follow the expected mealtime routine and rules at school, the variety of foods consumed, adequacy of nutrition intake, and perceived mealtime success and satisfaction.

Figure 1

The Latent Variable Diagram of MEALSS



Study Aims

This study aimed to determine the preliminary content validity and clinical utility of MEALSS. This study specifically aims to answer the following questions:

1. Do the items of MEALSS represent content valid items for inclusion in the assessment of mealtime participation within the school environment as determined by a panel of content experts?
2. Is MEALSS a screening tool that can be practically used by school-based occupational therapists in daily practice and accurately identify influences on measuring mealtime participation?

Method

Study Design

The present studies measured the content validity and the clinical utility of MEALSS using instrument development design. The preliminary content validity of MEALSS was assessed through a panel of five experts. Clinical utility was assessed through a descriptive survey. Establishing content validity is regarded as foundational to the development of an instrument (Allen & Yen, 2002). An assessment is deemed to have adequate clinical utility when found to be clinically feasible and valuable regarding the length of administration, cost, and ease of administration (Schwartz et al., 2016). Both studies were approved by the Institutional Review Board (AAAU3379, AAAU5614). All participants consented to participate in the study via an electronic form.

Study Participants

Content Validity

Content experts were recruited from the researcher's network and hand-searching pediatric occupational therapy scholars via their faculty web profiles. The researchers recruited seven content experts, and five completed the consent process. The experts were recruited based on the following criteria: seven or more years of clinical experience with school-aged children with intellectual and developmental disabilities or students presenting with related challenges; extensive experience or training with eating and feeding difficulties with school-aged children; publication of a peer-reviewed article; or completion of research in feeding for school-age populations.

Clinical Utility

The participants were recruited through a convenience sample from the investigator's network of school-based occupational therapists working in public schools (location removed for peer review). The inclusion criteria were English-speaking school-based occupational therapists residing in the United States who are currently licensed and practicing in pediatric occupational therapy and have at least one year's experience administering pediatric school-based assessments. Twenty participants completed the consent process. Of the twenty participants, 8 had 1-10 years of experience as an occupational therapist in pediatrics, 4 had 11-15 years of experience, and 7 therapists had over 16 years of experience.

Instrument

MEALSS is a non-standardized, ipsative, and descriptive screening tool to assess mealtime participation in the school setting in children with IDD. It is administered through observation during a meal at school, with supplemental information gathered via an interview with teachers and classroom staff before the screening. The tool is intended to be used when initial concerns regarding mealtime challenges are observed and reported by the student's teachers, school staff, or related service providers as a screening tool to identify potential barriers and restrictions that may impact mealtime participation. The tool is written in English, with terminology considerations relevant to American culture. Cultural and social

influences will need to be considered when using the screening tool as students whose households or backgrounds are not based on the American culture may present differently concerning what test items are considered inhibiting or supporting with respect to mealtimes. There are three domains to identify the supportive and inhibitory factors of overall mealtime participation: mealtime performance skills, environment and contexts, and mealtime behaviors.

- *Feeding performance skills* are measured by observing the student's ability to gather or obtain their food items from either their lunch bag or from the cafeteria line, the student's ability to open packages and set up their meal, the student's ability to self-feed, including finger feeding, utensil use, and cup drinking, and last the student's ability to wipe their face and hands as well as clean up their meal and the area in which they consumed the meal.
- The *environment* is measured by examining the physical environment in which the student is eating, including the noise level, lighting, temperature, physical barriers, difficulty navigating the environment, the available space proportionate to the number of students, and the presence of visual distractions. The *context* is assessed by observing social and cultural influences during meals, including that the mealtime environment is free of bullying and that the availability of a variety of foods meets the student's cultural, dietary, and religious needs.
- *Mealtime behaviors* assess the ability of a student to follow the expected mealtime routines and rules in school, which include communicating with an appropriate volume of their voice, staying seated during the meal as well as the consumption of a variety of foods, adequacy of nutritional intake, and successful attempts to fulfill nourishment for sustained energy and endurance to participate not only in their meal but in their classrooms for the duration of the school day. Table 1 enumerates the test items and scoring criteria of MEALSS.

