TPM Vol. 32, No. S7, 2025
ISSN: 1972-6325
https://www.tpmap.org/

Open Access

DEVELOPMENT AND PRELIMINARY VALIDATION OF ACTIVITY CARD SORT FOR ADOLESCENTS AND ADULTS WITH AUTISM SPECTRUM DISORDER IN TAMIL NADU INDIA: AN INSTITUTION VERSION

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ABSTRACT

Purpose: Occupation is central to occupational therapy, where client engagement indicates health and well-being. The Activities Card Sort (ACS) is a key measure used to identify participation level in daily activities within a population. This study aimed to develop an Indian version of the ACS for adolescents and adults with autism spectrum disorder (ACS-IAAASD) specific to Tamil Nadu, India and to identify the most relevant activities for Indian adolescents and adults with autism spectrum disorder within their culture.

Methods: A mixed-method approach was used to generate and validate items, followed by a pilot study to assess the internal consistency of the ACS-IAAASD.

Results: The ACS-IAAASD included 79 activities and identified domains of occupation showing a high Cronbach's alpha of 0.89 and a content validity index of 0.98.

Conclusion: The ACS-IAAASD is a reliable tool for assessing engagement in this population; however further study of its psychometric properties is necessary to explore its other types of reliability and validity to standardize the tool.

Keywords: Autism, Occupation, Activity Card Sort, Participation.

INTRODUCTION

Occupation encompasses everything we do in our daily life, including actions, activities, thoughts, and ways of being (Christiansen et al., 2005). The emphasis on this occupation is a central concept to the practice of occupational

therapists (OT) (Youngstrom, 2002). This ideology has been endorsed by the World Health Organization (WHO) through the development of the International Classification of Functioning, Disability and Health (ICF). According to the ICF, participation in daily life activities—as part of one's occupation—is a key aspect of functioning, regardless of any health condition or disability, and should encompass full physical, mental, and social involvement (World Health Organization, 2001). Participation is a multidimensional construct central to the framework of occupational therapy and the ICF. It reflects an individual's involvement in meaningful daily activities, which is influenced by both personal capabilities and environmental factors. Enhanced participation supports better health outcomes, promotes well-being, and increases overall life satisfaction (McCollum et al., 2015: Berg et al., 2015).

In line with this, the fourth edition of Occupational Therapy Practice Framework (OTPF) is also emphasizing engagement in occupation to support participation, underscoring the profession's understanding of occupation and its impact on health and highlighting the natural transition to meaningful real-life circumstances. (Youngstrom, 2002). So, participating in daily occupation will determine the level of engagement of a person in their activities of daily living.

In occupational therapy, evaluating the level of participation is crucial for assessing an individual's abilities and limitations in their occupations (Madroñero-Miguel & García, 2023). OT emphasizes individuals in engaging in meaningful occupations, which facilitates their participation in daily life activities. This approach is recognized as the primary focus of occupational therapy (Youngstrom, 2002). When considering this factor, the Activity Card Sort (ACS) is an excellent tool for measuring participation levels and difficulties in activity of daily living (ADL). ACS allows OTs to assess their clients' participation in instrumental, leisure, and social activities (Katz et al., 2003), as well as their level of engagement in these activities (Gustafsson et al., 2017). This tool uses sorting picture cards instead of questionnaires, simplifying the detection of the meaning of the activities for people with low comprehension, memory, or learning issues, which can increase their motivation (Katz et al., 2003). ACS usually measures an individual's participation through self-assessment rather than assessments from parents or caregivers (McCollum et al., 2015). The ACS is available in different versions, developed to meet the specific needs of various age groups and cultural backgrounds. This allows OTs to comprehensively assess participation level of occupation that are sensitive to individual and cultural differences (Alegre-Muelas et al., 2019). Most versions of the ACS are designed for healthy populations, with only a few studies adapting it for medical conditions such as multiple sclerosis (MS) and post-stem cell transplant patients (Goverover et al., 2020; Lyons et al., 2010). When considering the application of the ACS applying to autism spectrum disorder (ASD), a deep understanding of the condition is necessary.

