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THE EFFICACY OF A VIRTUAL REALITY-BASED PROGRAM IN ENHANCING DAILY LIVING SKILLS FOR INDIVIDUALS WITH INTELLECTUAL DISABIL- ITIES IN JORDAN

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Abstract
Virtual reality (VR) is an emerging tool for educating and training individuals with intellectual disabilities in essential daily living skills to support independent functioning. This study aimed to evaluate the efficacy of a VR-based intervention in improving two fundamental skills — eating and dressing — among individuals with intellectual disabilities in Jordan. In addition to measuring participants' performance before, after, and two months following the intervention, the study also examined the cognitive, emotional, and motivational impacts of the program.
Specifically, it explored how the VR experience influenced attention, memory, anxiety, and self-motivation. Furthermore, the role of family and social support was analyzed to understand its moderating effect on the intervention's outcomes. By integrating cognitive, emotional, and social dimensions, this research contributes a multi-perspective psychological approach to the design of assistive technologies for individuals with intellectual disabilities.
Keywords: Virtual reality, Intellectual disability, Daily Living Skills, special education, Educational Psychology.

INTRODUCTION

The American Psychiatric Association (APA, 2022) defines intellectual and developmental disability as a "deficit characterized by significant limitations in intellectual functioning and adaptive behavior, clearly manifested in conceptual, social, and practical adaptive skills, with onset before the age of 18." Essentially, intellectual disability signifies a condition marked by reduced mental performance and a diminished capacity to adapt to daily life and social environments. While the problem persists up to age 18, where all cognitive growth is expected, the initial diagnosis represents the beginning of its accumulation until that age; it never disappears and, once diagnosed, is a lifelong condition [1].

Cheung et al (2022) state that children with intellectual disabilities are those who experience significant deficits in intellectual development below the average, coupled with notable difficulty adapting to social life. These children are characterized by intellectual deficits and impairments in adaptive behavior, occurring during the developmental period (before 18 years of age). Children with intellectual disabilities are categorized into three levels: mild, moderate, and severe. According to Cheung et al (2022), children with mild intellectual disabilities are capable of working in semi-skilled jobs, while those with moderate intellectual disabilities can work in sheltered workshops or perform routine jobs under supervision. Individuals with

severe and profound disabilities, however, consistently rely on the care and assistance of others. This highlights that individuals with intellectual disabilities require intensive support from caregivers to manage daily living activities due to impaired adaptive functioning (Jaiswal, 2021). This dependence largely stems from challenges in intellectual and adaptive performance (American Psychiatric Association, 2022). Difficulties in adaptive functioning impact the ability to perform the social, conceptual, and practical skills necessary for daily life (Martin et al., 2015). Indeed, individuals with intellectual disabilities face severe or profound challenges in performing life skills (Michalski et al, 2023).

Daily living skills refer to the set of abilities that enable individuals to adapt positively to their environment and effectively manage the demands and challenges of daily life, thereby promoting physical, mental, psychological, and social well-being. These practical skills empower children with intellectual disabilities to live more independently. They are essential for completing daily tasks without needing caregiver assistance, such as cooking, showering, and cleaning (Martin et al., 2015). Furthermore, difficulties in performing life skills have prevented individuals with intellectual disabilities from living independently, which is associated with reduced feelings of happiness and a lower quality of life (Sandjojo et al., 2019). Therefore, there is a clear need to find effective ways to develop life skills in this population.

Traditionally, curricula for students with disabilities focused on personal care. Currently, the emphasis has broadened to include various skill areas within the domestic domain, such as social-sexual skills, home management, home care, and personal health and hygiene (Plouvier & Lee-Snel, 2014). Educational programs designed to facilitate the acquisition, maintenance, and generalization of domestic skills are crucial for all students. These programs are particularly vital for individuals with disabilities for several reasons:

- To foster independence for individuals with intellectual disabilities.
- Proficiency in domestic skills can maximize an individual's opportunities not only to live within their community but also in a less restrictive home environment within that community.
- Competence in this area projects a positive image of the person with a disability to those encountering challenges due to disabilities (Jaiswal, 2021).