The MEALSS rating scale uses a 4-point rating scale abbreviated as the FAIR scale (facilitates, allows, inhibits, restricts) and helps to generate a profile of strengths and weaknesses affecting a child's occupation (Bowyer et al., 2008). MEALSS is scored using ordinal data according to a 2-point rating scale of *Supportive of Mealtime Participation* or *Inhibiting Mealtime Participation* and with descriptive criteria for each item to guide the rater in assessing each variable. The assessor will check the corresponding box next to *supportive* or *inhibiting* for each item based on their observations during the meal. A rating of *inhibiting* indicates that the observable variable is restricting or is a barrier to participation during the meal, and a rating of *supportive* indicates the observable variable is facilitating mealtime participation. For example, when assessing feeding performance skills, if a student can feed themself independently using a fork, the skill will be rated as *supportive* of participation. If the student can use a fork with moderate to maximal adult assistance, the skill will be rated as *inhibiting*, as the need for moderate adult assistance inhibits participation. A summary of ratings is recorded to identify trends regarding where the most inhibitory factors restricting mealtime participation lie. This information will help guide intervention approaches and determine the need for further assessment.

Table 1

Test Items and Scoring of MEALSS

Item	Supporting Factors	Inhibiting Factors
Gather/Obtain Food	Student can gather their food items from the lunch line or their lunch box independently or with minimal adult assistance.	Student can access their food items from the lunch line or their lunch box with moderate to maximal adult assistance
Opening Containers	Student can open food containers and packages independently or with minimal adult assistance.	Student can open food containers and packages with moderate to maximal adult assistance.
Drinking Independence	Student can drink from an open cup, straw, or may need assistance with holding the water bottle independently and with minimal spilling.	Student can drink from an open cup, straw, or water bottle with the help of an adult holding the container but may experience moderate spilling.
Utensil Independence	Student uses utensils to feed self independently or with minimal adult assistance.	Student uses utensils to feed self with moderate to maximal adult assistance
Finger Feeding Independence	Student uses fingers to feed independently or with minimal adult assistance.	Student uses fingers to feed self with moderate to maximal adult assistance
Hygiene During Meals	Student can wipe face and hands during and at the end of the meal independently or with minimal adult assistance.	Student can wipe face and hands during and at the end of the meal with moderate to maximal adult assistance
Meal Clean-Up	Student can throw away disposable lunch tray and utensils, used packages, uneaten food, close and return containers to lunch bag, wipe down space and pick up crumbs independently or with minimal adult assistance.	Student can throw away disposable lunch tray and utensils, used packages, uneaten food, close and return containers to lunch bag, wipe down space and pick up crumbs with moderate to maximal adult assistance
Noise Level	Noise level in the mealtime environment allows for conversations, ability to hear directions/instructions clearly/audibly enough and does not distract from attending to the meal.	Noise level in the mealtime environment is loud impacting the ability to hear conversations, hear directions/instructions and distracts from attending to the meal.
Visual Distractions & Lighting	The environment lighting is not too bright or too dim, there is no cluttering of wall art.	The environment lighting is too bright or too dim, there is cluttering of wall art impacting ability to attend to the meal.
Navigation	The student is able to move about the mealtime environment independently or with minimal adult assistance	The student is able to move about the mealtime environment but may experience challenges (i.e., with turning around, positioning self at the table) needing moderate to maximal adult assistance.
Sufficient Furniture	There is sufficient number of chairs and tables to students in the mealtime environment and meets the student's physical needs. Or there are alternative spaces available for eating.	There are not enough chairs and tables per student or there is a lack of additional supports such as adult assistance or adapted equipment to meet a student's physical needs.
Physical Space	Arrangement of the physical environment is accessible enough to support participation during meals.	There are several features of the environment that are hindering accessibility.
Social Environment	Explicit bullying is not observable or not directly reported by the student, peers, or staff during mealtimes.	There is explicit observable bullying from either peer or staff during mealtimes
Room Temperature	The temperature of the mealtime environment is not too cold or too hot.	The temperature of the room is too hot or too cold impacting the comfort level of the student.
Food Availability	There is availability of a variety of foods (1-2 choices) to meet the student's cultural, religious or diet needs.	There are no available choices to meet the student's cultural, religious, or diet needs.
Mealtime Routine	The student sits during the meal, follows adult directions, and consumes meal within the given time frame independently or with minimal adult assistance.	The student is able to sit for the duration of the meal, follow adult direction and consume meal with moderate to maximal adult assistance
Food Variety	The student eats a variety of available foods (texture, taste/flavor, color, shape) without signs of aversion.	The student demonstrates signs of aversion(gagging or refusal), only eats specific types of food, or only drinks liquids (texture, taste/flavor, color, shape)
Energy and Endurance	The student consumes their meal with no signs of fatigue or decreased endurance observed or reported by staff.	The student consumes their meal with signs of fatigue or decreased endurance observed or reported by staff.