Autism Spectrum Disorder (ASD) is a brain development disorder that affects how people perceive and interact with others, making social interaction and communication challenging (American Psychiatric Association, 2013). Individuals with ASD frequently experience impairments in daily living skills (DLS), making it difficult for them to live independently (Bal et al., 2015). Longitudinal research provides compelling evidence that DLS improves during childhood and early adulthood but often plateaus in late adolescence (Bal et al., 2015). However, individuals with ASD may face DLS challenges due to various factors, including age, intelligent quotient (IQ), intellectual disability, and the level of parental support (Duncan & Bishop, 2013; Smith et al., 2012).

At a young age, verbal IQ, mental age, language, and lack of nonverbal skills are more accurate indicators of ADL deficits (Bal et al., 2015). Behavioral disorders such as anxiety, tantrums, aggression, and hyperactivity, along with emotional problems regularly impact ADLs (Green & Carter, 2011). Additionally, individuals with ASD often struggle to participate in post-secondary education, special education programs, schools, and community settings which further complicates the acquisition of DLS (Lin et al., 2012). Evidence suggests that DLS tend to decline due to increased challenges as individuals transition from adolescents to adulthood (Berg et al., 2015). This is exacerbated by changes in roles and responsibilities, as well as raising societal and parental expectations regarding employment, physical activity, leisure activities, health management, education, and social participation. To address these challenges, there is a need for an age and diagnostic specific tool to measure the participation levels in this population (Berg et al., 2015).

When addressing the above-mentioned issues of ASD in adolescents and adults, along with the need of the assessments to measure participation in daily occupations and implement the ACS for this population, it is evident that few assessment tools exist to measure engagement in daily occupations. The Adolescents and Young Adults Activity Card Sort (AYA-ACS), originally developed for typically developing populations, includes domains such as chores, leisure, social participation, health and fitness, work, education, and parenting (Berg et al., 2015). McCollum et al. (2015) applied the AYA-ACS in a feasibility study involving young adults with high-functioning autism to compare participation levels and identify barriers. The findings indicated reduced participation in chores, social, and educational domains, with minimal engagement in activities such as signing a lease, paying bills, dating, or maintaining long-term relationships. The parenting domain was not applicable, as none of the participants were married. However, the AYA-ACS has several limitations, including sampling bias—participants were primarily from urban settings and excluded those aged 22–25 living with parents—and limited cultural adaptability (Berg et al., 2015). Moreover, many listed activities are unsuitable for individuals with ASD due to social anxiety and

restricted social participation (McCollum et al., 2015). Cultural differences further constrain its applicability in Tamil Nadu, where joint family living is common and activities such as signing a lease or dating are less relevant. Consequently, adapting the AYA-ACS for Tamil Nadu adolescents and adults with ASD is not feasible. While numerous diagnostic tools exist for children with autism (Russell et al., 2016; Bel et al., 2015), most rely on parent or caregiver reports. Therefore, there is a critical need for culturally appropriate assessments that directly measure participation in daily activities among adolescents and adults with ASD in Tamil Nadu.

The ACS is one such assessment used for various disabling conditions and is available in different versions sensitive to cultural differences (Bernardo et al., 2020). The ACS can also be easily administered to individuals with lower literacy levels and can accommodate the culture-specific activities as well as subcultural variations within a country (Eriksson et al., 2011). Clinically, the ACS is used as an outcome measure, a tool for intervention planning, and as an initial assessment (Doney & Packer, 2008). Due to its feasibility and adaptability to different cultural contexts, this study was conducted to adapt the ACS methods to the Indian context.

