

Eating skills in children with autism via video modeling: an evaluation of face and content validation

Nurul Khairani Ismail¹, Hasrul Hosshan², Nurbieta Abd Aziz², Abdul Halim Masnan¹,
Norsayyidatina Che Rozubi³, Mohd Muslim Md Zalli⁴

¹Department of Early Childhood Education, Faculty of Human Development, Sultan Idris Education University, Perak, Malaysia

²Department of Special Education, Faculty of Human Development, Sultan Idris Education University, Perak, Malaysia

³Department of Psychology and Counselling, Faculty of Human Development, Sultan Idris Education University, Perak, Malaysia

⁴Department of Educational Studies, Faculty of Human Development, Sultan Idris Education University, Perak, Malaysia

Article Info

Article history:

Received Jun 6, 2023

Revised Jul 18, 2023

Accepted Jul 27, 2023

Keywords:

Children with autism

Content validation

Eating skills

Face validation

Video modeling

ABSTRACT

Children with autism spectrum disorder (ASD) may have their eating habits impacted by their traits, such as difficulty remaining seated at the table and exhibiting behaviors during mealtime. This often worries parents and causes stress and anxiety. Given video modeling's potential in helping children with ASD, experts should evaluate its effectiveness for teaching eating skills due to limited research in this area. Thus, the study aim to evaluate the validity of the developed videos of eating skills for children with ASD. For face validity, a focus group discussion was held to obtain experts' feedback on the eating skills video and was transcribed verbatim. Otherwise for content validity, the experts received content validity assessment forms and guidelines via email and the results was analysed using Microsoft excell. Face validity revealed four themes: suitability of videos, video quality and clarity, video instructions suitability, task analysis arrangement, and "other" recommendations. On the other hand, Video 1 and Video 2 scored 0.93 for relevance, clarity, simplicity, and ambiguity for the S-CVI/Ave (scale-level content validity index based on the average method) which was considered acceptable. Video 3 received a satisfactory S-CVI/Ave score of 0.93 for relevance, simplicity, and ambiguity, but its clarity score at 0.91, and still within an acceptable range, though not particularly high. As a conclusion, all task analyses for the videos met the requirement to be considered acceptable. Addressing the suggestions for improvement can increase the video's efficacy in teaching eating skills and relieving parents' concerns.

This is an open access article under the [CC BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.



Corresponding Author:

Hasrul Hosshan

Department of Special Education, Faculty of Human Development, Sultan Idris Education University
35900 Tanjong Malim, Perak Darul Ridzuan, Malaysia

E-mail: hasrul.hosshan@fpm.edu.my

1. INTRODUCTION

Autism spectrum disorder (ASD) is a neurological developmental disorder characterized by a lack of social communication skills and non-normative behavior [1]. The estimated average prevalence of autism spectrum disorders in Asia, Europe, and North America is 1% [2]. One common concern for parents with children with ASD is eating behavior. Children with ASD have been observed to experience eating problems, as reported by approximately 70% of parents of autistic children [3], [4]. The prevalence of eating problems is higher for children with ASD than for typically developing children [5] and children with other developmental disorders, such as attention-deficit/hyperactivity disorder [6] or other intellectual disabilities [7].

Eating disorders may result from behavioral, cognitive, and environmental factors in children with ASD [8]. Due to the changes in how children with ASD process information, mealtimes can be difficult for them due to the sensory input from both food and their surroundings [9]. Prior research suggests that children with ASD may also experience issues with staying seated at the table during mealtimes [5], [10], [11], gagging [5], closing the mouth tightly during chewing [11], displaying aggressive or disruptive behaviors during mealtime [7], [11] and pocketing food without swallowing [6]. Although children with ASD potentially experience eating problems during their early childhood, these issues typically become resolved with age [5], [6], [7]. Nevertheless, it has been observed that certain behaviors tend to persist during childhood and adolescence, like having food preferences or engaging in the consumption of particular foods [5].

Parents often express concern about eating problems among children with ASD, which represents a source of anxiety and stress for parents [12]. Therefore, it is essential to understand better the issues surrounding this eating problem to expand the evidence base that can be used to develop the most effective intervention strategies for treatment [13]. Previous research has indicated that instructional methods that include aids such as pictures, in vivo modeling, and video modeling are recognized as evidence-based approaches for children with ASD [14], [15]. The video modeling method is based on [16] social learning theory, which asserts that observational learning through modeling profoundly influences children's skill development. As a result of these strategies, individuals with ASD are far more able to process visual information because they are more likely to engage with media support [17]. This strategy can eliminate visual and auditory interfering stimuli and is not stressful for children with ASD [18], [19].