Data Collection

Content Validity

The researchers sent an electronic copy of the screening tool watermarked to prevent copying and distribution to the content experts and a link to the content review survey. To assess the relevance of each item, the content experts used the following 4-point ordinal scale: (1) *not relevant*, (2) *minimally relevant*, (3) *moderately relevant*, or (4) *highly relevant*. For each section of MEALSS, the content experts were allowed to provide feedback and make general comments via open-ended questions.

Clinical Utility

Clinical utility data were collected from school-based occupational therapists who responded to the researcher's email, demonstrating their desire to participate in the clinical utility study. The participants were emailed instructions on how to consent to participate in the study and the details of the 3-hr continuing education course required to complete a Qualtrics survey about MEALSS. The participants attended a virtual 3-hr continuing education course where they reviewed the tool and learned the properties (administration, scoring, and interpretation) of MEALSS. After the continuing education course, clinicians were emailed a QR code and link to anonymously complete an online descriptive Qualtrics survey on a device and location of their choice, taking a maximum of 15 min to complete. The survey consisted of eight demographic, clinical usefulness tools and and open-ended questions.

Data Analysis

Content Validity

Content validity is established by a panel of experts who determine the relevance of instrument items (Lynn, 1986). A minimum of three and a maximum of 10 content experts is needed to establish content validity (Lynn, 1986). In determining content validity, experts have historically used a 4-point scale to avoid a neutral midpoint (Lynn, 1986). A score of 3 (*moderately relevant*) or 4 (*highly relevant*) was interpreted as being essential and relevant to measuring the identified construct. Content validity was determined by calculating the item and scale validity indexes (I-CVI/S-CVI) from experts' ratings. The following formulas were used to calculate the content validity index (I-CVI) and scale content validity index (S-CVI):

Entity	Formula
I-CVI =	$\frac{\text{(number of experts that scored 3) + (number of experts that scored 4)}}{\text{(total number of content experts)}}$
S-CVI =	$\frac{\text{(sum of all I-CVI scores)}}{\text{(total number of scored items)}}$

To support the interpretation of the I-CVI scores, Davis (1992) established the following criteria: greater than or equal to 0.80 indicates excellent content validity; a score of 0.70 indicates a revision of the item is needed; and less than 0.70 targets an item for removal. A multi-rater modified kappa statistic is needed to accompany CVI to account for chance agreement from multiple content raters (Wynd et al., 2003). To determine the modified kappa (k*) statistic, researchers first calculated the probability of chance (Pc) with the formula referenced by Polit et al. (2007). The N is representative of the total number of content experts (Pc = 0.5N).

The definition of k^* is:

$$k^* = \frac{P_o - P_c}{1 - P_c}$$

Where p_o is the relative observed agreement among raters, and p_e is the hypothetical probability of chance agreement, using the observed data to calculate the probabilities of each observer randomly seeing each category. If the raters are in complete agreement, then $k^*=1$. If there is no agreement among the raters other than what would be expected by chance (as given by p_e), then $k^* = 0$ (Wynd et al., 2003).

Wynd et al. (2003) identified the following parameters for interpreting modified k: ≥ 0.75–100 (*excellent*); 0.60–0.74 (*good*); 0.40–0.59 (*fair*); and < .40 (*poor*)

Clinical Utility

The data collected from the clinical utility survey were analyzed for descriptive information, such as frequencies and percentages, in the survey software Qualtrics. Initially, 29 school-based occupational therapists responded as interested in the survey, and 20 occupational therapists completed the survey.

Qualitative data were analyzed using a collective case study methodology. This methodology uses a common set of questions to understand the participants' experiences and gain experiential insight by combining common themes and experiences simultaneously (Balog, 2016). This methodology was used to understand individual and collective experiences when examining MEALSS. The participants were asked to respond to Likert-type questions and comment with detail.

Trustworthiness in qualitative data was established using qualitative confirmability methods (Krefting, 1991). An audit trail was used to establish that the findings were purely based on the participants' responses, not the researchers' preconceptions and biases. The principal investigator (KH) and co-author (JG) formed clusters of themes from highlighted statements of participants' responses to each question. Themes were then coded and cross-analyzed for accuracy by the two authors. Lastly, a participant-checking protocol (Guzmán & Grajo, 2022) was completed to ensure the responses and comments accurately reflected their sentiments about MEALSS. The themes were emailed to all 20 participants to verify the accuracy of the themes. There were no objections, and the participants agreed to the veracity of the findings.