In India, approximately 2.3 million children are affected with ASD (Nayak & Math, 2024). India is a vast country with 28 states and 8 union territories, each having its own languages and cultural practice. This diversity results in significant variations in activity participation and engagement, influenced by cultural differences, which are more pronounced compared to other countries (Tiwari & Pandey, 2013). A few studies have examined cultural variations in Activities of Daily living (ADL) and Instrumental activities of daily living (IADL) among the elderly population in different regions of India (Fillenbaum et al., 1999; Mathuranath et al., 2005; Ohri et al., 2014; Singh et al., 2007). Similar scenarios apply to adolescents and adults, where cultural diversity impacts daily activities. Moreover, in the Indian context, there is a lack of assessment tools for individuals above the age of 18 and insufficient research on adults with ASD (Nayak & Math, 2024). Globally, and specifically in India, there is limited information available about participation patterns of daily living tasks among adolescents and adults with autism (Wang & Berg, 2013). However, a scoping review revealed that there have been no studies conducted on the use of ACS in the Indian population (Vetrayan et al., 2024). To address this gap, the current study aims to identify and validate the most common activities of adolescents and adults with ASD and to develop an Indian version of the ACS for this population (ACS-IAAASD).

METHODS

The development of ACS-IAAASD occurred in two phases. Phase 1 involved item generation for ACS-IAAASD using qualitative approach, where data was collected through semi-structured interviews and a paper based seven-day activity diary sheet (Hoyt et al., 2020). Phase 2 consisted of test construction and a pilot study using a quantitative design. Participants for these both phases were selected based on the inclusion criteria, which includes adolescents and adults diagnosed with ASD, and the diagnosis was obtained from the physicians, both gender aged between 17 and 35 years were selected to keep the sample represent the transition period of adolescent to adults, having IQ score above 70 were selected to make sure the samples to be understand the instruction and questions ask by the interviewer, a social behavior score between 60 and 75, and an adaptive behavior score below 85. Screening was conducted using standard scales such as the Wechsler Abbreviated Scale of Intelligence, Second Edition (WASI-II), Social Responsiveness Scale, Second Edition (SRS-2) and the Vineland Adaptive Behavioral Scales, Third Edition (Vineland-3). Participants with severe cognitive or physical impairments were excluded from the study. Creswell and Clark's (2017) methodology for the development of measurement tools was used in this study. It consists of eight steps starting from determining what to measure to optimize the length of scale. Phase I of the study follows Step 1 to 4 and Phase II follows Step 5 to 8 to complete the standard methods of development and validation of the instruments. Email approval was obtained from the author of ACS to use its methodology to this current study. The Institutional Ethical Committee (IEC) approval was obtained for this study (IEC Number 005/12/2021). Also, the approval letter and consent were obtained from each institution and participants before the data collection.

Phase I - Item generation for ACS-IAAASD

Thirty-four adolescents and adults were selected for this phase using the purposive sampling method, based on the specified inclusion and exclusion criteria mentioned above. Participants were recruited from various special school with residential setups across different geographical locations in and around Tamil Nadu state, India, to ensure a diverse range of perspectives. A semi structured interview was conducted using open-ended questions such as “What was your morning like?”, what did you do during the daytime?”, “what was your evening/night like?” Additionally, a paper-based seven-day activity diary was completed. The study included 26 (76.5%) males and 8 (23.5%) females adolescents and adults with ASD with mean age of 20.69 years (SD = ±2.24) for males and 20.87 years (SD = ±3.04) for females. All responses were recorded, transcribed and coded into relevant domains. Everyday activities mentioned by the participants were extracted and interviews conducted until saturation was reached. Saturation was determined based on the concept by Hsieh and Shannon (2005), where the repetition of the same activities and the lack of new activities indicated the saturation point. Any activities that overlapped within domains were removed or rearranged. Activities frequently mentioned in a paper based seven-day activity diary

sheet were included in the list of activities for the ACS-IAAASD. A photograph was taken to capture images of individuals performing the activities in their real environments to help prompt the subjects to recall their level of participation in these activities. The image excluded any seasonal or geographical representations (Berg et al., 2015; Sachs & Josman, 2003).

Phase 1 - Content Validation

Following the item generation process, all activities were assessed for content validity using two rounds of the Delphi techniques by using the online survey method, a method commonly employed in the development of other versions of the ACS. (Berg & LaVesser, 2006).