The current study specifically focused on eating and dressing skills. The core purpose of special education is to teach students how to live as independently as possible; therefore, eating and dressing skills should be a high priority in the curriculum for individuals with intellectual disabilities. Eating skills are vital for independent living for individuals with intellectual disabilities. They promote autonomy, dignity, and self-determination. A lack of these skills negatively affects functional independence, reduces an individual's participation in home and community settings, and limits their freedom of choice. Hence, individuals with moderate and severe disabilities must learn eating skills. Eating skills are also a common target in programs for individuals with intellectual disabilities (Danon et al., 2025). As for dressing skills, mastering them is important because they serve a fundamental function in protecting the body from environmental harm and exposure during daily activities. Dressing skills generally begin to develop when children reach 12 months of age, and they are expected to be able to dress completely without any assistance by 48 months of age (Westling & Fox, 2009). According to the American Psychological Association (2013), dressing skills can be developed in children with moderate intellectual disabilities, though it requires considerable time, continuous encouragement, guidance, and assistance before they can finally perform them independently.

In practice, the advent of Virtual Reality (VR) technology has breathed new life into computer-based rehabilitation. Through the human-computer interface, users can experience "immersion" via visual, auditory, or even haptic feedback. VR enables hands-on training that is difficult to convey through words and images. Additionally, individuals with intellectual disabilities can be more engaged in VR-based training and education to build their self-confidence, as it is more entertaining and safe. Moreover, caregivers will experience less pressure regarding safety and feedback from others.

The current study is among the first to focus on using VR for individuals with intellectual disabilities to enable them to master essential daily skills. It aims to answer the main research question:

- What is the impact of using a virtual reality-based program on improving certain daily living skills (eating and dressing) for individuals with intellectual disabilities?
- Are there statistically significant differences at the $\alpha \leq 0.05$ level? Level between the mean scores of the pre-test and post-test for the study sample in daily living skills (eating, dressing) attributable to the virtual reality program?
- Are there statistically significant differences at the $\alpha \leq 0.05$ level between the mean scores of the post-test and follow-up test for the study sample in daily living skills (eating, dressing) attributable to the virtual reality program?

The current study also aimed to document student performance before and after the program and to ascertain the level of task retention two months after the program's conclusion. The program included a series of VR-based experiments to demonstrate the feasibility of using such an approach for this group of students, as well as to identify the characteristics of their responses.

LITERATURE REVIEW

VR technology has shown improvement in motor and cognitive learning processes and life skills to support independent living, such as shopping, cooking, road safety, and vocational training (Cheung et al, 2022). It has also proven effective in improving life skills and waste management among individuals with intellectual disabilities (Michalski et al, 2023). Alfarani and Al-Selmi (2025) further indicated the effectiveness of using video modeling in virtual Reality for daily living skills and socialization. Similarly, (Simões et al, 2014) proposed a platform for training daily activities for individuals with autism spectrum disorder, allowing therapists to monitor patient performance and improvement over time. This platform contains several serious games targeting specific adaptive and executive dysfunctions. Previous literature also points to the effectiveness of VR in improving classroom behavior for individuals with Down syndrome (Michalski et al., 2022). Despite the severe difficulties faced by individuals with cerebral palsy and severe intellectual disabilities, VR has led to increased self-confidence, enhanced self-concept, and a sense of enjoyment in physical and motor games (WEISS et al, 2003).

METHODOLOGY

Study Design: A quasi-experimental design was used in this study and in study, and there was only one experimental group to be tested before the experiment, after it, and in the future. The purpose was to establish the influence of the independent factor (the virtual reality program) on the dependent factor (daily living skills, within the pre-defined dimensions) among intellectually disabled people.