Furthermore, research reveals that children with ASD may be able to understand ideas and circumstances more clearly through "social stories" because it can help children with ASD understand and navigate social situations by providing clear descriptions, desired actions, and familiar social cues [20], [21]. There has been concrete evidence that video modeling, video self-modeling, or social story (or social story combined with video modeling) can improve the social skills of individuals with ASD [22], [23], [24]. However, to date, research and data on video modeling and social stories in improving the eating skills of children with ASD are still limited. Due to the nature of the research, the videos created for this study must be evaluated for quality. Information about measurement instruments in the health field should be evaluated to eliminate or modify unnecessary elements and add pertinent details to improve cohesion [25]. For this reason, experts from the relevant expertise should conduct assessments before the module can be used to ensure the accuracy of the intended measurement items [26], [27]. Therefore, the purpose of the study is to evaluate the validity of the developed videos of eating skills for children with ASD.

2. METHOD

2.1. Research design and expert selection

The study used a methodology known as design and development research (DDR), which is justified due to its pragmatic nature in testing theories and validating practicality that allows for establishing new procedures, techniques, and tools based on a thorough analysis of specific needs. Before the study began, ethical approval was granted from the Malaysia Social Welfare Department (JKMM 100/12/5/2:2022/492) and the Research Management Innovation Centre (RMIC-2022-0527-01) at UPSI. During this phase of the study, we sought feedback from 14 individuals who have expertise in fields such as special education, early childhood education, educational technology, experienced teaching professionals, occupational therapists, and rehabilitation center managers. Among the experts, there were eight university lecturers, three therapists, two experienced teachers, and one rehabilitation center manager. We obtained both feedback regarding content validity and qualitative feedback regarding face validity.

2.2. Video development, testing, and validity

The developed eating skills videos have three sections: introduction, content, and conclusion. In developing the eating video, the research team conducted an extensive literature review to find suitable items, and then the validity was evaluated by 14 experts. Face validity was used to measure whether the videos truly represent their intentions. A semi-structured interview was used to improve clarity, understandability, and congruence. Before the session, the experts were provided with the developed eating video. A focus group discussion (FGD) was conducted after giving experts a certain period. The FGD aimed to get experts' feedback on the developed eating skills video. In the workshop, the experts gave their input on the video, and the sessions were recorded and transcribed verbatim.

Content validity assesses the representation of a concept by an instrument or module [28]. The content validity index (CVI) of the video was determined by four elements, which are relevancy [29] and simplicity, clarity, and ambiguity [30]. The four elements were rated using a 4-point Likert scale. The four elements were marked as one for a total revision, two for major revisions, three for minor revisions, and four for good

condition. The experts were given content validity assessment forms and guidelines on assessing the study's content validity through e-mail. The videos were marked as Video 1 for spoon-eating, Video 2 for fork-eating, and Video 3 for one-handed eating. Scores from the experts were compiled, and the videos were improved based on the experts' suggestions. The data was measured from task analysis proportion, I-CVI as well as video as a whole, and S-CVI [29].

Before calculating the CVI, the rating must be recorded as 1 (scale of 3 or 4) or 0 (scale of 1 or 2). The I-CVI and S-CVI/Ave were calculated from expert scores. The I-CVI was obtained by dividing the scores of the experts in agreement by the number of experts. The S-CVI/Ave was calculated based on the proportion of items on the scale that received a relevance score of 3 or 4 from all experts. Acceptable levels for both I-CVI and S-CVI/Ave were determined as a proportion of rater scores between 0.78 and 1.00, with 14 experts involved [29].

3. RESULTS AND DISCUSSION

3.1. Face validity

According to the expert, the video can be improved by including simple activities for children with ASD and avoiding complicated task analysis without extra sub-skills. The results of this face validity suggest that the videos should be easy, suited to children's level of development, and enjoyable. The memory pattern observed in children with ASD can be conceptualized within the framework of autism as a disorder of the processing of information by the brain [31]. This child seems to struggle with remembering information, whether it's a number of individual elements or a single complicated element, both in written and visual formats [32]. Thus, the task analysis provided to the ASD child should be a single and straightforward task. This is because, for children with ASD, whenever their cognitive load increases, it eventually will result in a decrease in its effectiveness. Single tasks help children focus and avoid overstimulation. It also helps children break down complex activities into simpler ones.