Delphi Round I - Activity generation and categorization

The extracted list of activities and corresponding photographs was provided to a group of 10 content experts, including five occupational therapy experts with PhDs and at least five years of experience working with adolescents and adults with ASD, as well as five caregivers of adolescents and adults with ASD. These caregivers spent nearly 75% of their time with participants, enabling them to accurately identify the everyday activities in which the participants engaged. Content experts were requested to match the activities with real life photographs to enhance the face validity of the scale. A minimum of 50% agreement among the expert group was required for the activities and photographs to be accepted. Any discrepancies or mismatches between activities and photographs were analyzed and corrected, with duplicates removed. Once the activities and photographs were finalized, they were sent for the second round of the Delphi survey to rank the activities for ACS-IAAASD.

Delphi Round II - Ranking activity ACS-IAAASD VERSION 1

The activities and photographs included in ACS-IAAASD were sent to the same experts group from Delphi round I to rank the activities using a scale designed to assess how often participants perform these activities. A tent card was used to display the rating scale during the Delphi II survey. The scale ranged from 0 to 4.

"0 = Nobody does this activity"
"1 = Common but usually someone else done this activity"
"2 = Some adolescents and adults with ASD do this activity"
"3 = Many adolescents and adults with ASD do this activity"
"4 = Most adolescents and adults with ASD do this activity"

After the ranking was completed, the activities performed by many and most adolescents and adults with ASD were included in version 1 of the ACS-IAAASD. Based on 70% of the expert agreement with a cutoff score of 2.70 was applied to ensure that the activities included in the ACS-IAAASD list were both common and frequently used in the daily lives of adolescents and adults with ASD. This cut of score was adapted based on the study development of Arabic-preschool activity card sort (A-PACS) (Malkawi et al., 2014). The cutoff score was also set to maintain the number of items below 100, aligning with the structure of other developed versions of the ACS. Version 1 of ACS-IAAASD was then used for pilot study.

Phase 2 - Pilot Study: Checking Psychometric Properties for ACS-IAAASD VERSION 1

After ranking the most performed activities by adolescents and adults with ASD in Tamil Nadu population, a pilot study was conducted to assess the psychometric properties of ACS-IAAASD Version 1. A total of 25 participants, aged between 17 to 35 years, were included in this pilot study, following the same selection criteria used in the previous phase. Participants were recruited from special schools with residential setups in and around Madurai, Tamil Nadu. The selected participants were administered ACS-IAAASD Version 1 using Q-sort methodology. They were asked to sort the cards into five categories based on their level of participation: (1=I do now, 0.5=I do less, X=I wish to do this in future, 0=I gave up, 1=I had done previously). The total score for each category was calculated to determine the level activity participation. The current activity score was obtained by adding the scores from category 1 and 2. The retained activity score was calculated by dividing the current activity score by the previous activity score. A reliability test was conducted to calculate Cronbach's alpha using the total score of both the overall items and the items within each subdomain. Initially, Cronbach's alpha was calculated for all activities from ACS-IAAASD version I, and criteria were set so that only those activities and subdomains with a Cronbach's alpha value between 0.70 or above were included in ACS-IAAASD version 2. Following the pilot study, content validation of ACS-IAAASD version 2 was conducted by six OT experts with a minimum of five years' experience in treating adolescents and adults with autism. The ACS-IAAASD Version 2, was sent to experts for evaluation, The experts were asked to rate each activity on a tent card using a scale of 1 to 4, Where 1 indicated the item was not relevant to the domain, and 4 indicated the item was highly relevant. Item rated as 3 or 4 were classified as 'agreed', while those rated as 1 or 2 were classified as 'disagreed'. Based on these ratings, the content validity index (CVI) was calculated by dividing the number of agreements by the total number of experts. The average content validity index (Ave-CVI) was then determined by taking the mean of the CVI scores for all 79 items.