Participants: The study sample comprised 15 students of both genders (9 males and 6 females), all diagnosed with mild intellectual disability. The Directorate of Health made these diagnoses for Persons with Disabilities, part of the Jordanian Ministry of Health.

The sample was purposely sampled from participants in a special education institution that is privately owned, the Autism Consulting Center in Amman, Jordan.

The participants were included on the basis of:

a) Children (age 9-13 years), and the parent seeks informed consent to allow the child to take part.
b) Observational data reveal a need to produce intensive intervention to be able to accomplish daily tasks.
c) Personal goals for increasing independence in the area of daily life.

Exclusion criteria included severe epilepsy and severe mental disorders such as schizophrenia and depression. Participants experiencing symptoms like headache, abnormal sweating, nausea, vomiting, or abnormal motor coordination were also excluded. If any of these issues arose during a session, the experiment was immediately paused for rest and postponed. Should the problem persist or recur in subsequent sessions, participants would be referred for medical care and withdrawn from the study. The responsible center managed the enrollment of all subjects. Table 1 (not provided here) illustrates the characteristics of the sample.

Table 1

Characteristics of Study Participants

Variable	Category	Frequency	Percentage
Gender	Male	9	60%
	Female	6	40%
Age	9-11	5	33%
	12-14	10	67%
Total		15	100%

Study Instruments: The research utilized Vineland Adaptive Behavior Scales (VABS), which were designed by Sara S. Sparrow, David A. Balla, and Domenic V. Cicchetti back in 1984. Later on in the year 2004, Dr. Bandar Al-Otaibi of King Saud University translated and standardized this scale to reflect the Saudi Arabian context.

In this study, VABS was particular to the Daily Living Skills domain and close attention was accorded to eating and drinking skills and dressing skills. It analysed only a sample of the skills that had been included in the original scale, as shown in Table 2 (what would otherwise appear at this point in a full paper). These are certain skills that relate to items:

Skill 1- 9

Skills 12- 14

Skills 21, 23, 28, 30, 34, 38 and 41

The scoring was done on a three-point Likert scale and was symbolized by 3, 2 and 1:

- 3: Capable of doing
- 2: Needs help to be able to do
- 1: You are not able to do

Table 2

Targeted Daily Living Skills in the Current Study

Domain	Skill No.	Specific Skills
Eating & Drinking	1	Shows anticipation for food upon seeing it.
	2	Opens mouth when offered a spoon.
	3	Takes food from the spoon with the mouth.
	4	Sucks or chews cornflakes.
	5	Eats solid foods (chocolate, banana, etc.).
	6	Eats independently without assistance.
	7	Eats with a spoon without making a mess.
	8	Prepares and sets the table when asked, without assistance.
	9	Drinks from a cup without assistance.
	10	Drinks water from the tap without assistance.
	11	Understands that hot things are dangerous.
Dressing	12	Removes a jacket or shirt without assistance.
	13	Expresses desire to change clothes when wet or dirty.
	14	Puts belongings in designated places when asked.

	15	Puts on shoes on the correct foot without assistance.
	16	Ties shoelaces without assistance.
	17	Dresses independently except for shoelaces.
	18	Puts clean clothes aside without assistance when asked.
	19	Fastens all clothing buttons.
	20	Expresses wetness or dirtiness in clothes through gestures or sound.

Construct Validity: In order to determine the construct validity of the scale, we have determined correlation coefficients at different levels. Namely, we investigated the following correlations:

- The number of individual items and the total score of the scale.
- Individual items and the total of each of the domains.
- The different domains themselves and the total scale score.

These analyses were conducted on a pilot sample of 20 participants, separate from the main study sample. The correlation coefficients for individual items with the overall tool ranged from 0.45 to 0.92. For individual items with their specific domains, the coefficients ranged from 0.50 to 0.93. The following table (which would typically be inserted here) illustrates these findings.