In addition, the experts also provided suggestions regarding safety concerns related to the handling of materials. Improper handling of materials not only affects the clarity of the steps in the video but could also affect the children's safety. Even though injury risks among children with ASD vary by age and demographics, the injury risk among younger children with ASD has been observed as more significant than that among older children with ASD [33]. Children with ASD are more likely to have alleged injuries due to common development delays and motor impairments, with a 3-fold higher risk than their neurotypical peers [33], [34]. On the other hand, children with ASD do not know how to ask for help or self-advocate for themselves, especially in dangerous situations. This is because they need more understanding of basic social communication norms, and processing verbal information and instructions takes more time. Hence, safety precautions should be considered in developing the video for this target population. Some additional background music to the video can make it more engaging for the children and capture their attention, as well as create an element of excitement. Numerous research studies have shown that children with ASD exhibit an affinity for music. In fact, they have been observed to perform on par with their developing peers in this domain [35], [36].

The second theme focused on video clarity, especially shooting angles. Children with ASD need videos or authentic visuals at their eye level to understand what's coming next and reduce their anxiety. The third concern revolves around the appropriateness of the instructions provided in the video. It is beneficial to keep the instructions concise and straightforward. Using instructions with captions can help children better comprehend the content of the video.

The video modeling is used with a social story to teach children eating skills in this module. Social stories offer textual or visual cues and proper responses to assist ASD children in comprehending social situations and becoming autonomous [37], [38]. However, lengthy instructions are discouraged, as this will disrupt the children's learning process as they cannot locate and organize the various elements of the information [39]. Based on Gray [38], it is recommended to have a balance of two to five sentences that describe, provide perspective, and express affirmation for each directive sentence in a story. One of the concerns raised by experts is ensuring that children remain engaged during the session by providing reinforcement after completing task analysis. As mentioned in Bandura [16], video modeling relies on attention, retention, motor reproduction, and reinforcement. In addition, Bandura [16] proposes that individuals learn behavior through observation rather than solely responding to stimuli. In a live setting, the child can watch the model directly or through a video of the model performing the targeted behavior to be imitated and reproduced. According to Fryling *et al.* [40], children tend to imitate or avoid behaviors depending on the negative outcomes they observe from others' actions. However, children with ASD may respond more to tangible than abstract rewards (e.g., verbal praise). This may be because tangible rewards are more concrete and immediate and thus may be more salient to children with ASD. Apart from that, they had some concerns

related to the issues surrounding video production. These concerns include obtaining consent and addressing them from the start of the process. It is also important to establish guidelines.

As known, ASD is complex, and there is no single way to approach teaching a child with ASD. Since ASD encompasses many sub-categories, no two children will have the same symptoms. Although they may behave similarly, they cannot be taught identically. Thus, individualized education manuals are necessary. Therefore, the researcher must provide a manual that will enable the parent to assess the child's learning styles and ensure that the learning environment is adapted and controlled methodically to ensure the child's successful development.

In addition, the instructions should state that children with autism must already be able to imitate before parents can show them the eating skill videos. Imitation has often been identified as one of the fundamental skills necessary for video modeling [41]. Most children with ASD often struggle with imitation skills. However, more information is needed about how these difficulties affect their performance in video modeling [42], [43]. However, based on Bravo and Schwartz's [44] study, children with ASD may perform better on a task involving elicited imitation instead of spontaneous imitation when instructed when to do so. The summary of the face validity result is shown in Table 1.

Table 1. Summary of face validity result

Themes	Comment	Recommendations
Suitability of videos for activities	Eating rice with chicken is difficult	There is no need to add sub-skills for the existing skills. For example, eating chicken by hand, no need for rice with chicken. Carbohydrates, protein, and fiber should be balanced on the plate. Fried rice can replace chicken and rice.
	The plate does not have complete nutrition	
Video quality and clarity	Dull video	Keep children engaged with background music in the video.
	Inappropriate way of holding the materials	Ensure children's safety by holding spoons and forks correctly.
	The shooting angle is not appropriate.	Ensure the model is in front of the camera to prevent the model's excessive movement.
Suitability of the instructions in the video	Lengthy and wordy instruction	The instructions should be short and precise, with a simple caption.
	No introductory part on materials will be used	Materials involved should be introduced first.
Task analysis arrangement	No rewards after completing a task analysis	Put picture assistance in the introductory segment.
	There is no final action after completing a task.	It should come with simple reinforcement (clapping, good job). A task analysis should be added; put the fork and spoon back on the plate after eating.
Other	No comment	Ensure consent is obtained from the child's guardian.
		Modules/videos should come with a personalized manual with clear instructions.
		Videos about pre-imitation skills should be included before eating skills.