RESULTS

Item generation of ACS-IAAASD

In the item generation phase of ACS-IAAASD, a total of 158 activities commonly participated by adolescents and adults with ASD in Tamil Nadu population was generated. These activities were classified into six subdomains including ADL, IADL, leisure/play, work/school, social participation, and sleep/rest. These activities are unique to Tamil Nadu culture, including practices such as yoga, surya namaskaram, meditation, kabaddi (A kind of sports commonly played in rural areas of India), and festival specific to the cultural context of Tamil Nadu, India.

Delphi Round I

The list of 158 activities accompanied by photographs was provided to 10 experts for content validation, specifically to match each activity with its corresponding photograph. A threshold of ≥50% agreement was set for validation. As a result, 28 activities were removed due to redundancy or because they did not fit into the established domains. After restructuring, a total of 130 activities were finalized in Delphi round I.

Delphi Round II

The 130 activities from Delphi round I were sent to the experts' group for the ranking, from the most common to the least used by adolescents and adults with ASD. After applying the cutoff score, 45 activities were removed from the ACS-IAAASD, as they fell under category 2 and 1, where the activities were less likely to occur or were performed with assistance. This round resulted in a final list of 85 activities in ACS-IAAASD Version I at the end of Delphi round II. The number of items throughout the development process of ACS-IAAASD is represented in (Table 1).

TABLE 1 *Number of Items Throughout the Development Process of ACS-IAAASD*

Steps	Number items at the beginning of steps	Number of items deleted at the end of steps	Final number items
Phase 1: Item generation	Items were extracted from the semi-structured interview by using a qualitative approach	None	158
Phase 1: Delphi Round I	158 activities with photographs were sent to the expert committee	28 items were deleted due to redundancy and not fitting the domains	130
Phase 1: Delphi Round II content validation	130 activities were sent to the expert reviewers to rank from the most common to the least common activities used by adolescent and adult with ASD	45 items were deleted based on a set cut-off score with a mean of 2.70 or above	85
Phase 2: Pilot study	85 items with a high cut-off score of 2.70	Six items and one sub domain were deleted by the set criteria of Cronbach's alpha value of 0.70	79

Pilot study

Six activities were removed due to Cronbach's alpha being less than 0.70. At the end of the pilot study, five subdomains with a finalized list of 79 activities were produced for the ACS-IAAASD version 2. Additionally, the content validation of the 79 items was assessed, yielding a high content validity index (Ave CVI) of 0.98. These results demonstrate that ACS-IAAASD version 2 has good reliability and high content validity. The alpha values of the sub domains in ACS-IAAASD version 2 were listed in (Table 2) and all 79 activities across all subdomains were listed in (Appendix A). The ranking of activities from the most to least common in ACS-IAAASD is listed in (Table 3).

TABLE 2 *Psychometric Properties of the ACS-IAAASD for the Whole Scale and Subdomains*

Subdomains-Items	Cronbach's Alpha Value
ADL	0.90
IADL	0.70
Work /School	0.75
Leisure/Play	0.80
Social Participation	0.73

Overall Cronbach Alpha's for 79 items	0.89

TABLE 3 *Items Included in the ACS-IAAASD, Ranked from Most Common to Least Common Based on Delphi Round II*