Results

Content Validity

Table 2 provides a summary of the content validity indices of MEALSS. The content experts identified 17 of the 18 MEALSS items as essential in measuring mealtime participation in the school setting, as reported by an I-CVI of .75 or higher. Based on comments from content reviewers, the authors rephrased the social context item to be more inclusive of all aspects of social interaction during mealtimes. In addition, based on expert feedback, items that may not apply to students, such as the student-only finger feeds, and a "not applicable" option were added to the scoring form. The room temperature test item was removed completely based on comments from content reviewers, and the energy and endurance item was expanded to include percentages of the meal consumed. Lastly, the furniture and physical space items were combined based on the expert reviewers'suggestions. Overall, the content validation process, with the opportunity for reviewers to comment, provided valuable insight to modify and clarify some of the items and their criteria and make decisions about retaining or revising items on MEALSS. Excellent scale-level content validity was noted by a S-CVI score of 0.87. Modified kappa indices supported the validity of I-CVI and S-CVI, as excellent agreement was noted in 17 out of 18 assessment items. The modified kappa statistic aligned with the I-CVI finding as the one item that was targeted for removal also had the lowest level of agreement amongst raters. Table 2 provides a summary of the content validity indices of MEALSS.

Table 2

Content Validity Indices and Modified Kappa Statistic of MEALSS

MEALSS Item	Highly Relevant	Moderately relevant	Minimally relevant	Not relevant	I-CVI	k*
Gather/Obtain Food	2/3	1/3	0	0	1	1
Opening Packages	2/2	0	0	0	1	1
Drinking Independence	2/2	0	0	0	1	1
Utensil Independence	3/4	1/4	0	0	1	1
Finger Feeding Independence	2/4	1/4	1/4	0	.75	.75
Hygiene During Meals	2/4	1/4	1/4	0	.75	.75
Meal Clean Up	1/3	2/3	0	0	1	1
Noise Level	0	2/2	0	0	1	1
Visual Distractions & Lighting	4/5	0	1/5	0	.8	.8
Navigation	2/4	2/4	0	0	.75	.75
Sufficient Furniture	1/3	2/3	0	0	1	1
Physical Space	0	2/2	0	0	1	1
Social Environment	2/5	1/5	2/5	0	0.6	0.6
Room Temperature	1/2	1/2	0	0	1	1
Food Availability	4/5	1/5	0	0	1	1
Mealtime Routine	2/3	1/3	0	0	1	1
Food Variety	3/3	0	0	0	1	1
Energy/Endurance	1/1	0	0	0	1	1
						S-CVI = 0.87

Clinical Utility

Table 3 summarizes the demographic data from the survey. The responses showed that 94% (n = 18) of the participants indicated that MEALSS was quite or extremely easy to use. Almost all of the participants who responded (95%, n = 19) indicated that MEALSS was either quite or extremely accurate in identifying and measuring mealtime challenges in the school setting. Seventy-nine percent of participants (n = 15) indicated they were quite or extremely likely to use MEALSS in their practice.

Table 3

Clinical Utility Demographic and Descriptive Data

State of Residence (n=20)	**N**
North Carolina	20
Years of Experience (n=19)	n (0%)
1–10 years	8
11–15 years	4
More than 16 years	7
Pediatric Practice Experience (n = 19)	n (0%)
1–10 years	8
11–15 years	4
More than 16 years	7

Qualitative

Three general themes were derived from the survey's open-ended comments.

Theme 1. MEALSS provides valuable information and is easy to use. Most of the respondents described MEALSS as easy to use and provided valuable information regarding what factors may inhibit mealtime participation in the school environment.

- "This can be used during a simple observation wherever the student is receiving their meal (either in the cafeteria, classroom, or instructional kitchen)."

- "This tool provides a great opportunity to obtain specific information that can easily be relayed to those working with students on barriers to mealtime participation and provides a framework to address changes that may better support a student's mealtime participation."
- "Making the observation without singling out the child if their mealtime environment is the cafeteria."