3.2. Content validity

The task analysis and qualitative feedback experts assigned scores of 5, 5 and 6 to each video in the CVI form. They evaluated the videos based on criteria such as relevancy, clarity, simplicity, and ambiguity. To meet the required standard of 0.78, all videos had to achieve an S-CVI/AVE score than or equal to this threshold. The study's results indicated that one round of expert evaluations was necessary as shown in Table 2 because all task analyses had an I-CVI and S-CVI/AVE score above 0.78. For video 1, spoon eating, the I-CVI scores for relevancy, clarity, simplicity, and ambiguity were all at a level of 0.93. Similarly, video 2, fork eating, received I-CVI scores of 0.93 for relevancy, clarity, simplicity, and ambiguity. Regarding the one-handed eating, it scored an I-CVI of 0.93 for relevance, simplicity, and ambiguity but scored slightly lower at 0.86 for clarity (specifically steps 3 and 6). Both videos 1 and 2 achieved an S-CVI/AVE rating of 0.93 across relevancy, clarity, simplicity, and ambiguity. On the other hand, when it comes to video 3, one-handed eating, the relevancy score was 0.93, clarity scored 0.91, simplicity scored 0.93, and ambiguity also scored 0.93. Table 2 provides a summary of the scores given by 14 experts for I-CVI and S-CVI/AVE levels.

Content validity involves the extent to which the items chosen accurately represent the variables of the construct being measured [45]. It can offer insights into the inclusiveness and comprehensibility of items, aiding in the enhancement of a tool through the incorporation of suggestions from a panel of experts [46]. A group of 14 experts participated in the study to offer their input on the task analysis of the created videos. As cited by Escobar-Pérez and Cuervo-Martínez [47], a qualified expert has experience in the field, is regarded by others as an expert, and can provide information, evidence, judgments, and assessments. This helps ensure that the video is accurate and effective in teaching children with ASD how to develop appropriate eating skills. The study included experts with content knowledge and experience related to the special needs of children with ASD and experience managing such children. According to their assessment, the video was relevant, simple, clear, and non-ambiguous. Almost all task analyses were considered appropriate and acceptable by at least 12

experts. The video has met its intended purpose, implying its purpose has been achieved. Most items had I-CVIs of 0.93, and the lowest I-CVI was 0.86 for only two items. Polit and Beck [46] advised that the CVI achieves the minimal agreement of 0.78 for more than nine experts defined by Lynn [29] for outstanding content validity.

Table 2. Summary of I-CVI and S-CVI/AVE scores

Task analysis	Relevancy		Clarity		Simplicity		Ambiguity	
	No. of expert agreement	I-CVI	No. of expert agreement	I-CVI	No. of expert agreement	I-CVI	No. of expert agreement	I-CVI
Video 1: Spoon eating								
I grasp the spoon with one hand.	13	0.93	13	0.93	13	0.93	13	0.93
I took the food from the plate.	13	0.93	13	0.93	13	0.93	13	0.93
I brought the spoon and placed the food into my mouth.	13	0.93	13	0.93	13	0.93	13	0.93
I chewed and swallowed the food.	13	0.93	13	0.93	13	0.93	13	0.93
I repeat the same steps until the food runs out	13	0.93	13	0.93	13	0.93	13	0.93
S-CVI/AVE	0.93		0.93		0.93		0.93	
Video 2: Fork eating								
I handled a fork with one hand	13	0.93	13	0.93	13	0.93	13	0.93
I pressed the fork's tips into the food.	13	0.93	13	0.93	13	0.93	13	0.93
I brought the fork and put the food into my mouth	13	0.93	13	0.93	13	0.93	13	0.93
I chewed and swallowed the food.	13	0.93	13	0.93	13	0.93	13	0.93
I repeat the same steps until the food runs out	13	0.93	13	0.93	13	0.93	13	0.93
S-CVI/AVE	0.93		0.93		0.93		0.93	
Video 3: One-handed eating								
I checked that my right hand was clean.	13	0.93	13	0.93	13	0.93	13	0.93
I pinched a small portion of chicken	13	0.93	13	0.93	13	0.93	13	0.93
I mix chicken with rice	13	0.93	13	0.86	13	0.86	13	0.93
I took some rice with my fingers	13	0.93	13	0.93	13	0.93	13	0.93
I bring some rice into my mouth	13	0.93	13	0.93	12	0.93	13	0.93
I chewed and swallowed the rice.	13	0.93	12	0.86	13	0.86	13	0.93
I repeat the same steps until the rice runs out	13	0.93	13	0.93	13	0.93	13	0.93
S-CVI/AVE	0.93		0.91		0.91		0.93	

S-CVI/AVE for one-handed, spoon, and fork eating also exceeded 0.78 for relevancy, clarity, simplicity, and ambiguity. The result indicates that the video has fulfilled the requirement. Results also suggest no need for more than one round of expert reviews. For video 3, one-handed eating, the results of S-CVI/AVE for clarity were slightly lower than others. It is explained that although the definition of the items was deemed clear and straightforward, slight confusion still needed to be noted. Both task analyses were kept in the video, and changes were made based on expert feedback, either on content or technical issues. Thus, according to the findings of this study, the items are relevant, clear, simple, and have no ambiguity.