Ranking of Activities	Activities	*M*	*SD*
1	Walking	3.70	0.67
2	Watching YouTube	3.60	0.69
3	Feeding	3.40	0.51
4	Eating	3.40	0.69
5	Switch on lights/fans	3.40	0.84
6	Going to school	3.30	0.82
7	Writing	3.30	0.82
8	Face washing	3.20	0.78
9	Watching TV	3.20	0.78
10	Running	3.20	0.78
11	Surya Namaskaram	3.20	0.78
12	Arrange puzzles	3.20	1.01
13	Cleaning rooms	3.10	0.56
14	Going to market	3.10	0.87
15	ADL training	3.10	0.87
16	Video games	3.10	0.87
17	Watching phone	3.10	0.99
18	Reading newspaper	3.10	0.99
Ranking of Activities	Activities	*M*	*SD*
19	Dancing	3.10	0.73
20	Tabletop activities	3.10	0.87
21	Going to park	3.10	0.99
22	Brushing	3.00	1.05
23	Bathing	3.00	0.81
24	Assistance to therapy	3.00	0.81
25	Coloring activity	3.00	1.05
26	Play hand ball	3.00	0.94
27	Yoga	3.00	0.81
28	Jumping	3.00	1.15
29	Listening to music	3.00	1.24
30	Paper cutting	3.00	0.81
31	Going out with family	3.00	0.94
32	Dressing UE/LE	2.90	0.73
33	Combing	2.90	0.73
34	Using public transport	2.90	0.99
35	Taking care of others/children/pets	2.90	0.87
36	Serving food	2.90	0.87
37	Helper skills	2.90	0.73
38	Gym activity	2.90	1.10
39	Foot ball	2.90	0.73
40	Playing keyboard	2.90	0.99

Ranking of Activities	Activities	*M*	*SD*
41	Pushup	2.90	0.73
42	Basketball	2.90	0.87
43	Playing with toys	2.90	0.87
44	Target ball	2.90	0.87
45	Play music	2.90	0.99
46	Gardening	2.90	0.87
47	Going to temple	2.90	1.10
48	Group activity	2.90	0.73
49	Going to shopping	2.90	0.88
50	Putting shoes	2.80	1.03
51	Folding clothes	2.80	0.78
52	OT class/activities	2.80	0.91
53	Going to music class	2.80	0.91
54	Obstacle walking	2.80	1.03
55	Mopping	2.80	0.91
56	Singing rhymes	2.80	0.78
57	Reading books	2.80	1.03
58	Tennis	2.80	0.78
59	Drawing	2.80	1.13
60	Meditation	2.80	1.03
61	Celebrating festival with family	2.80	0.91
62	Greetings others	2.80	0.78
Ranking of Activities	Activities	*M*	*SD*
63	Soaping	2.70	0.94
64	Grooming	2.70	0.94
65	Washing vessels	2.70	0.67
66	Serving tea and snacks	2.70	0.82
67	Playing carrom board	2.70	0.82
68	Cycling	2.70	0.67
69	Kabaddi	2.70	0.82
70	Suttle cock - badminton	2.70	0.82
71	Shot put	2.70	1.41
72	Painting	2.70	0.82
73	Dumbbells	2.70	0.94
74	Ballooning	2.70	0.94
75	Prayer with family/groups	2.70	0.94
76	Play with family members	2.70	0.82
77	Going to amusement park	2.70	1.05
78	Playing music drums	2.70	1.05
79	Going to zoo	2.70	0.94

DISCUSSION

The purpose of this study was to develop and validate a scale to measure the level of participation in culturally relevant daily life activities among adolescents and adults with ASD in the Tamil Nadu population. Data was collected directly from adolescents and adults with ASD, rather than the proxy methods, to enhance face validity. The activities included in ACS-IAAASD were selected because they regularly occur in the participants' natural environments. The ACS-IAAASD encompasses the most common activities engaged in by adolescents and adults with ASD, specifically tailored to the cultural context of Tamil Nadu.

T

he ACS-IAAASD is the first of its kind to be used in an Indian context, addressing cultural variations like other versions, such as the ACS-UK and ACS-HK. India is a vast country with 28 states and 8 union territories, each with distinct cultural practices and languages (Tiwari & Pandey, 2013). The activities in the ACS-IAAASD can serve as a foundational framework, allowing culturally specific activities to be added for individual states. Since the ACS is a flexible tool, it can easily accommodate subcultural variations within the country (Eriksson et al., 2011). The ACS has also been validated in different languages (Hamed et al., 2011). While other ACS versions have been developed for older populations, adolescents and young adults, preschoolers, and infants, however, the ACS-IAAASD is specifically designed for adolescents and adults with ASD to the cultural context of Tamil Nadu, India.