Theme 2. MEALSS is a potentially useful tool in school-based practice. Most of the respondents indicated that they would use MEALSS in their school-based practices, as the following comments demonstrate:

- "Within an OT department, there are so many levels of knowledge when it comes to feeding, and this would serve as a good standard protocol for how we look at feeding in the school setting."
- "I think it is a very valuable tool for looking at feeding challenges in the school setting."
- "It provides a structured view of how to complete a mealtime observation and what specific items to look for."

Theme 3. MEALSS can potentially be used as a training or education tool with school staff about factors that inhibit or support mealtimes and what can be done to address them. Several of the respondents commented that MEALSS would be a valuable tool to educate and train classroom staff about the importance of mealtime participation in the school setting and help guide interventions and next steps.

- "It opens up conversation with school staff about using the tool and how they may be inhibiting or supporting the kids."
- "Results may be different from parents' concerns/what they observe at home based on the environmental differences, but it will glean good information for school-based practice/support, and many areas will overlap between home and school."

Discussion

One of the core functions that impact the life quality of students with IDD is feeding and eating. No existing tools are currently available for school-based occupational therapists; therefore, there is a need for assessments that identify the influences and barriers to mealtime participation in the school setting. This study aimed to determine whether the test items in MEALSS are essential in measuring its primary constructs of mealtime participation and the clinical use of MEALSS. Ninety-four percent of the test items were deemed essential by the content experts. The assessment item regarding physical space was not eliminated, even though an I-CVI score of 0.60 was noted. This item was regarded as critical to identifying barriers and supports to mealtime participation; it was maintained in the assessment but revised and combined with sufficient furniture.

There were many positive perceptions of the clinical utility of MEALSS, providing insight into the ease, usefulness, and accuracy of this tool in school-based occupational therapy practice. The qualitative data demonstrated a strong positive response to the clinical utility of the tool. According to the participants, MEALSS has the potential to be a useful screening tool for pediatric occupational therapists to identify and address mealtime challenges in school-aged children. Specifically, occupational therapists commented on how any therapist can use the tool regardless of years of experience or specialized training in feeding and eating. In addition, MEALSS provides guidance and a structured way to assess mealtime participation and determine the supporting and inhibiting factors versus completing a functional observation.

AOTA (2020) recognizes how essential it is for a child to eat and feed themselves as a daily living skill. They also acknowledge feeding and eating as crucial developmental milestones for children. The occupation of eating supports a child's growth, learning, and interactions with others by providing nutrition and opportunities to socialize (Morris & Klein, 2000). Feeding difficulties are prevalent in 90% of children with disabilities, limiting participation in the essential daily occupation of eating and feeding (Estrem et al., 2018; Maynard et al., 2020). No pediatric feeding assessments that address mealtime participation or feeding assessments based on the school setting have been validated. MEALSS would fill this need by providing school-based occupational therapists with a tool to help identify barriers to participation and how to address those barriers effectively.

The present research broadens the use and validation of pediatric assessments for school-based practice and extends our scope of practice. MEALSS is a screening tool that detects mealtime challenges in elementary school children. It may be used as a baseline measure to guide services and care plans provided by occupational therapists in the school setting.

The generalizability of this study may be limited in clinical utility as the participants were all from one geographical location in the Southeastern United States. This omission may exclude the increasing racial and ethnic diversity in the United States and the differences in how school-based occupational therapy services are provided from state to state. In addition, it is essential to note that the 3-hr training that the occupational therapists participated in for the purposes of this clinical utility study will not be a requirement moving forward.

This study provides preliminary evidence of the validity and clinical usefulness of MEALSS as a screening tool. The findings are encouraging as the existing challenges of defining the constructs of mealtime participation and developing functional measurement tools to capture these constructs need to be improved, especially in the school setting. Established content validity and clinical utility will provide the foundation for examining construct validity and inter-rater reliability. In addition, feedback obtained from this study indicates that the tool should be expanded to include preschool and secondary-aged students and that multi-disciplinary use should occur. The promising preliminary results of the current research contribute to the literature as the first mealtime screener designed for the school setting.

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Karen Howarth has been a licensed and board-certified pediatric occupational therapist for the past 23 years. Dr. Howarth has worked in various settings, including the neonatal intensive care unit, children's rehabilitation hospitals, pediatric and cardiac intensive care units, outpatient clinics, early intervention, and most recently, the public school system. Dr. Howarth has extensive and specialized training in pediatric feeding difficulties and disorders, including premature infants, children with Cerebral Palsy, transitioning children from tube feeding to oral feeding, children with Avoidant/Restrictive Food Intake Disorder (ARFID), and Autism.

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