4. CONCLUSION

Using video modeling with social stories is considered a practice that is supported by evidence and takes advantage of the strengths of children with ASD. However, it is important to evaluate the videos to ensure their validity. This study met the requirement to be considered acceptable as task analyses or for the videos themselves for all three videos through content validity evaluation and some positive feedback from experts regarding face validity. By taking into consideration on recommendations for enhancement can enhance the effectiveness of the video in teaching eating skills and alleviating parental anxieties.

ACKNOWLEDGEMENTS

The research team expresses gratitude towards Sultan Idris Education University (UPSI) for funding this research project under the Special Interest Group Grant (SIG Research Code: 2021-0132-107- 01).

REFERENCES

- [1] T. Kodak and S. Bergmann, "autism spectrum disorder," *Pediatric Clinics of North America*, vol. 67, no. 3, pp. 525–535, Jun. 2020, doi: 10.1016/j.pcl.2020.02.007.
- [2] E. Fombonne, "Epidemiological controversies in autism," *Swiss Archives of Neurology, Psychiatry and Psychotherapy*, Jan. 2020, doi: 10.4414/sanp.2020.03084.
- [3] M. V. Ristori *et al.*, "Autism, gastrointestinal symptoms and modulation of gut microbiota by nutritional interventions," *Nutrients*, vol. 11, no. 11, p. 2812, Nov. 2019, doi: doi.org/10.3390/nu11112812.
- [4] G. Leader, E. Tuohy, J. L. Chen, A. Mannion, and S. P. Gilroy, "Feeding problems, gastrointestinal symptoms, challenging behavior and sensory issues in children and adolescents with autism spectrum disorder," *Journal of Autism and Developmental Disorders*, vol. 50, no. 4, Jan. 2020, doi: 10.1007/s10803-019-04357-7.
- [5] L. Margari, L. Marzulli, A. Gabellone, and C. de Giambattista, "Eating and mealtime behaviors in patients with autism spectrum disorder: current perspectives," *neuropsychiatric disease and treatment*, vol. 16, pp. 2083–2102, Sep. 2020, doi: 10.2147/ndt.s224779.
- [6] S. D. Mayes and H. Zickgraf, "Atypical eating behaviors in children and adolescents with autism, ADHD, other disorders, and typical development," *Research in Autism Spectrum Disorders*, vol. 64, pp. 76–83, Aug. 2019, doi: 10.1016/j.rasd.2019.04.002.
- [7] K. Allen, J. Harrington, L. B. Quetsch, J. Masse, C. Cooke, and J. F. Paulson, "Parent–child interaction therapy for children with disruptive behaviors and autism: a randomized clinical trial," *Journal of Autism and Developmental Disorders*, Jan. 2022, doi: 10.1007/s10803-022-05428-y.
- [8] K. CM and K. CA, "What is different about eating disorders for those with autistic spectrum condition?," *International Journal of Psychiatry Research*, vol. 4, no. 2, Apr. 2021, doi: 10.33425/2641-4317.1089.
- [9] S. K. Gara, A. G. Chhetri, M. Alrjoob, S. A. A. Abbasi, and I. Rutkofsky, "The sensory abnormalities and neuropsychopathology of autism and anxiety," *Cureus*, May 2020, doi: 10.7759/cureus.8071.
- [10] S.-E. Bamigbade, S. L. Rogers, W. Wills, and A. K. Ludlow, "Mothers' accounts of mealtime and feeding challenges for children with Tourette syndrome or persistent tic disorders," *Frontiers in Psychiatry*, vol. 13, p. 936796, Aug. 2022, doi: 10.3389/fpsy.2022.936796.
- [11] P. S. Padmanabhan and H. Shroff, "Addressing mealtime behaviours of children with autism spectrum disorders in schools: a qualitative study with educators in Mumbai, India," *International Journal of Developmental Disabilities*, pp. 1–9, Mar. 2020, doi: 10.1080/20473869.2020.1738794.
- [12] B. Kazez *et al.*, "Eating behaviors of children with autism-pilot study, part II," *Nutrients*, vol. 13, no. 11, p. 3850, Nov. 2021, doi: 10.3390/nu13113850.
- [13] S. Doreswamy *et al.*, "Effects of diet, nutrition, and exercise in children with autism and autism spectrum disorder: a literature review," *Cureus*, vol. 12, no. 12, Dec. 2020, doi: 10.7759/cureus.12222.
- [14] A. McCabe, "Implementing evidence-based practice: a visual and video-modelling case study," *Kairaranga*, vol. 21, no. 1, pp. 7–16, Jan. 2020, doi: 10.54322/kairaranga.v21i1.321.