After the various phases of this study, the final ACS-IAAASD included a total of 79 activities. This number is consistent with the number of items in other versions of the ACS, such as the original ACS (88 items), A-ACS (88 items), Israeli (88 items), Australia ACS (82items). It also exceeds the number of items in some other ACS scales, such as Infants ACS (40items), ACS-HK (45items). The ACS-IAAASD, with its 79 items, aligns with the ACS used in Korea and the Netherlands (Eriksson et.al., 2011). Additionally, it includes culturally specific activities relevant to Indian culture, such as yoga, surya namaskaram, festivals unique to Indian context.

The domains of the ACS-IAAASD differ from those in other versions of the ACS because the conceptual framework for this scale is built based on the Occupational Therapy Practice Framework (OTPF). The ACS-IAAASD primarily focuses on the domain of occupation in OTPF, with subdomains such as ADL, IADL, leisure/play, work/school, social participation, and sleep/rest. Based on the pilot study, six activities were removed when transitioning from ACS-IAAASD Version1 to Version 2 due to the set criteria of Cronbach's alpha value of 0.70 in the subdomains. Consequently, the sleep/rest subdomain was also removed in ACS-IAAASD Version 2, resulting in a total of five subdomains. While these subdomains correspond to IADL, leisure, and social activities in the 2nd Edition of ACS (Baum & Edwards, 2008) the leisure activities in the ACS-IAAASD are not divided into high- and low-demand activities as they are in the ACS and some other versions of ACS. Since most ACS were developed for the older population, task performance was influenced by energy levels (Katz et al., 2003), which in turn affected participation in daily activities. However, a few ACS versions designed for infants and adolescents and young adults do not categorize activities based on demand levels (Hoyt et al., 2020; Berg et al., 2015). The ADL subdomain is a new addition to the ACS-IAAASD, setting it apart from other ACS versions. Since occupational therapy interventions often focus on assessing ADLs participation, the inclusion of this subdomain is particularly relevant. It is especially useful when planning interventions to improve participation in ADL activities.

The ACS-IAAASD comprises the following subdomains and corresponding items: ADL (10items), IADL (7 items), work/school (11 items), leisure/play (39 items), and social participation (12 items). The largest subdomain, leisure/play, reflects the board range of activities in which adolescents and adults with ASD commonly engage. Participants were from special school residential settings, where they were encouraged to choose leisure activities that promote physical, mental, and social engagement. This emphasis on play activities likely accounts for the greater number of items in this subdomain. Similar findings were reported by McCollum et al. (2015), who observed that young adults with high-functioning autism most frequently participated in leisure activities listed in the AYA-ACS. The ACS-IAAASD also includes some therapeutic activities commonly participated by adolescents and adults with ASD, such as ADL training, obstacle walking, coloring activity, gardening, group activity, tabletop activities and assistance to therapy. These activities often involve regular occupational therapy interventions and participants in special school residential setup occupational therapy interventions are given as a part of package of their services for most of the participants and they engaged in these therapeutic activities. Although some participants are highly skilled in these activities, their engagement depends largely on individual interest and motivation. The ACS-IAAASD enables occupational therapists to identify participation limitations across listed activities. Through targeted interventions-such as adapting or modifying tasks- therapists can address these barriers and enhance participation among individuals with ASD. An optional subdomain was included in the scale to allow for the inclusion of special talented activities that some individuals with ASD may have, such as computer assistance or office tasks. These special activities can be added to the optional subdomain and included in the scoring. This approach is like that of the In-Home Occupational Performance Evaluation (I-HOPE) assessments, which includes an optional subdomain for older populations to capture any missing activities and assess their participation and satisfaction levels (Stark et al., 2010). In top 20 ranked activities of ACS-IAAASD, activities such as watching YouTube, watching TV, playing video games, and using a phone were indicated. This indicates that internet surfing is one of the most common activities among this group, similar to typical emerging adults (Berg et al, 2015).