- [15] R. Egarr and C. Storey, "Model teachers or model students? a comparison of video modelling interventions for improving reading fluency and comprehension in children with autism," *Journal of Autism and Developmental Disorders*, Jul. 2021, doi: 10.1007/s10803-021-05217-z.
- [16] A. Bandura, "Self-efficacy: toward a unifying theory of behavioral change," *Psychological Review*, vol. 84, no. 2, p. 191–215, 1977.
- [17] C. Harrop, J. Amsbury, S. Towner-Wright, B. Reichow, and B. A. Boyd, "That's what I like: The use of circumscribed interests within interventions for individuals with autism spectrum disorder. A systematic review," *Research in Autism Spectrum Disorders*, vol. 57, pp. 63–86, Jan. 2019, doi: 10.1016/j.rasd.2018.09.008.
- [18] A. M. Gonçalves and P. Monteiro, "Autism Spectrum Disorder and auditory sensory alterations: a systematic review on the integrity of cognitive and neuronal functions related to auditory processing," *Journal of Neural Transmission*, vol. 130, no. 3, pp. 325–408, Mar. 2023, doi: 10.1007/s00702-023-02595-9.
- [19] J. Fuentes, A. Hervás, and P. Howlin, "ESCAP practice guidance for autism: a summary of evidence-based recommendations for diagnosis and treatment," *European Child & Adolescent Psychiatry*, Jul. 2020, doi: 10.1007/s00787-020-01587-4.
- [20] E. Smith, A. Constantin, H. Johnson, and M. Brosnan, "Digitally-mediated social stories support children on the autism spectrum adapting to a change in a 'real-world' context," *Journal of Autism and Developmental Disorders*, vol. 51, Jun. 2020, doi: 10.1007/s10803-020-04558-5.
- [21] J. D. Garwood and C. L. Van Loan, "Using social stories with students with social, emotional, and behavioral disabilities: the promise and the perils," *Exceptionality*, pp. 1–16, Dec. 2019, doi: 10.1080/09362835.2017.1409118.
- [22] I. Alkinj, A. Pereira, and P. Santos, "The effects of an educational program based on modeling and social stories on improvements in the social skills of students with autism," *Heliyon*, vol. 8, no. 5, p. e09289, May 2022, doi: 10.1016/j.heliyon.2022.e09289.
- [23] A. Stathopoulou, D. Loukeris, Z. Karabatzaki, E. Politi, Y. Salapata, and A. Drigas, "Evaluation of mobile apps effectiveness in children with autism social training via digital social stories," *International Journal of Interactive Mobile Technologies (IJIM)*, vol. 14, no. 03, p. 4, Feb. 2020, doi: 10.3991/ijim.v14i03.10281.
- [24] P. Ghanouni, T. Jarus, J. G. Zwicker, J. Lucyshyn, K. Mow, and A. Ledingham, "Social stories for children with autism spectrum disorder: validating the content of a virtual reality program," *Journal of Autism and Developmental Disorders*, vol. 49, no. 2, pp. 660–668, Sep. 2018, doi: 10.1007/s10803-018-3737-0.
- [25] E. Fernández-Gómez, A. Martín-Salvador, T. Luque-Vara, M. A. Sánchez-Ojeda, S. Navarro-Prado, and C. Enrique-Mirón, "Content validation through expert judgement of an instrument on the nutritional knowledge, beliefs, and habits of pregnant women," *Nutrients*, vol. 12, no. 4, p. 1136, Apr. 2020, doi: 10.3390/nu12041136.
- [26] V. Zamanzadeh, A. Ghahramanian, M. Rassouli, A. Abbaszadeh, H. Alavi-Majd, and A.-R. Nikanfar, "Design and implementation content validity study: development of an instrument for measuring patient-centered communication," *Journal of Caring Sciences*, vol. 4, no. 2, pp. 165–178, Jun. 2015, doi: 10.15171/jcs.2015.017.
- [27] O. A. Bolarinwa, "Principles and methods of validity and reliability testing of questionnaires used in social and health science researches," *Nigerian Postgraduate Medical Journal*, vol. 22, no. 4, pp. 195–201, 2015, doi: 10.4103/1117-1936.173959.
- [28] R. Heale and A. Twycross, "Validity and reliability in quantitative studies," *Evidence Based Nursing*, vol. 18, no. 3, pp. 66–67, May 2015, doi: 10.1136/eb-2015-102129.
- [29] M. R. Lynn, "Determination and quantification of content validity," *Nursing Research*, vol. 35, no. 6, pp. 382–386, Nov. 1986, doi: 10.1097/00006199-198611000-00017.

- [30] F. Yaghmaie, "Content validity and its estimation". *Journal of Medical Education*, vol 3, no. 1, pp. 25-27, March. 2009.
- [31] R. Zhou, X. Xie, J. Wang, B. Ma, and X. Hao, "Why do children with autism spectrum disorder have abnormal visual perception?," *Frontiers in Psychiatry*, vol. 14, pp. 1087122–1087122, Jan. 2023, doi: 10.3389/fpsyt.2023.1087122.
- [32] Y. M. Y. Han, M.-C. Chan, M. M. Y. Chan, M. K. Yeung, and A. S. Chan, "Effects of working memory load on frontal connectivity in children with autism spectrum disorder: a fNIRS study," *Scientific Reports*, vol. 12, no. 1, Jan. 2022, doi: 10.1038/s41598-022-05432-3.
- [33] DiGiuseppi et al., "Injuries in children with autism spectrum disorder: study to explore early development (SEED)," *Journal of Autism and Developmental Disorders*, vol. 48, no. 2, pp. 461–472, Oct. 2017, doi: 10.1007/s10803-017-3337-4.
- [34] J. Guan and G. Li, "Injury Mortality in Individuals With Autism," *American Journal of Public Health*, vol. 107, no. 5, pp. 791–793, May 2017, doi: 10.2105/ajph.2017.303696.
- [35] G. Bharathi, A. Venugopal, and B. Vellingiri, "Music therapy as a therapeutic tool in improving the social skills of autistic children," *The Egyptian Journal of Neurology, Psychiatry and Neurosurgery*, vol. 55, no. 1, Jun. 2019, doi: 10.1186/s41983-019-0091-x.
- [36] B. Applewhite, Z. Cankaya, A. Heiderscheit, and H. Himmerich, "A systematic review of scientific studies on the effects of music in people with or at risk for autism spectrum disorder," *International Journal of Environmental Research and Public Health*, vol. 19, no. 9, p. 5150, Apr. 2022, doi: 10.3390/ijerph19095150.
- [37] T. Silveira-Zaldivara, G. Özerk, and K. Özerk, "Developing social skills and social competence in children with autism," *International Electronic Journal of Elementary Education*, vol. 13, no. 3, pp. 341–363, Mar. 2021, doi: 10.26822/iejee.2021.195.
- [38] C. Gray, *The new social story book*. Future Horizons, 2015.
- [39] C. Mallory and B. Keehn, "Implications of Sensory Processing and Attentional Differences Associated With Autism in Academic Settings: An Integrative Review," *Frontiers in Psychiatry*, vol. 12, Aug. 2021, doi: 10.3389/fpsyt.2021.695825.
- [40] M. J. Fryling, C. Johnston, and L. J. Hayes, "Understanding observational learning: an interbehavioral approach," *The Analysis of Verbal Behavior*, vol. 27, no. 1, pp. 191–203, Apr. 2011, doi: 10.1007/bf03393102.
- [41] R. M. DeBar, C. L. Kane, and J. L. Amador, "Video Modeling Instruction for Individuals with Autism Spectrum Disorder," *Handbook of Applied Behavior Analysis Interventions for Autism*, 2022, pp. 227–250. doi: 10.1007/978-3-030-96478-8_13.
- [42] R. Zhang, G. Cheng, and L. Wu, "Influence of instructor's facial expressions in video lectures on motor learning in children with autism spectrum disorder," Feb. 2023, doi: 10.1007/s10639-023-11676-x.
- [43] C. Keenan, A. Thurston, C. Storey, and K. Urbanska, "PROTOCOL: Video-based interventions for promoting positive social behaviour in children with autism spectrum disorders: a systematic review and meta-analysis," *Campbell Systematic Reviews*, vol. 17, no. 2, May 2021, doi: 10.1002/cl2.1171.
- [44] A. Bravo and I. Schwartz, "Teaching imitation to young children with autism spectrum disorder using discretetrial training and contingent imitation," *Journal of Developmental and Physical Disabilities*, Oct. 2021, doi:10.1007/s10882-021-09819-4.
- [45] A. Spoto, M. Nucci, E. Prunetti, and M. Vicovaro, "Improving content validity evaluation of assessment instruments through formal content validity analysis," *Psychological Methods*, Jan. 2023, doi: 10.1037/met0000545.
- [46] D. F. Polit and C. T. Beck, "The content validity index: Are you sure you know what's being reported? critique and recommendations," *Research in Nursing & Health*, vol. 29, no. 5, pp. 489–497, 2006, doi: 10.1002/nur.20147.
- [47] J. Escobar-Pérez and A. Cuervo-Martínez, "Validez de contenido y juicio de expertos: una aproximación a su utilización," *Avances en Medicina*, vol. 6, pp. 27-36, Jan. 2008