The significance of the ACS-IAAASD lies in its distinction as the first assessment to incorporate activities representative of adolescents and adults with ASD within the cultural context of Tamil Nadu's special school residential setups, based directly on participant input. This makes the ACS-IAAASD a valuable tool for occupational therapists to assess participation limitations in institutional environments. By incorporating these activities, the assessment serves as a baseline for identifying current activity participation, activities having difficulty in participations, performance levels, and satisfaction in these activities among adolescents and adults with ASD in Tamil Nadu population. This baseline information can inform the development of an initial treatment plan aimed at enhancing occupational participation by adapting or modifying activities selected by the client in which participation is challenging, thereby emphasizing a client-centered approach. Understanding an individual's current activity level helps establish their participation profile, identifying both activities performed with ease and those posing difficulties or desired for future engagement. Assessing their participation levels and related barriers enables targeted interventions to enhance engagement across diverse activities and promote overall well-being. In this way, the ACS-IAAASD contributes to a paradigm shift in the assessment and intervention of adolescents and adults with ASD in Tamil Nadu India

Limitations

This study has several limitations. The sample size was small, but all necessary measures were taken to reach saturation in identifying activities for inclusion in the ACS-IAAASD. Additionally, since the study focused on the Tamil Nadu population, generalizing the activities included in the scale to the entire Indian population is challenging. The data were primarily collected from institutional settings as purposeful sampling techniques, excluding community-based samples, socioeconomic factors and education level variables were not considered in data collection. Due to these limitations, future studies should be conducted in others states of India to achieve broader generalizability. Increasing the sample size, appropriate sampling design and including socioeconomic and education factors would further enhance the study's applicability. Additionally, developing a separate version of the ACS-IAAASD for community-based samples could help identify a wider range of activities. Furthermore, this study focuses on the preliminary stage of tool development and content validation. Since the criterion and construct validity, test-retest reliability and inter-rater reliability of the ACS-IAAASD have not yet been established. Further research is underway to assess its psychometric properties including reliability and validity measures. Ongoing studies also aim to develop a digital version of the ACS-IAAASD to enhance feasibility and to identify barriers associated with least-participated activities.

CONCLUSION

The ACS-IAAASD was developed following standard scale development procedures. The pilot study demonstrated good reliability and content validity, indicating that the 79 activities included accurately represent the participation patterns of adolescents and adults with ASD in Tamil Nadu population. This tool supports the assessment of participation levels and the refinement of intervention strategies to enhance engagement in meaningful activities. Developed within the Indian context, the ACS-IAAASD represents a significant advancement in OT assessment for this population. Further research is warranted to address its limitations and evaluate its psychometric properties.

FUNDING

This study was supported by the Faculty of Associated Medical Sciences and the Graduate School, Chiang Mai University, Thailand.

DECLARATION OF CONFLICTING INTEREST: The authors declare no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

ACKNOWLEDGEMENT:The authors would like to thank all the participants involved in this study.

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APPENDIX A

Sample Activities included in each domain.

ADL	Feeding Eating Brushing Bathing Soaping	Dressing UE/LE Grooming Combing Putting shoes Face washing
IADL	Switch on lights/fans Using public transport Taking care of others/children/pets	Serving food Washing vessels Cleaning rooms Folding clothes
WORK/SCHOOL	OT class/activities Serving tea and snacks Going to market Going to school Going to music class	Writing ADL training Obstacle walking Assistance to therapy Mopping Helper skills
LESUIRE/PLAY	Video games Singing rhymes Watching TV Playing carrom board Coloring activity Cycling Gym activity Watching phone Play handball Kabaddi Running Football Suttle cock-badminton Watching YouTube Reading books Reading newspaper Shot put Walking	Playing keyboard Painting Tabletop activities Pushup Basketball Tennis Yoga Surya Namaskaram Playing with toys Dumbbells Jumping Arrange puzzles Drawing Listening to music Target ball Ballooning Meditation Paper cutting

	Dancing	Play music Gardening
SOCIAL PARTICIPATION	Prayer with family/groups Play with family members Going out with family Going to park Going to temple Celebrating festival with family	Group activity Greetings others Going to shopping Going to amusement park Playing music drums Going to zoo