BIOGRAPHIES OF AUTHORS



Nurul Khairani Ismail    is a Post Doctoral officer at University Pendidikan Sultan Idris, Tanjung Malim Perak. Her educational background includes a Bachelor's degree in Nursing from International Islamic University Malaysia's Kuantan campus, a second degree in education, specializing in Educational Psychology from the same university, and a Ph.D. in Preschool Education from Universiti Kebangsaan Malaysia. She has experience in teaching and as researcher at UKM and USM, as well as a research fellow at the Malaysia Institute of Road Safety Research (MIROS). Her research interests and experience are varied, ranging from early childhood and special education through character education and road safety training for youngsters. She can be contacted at email: khairani.miros@gmail.com.



Hasrul Hosshan    is a Senior Lecturer at the Faculty of Human Development, Universiti Pendidikan Sultan Idris (UPSI), Malaysia and Honorary Lecturer at, Centre on Disability Research and Policy, The University of Sydney, Australia. He does research in education and community setting specifically related to disability inclusion, social participation, center based-rehabilitation, parenting and teaching quality. He is also a member of the International Association for the Scientific Study of Intellectual and Developmental Disabilities (IASSIDD). He is actively involved as a Disability Advocacy in local and international level. He can be contacted at email: hasrul.hosshan@fpm.ups.edu.my.



Nurbieta Abd Aziz    received her PhD in Occupational Therapy from Universiti Kebangsaan Malaysia (2022), MSc in Disability Policy and Practice from Flinders University Australia (2016), Bachelor (Hons) in Occupational Therapy from Universiti Kebangsaan Malaysia (2009) and Diploma in Occupational Therapy from Universiti Teknologi Mara (2001). She has 22 years of experience in Occupational Therapy fields. She is a senior lecturer at the Department of Special Education, Faculty of Human Development, Universiti Pendidikan Sultan Idris. Her expertise in Occupational Therapy interventions for children with special needs, including autism spectrum disorders. She can be contacted at email: nurbieta@fpm.upsi.edu.my.



Abdul Halim Masnan    is the Assoc. Prof of Department of Early Childhood Education at Universiti Pendidikan Sultan Idris. He is a PhD holder from the Universiti Sains Malaysia. He is an Adjunct Professor at UNITAR and a visiting professor at UNNES, Semarang, Indonesia. He also received an Erasmus grant in March 2022 for a 3-week teaching mobility program at Trnava University, Slovakia. He specializes in Early Childhood Education. His expertise in Pedagogy in Early Childhood Education made him a team member conducting research projects and advisory boards in Malaysia and overseas. He can be contacted at email: abdulhalim@fpm.upsi.edu.my.



Norsayyidatina Che Rozubi    is a Senior Lecturer in Counselling at the Psychology and Counselling Department, Faculty of Human Development, Sultan Idris Education University (UPSI) and is a registered counsellor. She graduated with a B. ed (Counselling and Guidance) from University Malaya (UM) in 2008. She later completed her M. Ed (Counselling and Guidance) at National University Malaysia (UKM) in 2011 and Phd in Counselling at University Malaya in 2017. She has 15 years of experience in counselling and had served as a counsellor in boarding school. Her expertise is in children's counselling. Now she is doing postdoctoral at University of Edinburgh, United Kingdom, focusing on child sexual abuse and exploitation. She can be contacted at email: sayyidatina@fpm.upsi.edu.my.



Mohd Muslim Md Zalli    is a Senior Lecturer at the Faculty of Human Development, Universiti Pendidikan Sultan Idris (UPSI), Malaysia. He does research in higher learning education and school setting specifically related to learners' behavior in online courses, learning strategies, and teaching quality. He is also a member of the International Study Association on Teachers and Teaching and is actively involved as the ATLAS.ti certified trainer. He can be contacted at email: muslim@fpm.upsi.edu.my