Table 3

Item-Domain and Item-Total Correlation Coefficients

Item No.	Correlation with Domain	Correlation with Tool	Item No.	Correlation with Domain	Correlation with Tool
1	0.60**	0.69**	12	0.88**	0.77**
2	0.60**	0.50*	13	0.83**	0.76**
3	0.60**	0.66**	14	0.82**	0.74**
4	0.64**	0.60**	15	0.76**	0.80**
5	0.87**	0.71**	16	0.91**	0.86**
6	0.68**	0.45*	17	0.92**	0.75**
7	0.93**	0.66**	18	0.90**	0.73**
8	0.72**	0.63**	19	0.75**	0.64**
9	0.69**	0.66**	20	0.92**	0.82**
10	0.76**	0.62**			
11	0.83**	0.73**			

*Statistically significant at the 0.05 level.

** Statistically significant at the 0.01 level.

It's worth noting that all correlation coefficients were at acceptable and statistically significant levels. Consequently, no items were removed from the scale.

Additionally, the correlation coefficient between each domain and the total score, as well as the inter-domain correlations, were extracted. The following table (which would be provided here) illustrates these findings.

Table 4

Inter-Domain and Domain-Total Correlation Coefficients

	Eating & Drinking	Dressing	Total Score
Eating & Drinking	1		
Dressing	0.732**	1	
Total Score	0.721**	0.632**	1

*Statistically significant at the 0.05 level.

**Statistically significant at the 0.01 level.

Table 4 indicates that all correlation coefficients are acceptable and statistically significant, suggesting an appropriate level of construct validity.

Reliability of the Study Instrument

To ensure the reliability of the study instrument, test-retest reliability was assessed. The scale was administered and then re-administered after two weeks to a group of 20 participants who were outside the main study sample. Pearson correlation coefficients were then calculated between their scores on both administrations. Additionally, internal consistency reliability was calculated using Cronbach's Alpha coefficient. Table 5 (which follows this section) presents the internal consistency coefficients (Cronbach's Alpha) and the test-retest reliability for both the individual domains and the total score. These values were considered appropriate for this study.

Table 5

Cronbach's Alpha Internal Consistency and Test-Retest Reliability for Domains and Total Score

Domain	Test-Retest Reliability	Internal Consistency (Cronbach's Alpha)
Eating & Drinking	0.81	0.79
Dressing	0.83	0.76
Total Score	0.85	0.81

Able 5 demonstrates that the study instrument exhibits good levels of reliability. Internal consistency coefficients ranged from 0.76 to 0.81, and test-retest reliability coefficients ranged from 0.81 to 0.85. These values indicate a high level of dependability and consistency for the scale.

Virtual Reality Device: The Oculus Quest 1 device was used in this study. It features a resolution of 1440x1600 pixels per eye and a refresh rate of 72 Hz, providing smooth and realistic motion within virtual environments. It offers a 115-degree diagonal field of view and utilizes "Inside-out tracking" technology with four built-in cameras. This allows the device to track its position and orientation in the physical environment without the need for external sensors. Users can interact within the virtual environment using the controller. The device has a storage capacity of 64 GB.

Virtual Reality Educational Program: A custom-built VR program was developed for this study, structured in two phases:

Phase 1: Eating and Drinking Training. This phase involved a scenario set in a virtual kitchen where a family is eating and drinking. The participant, controlling a virtual child avatar through specific buttons, navigates the child to the dining table and ensures they sit correctly. Using the VR device, the child then virtually picks up food with a spoon and slowly brings it to their mouth, avoiding spills. Successful actions are rewarded with the sound of applause. If food falls on the child's clothes, a red light appears from the program, granting another attempt. A proximity warning sound is triggered when the child approaches hot food. Subsequently, the program transitions to drinking, where the child slowly picks up a glass of water, holding it correctly, and gradually lifts it to their mouth without spilling.

Phase 2: Dressing Skills Training. After completing the eating portion, the participant moves the child avatar to a virtual wardrobe. Here, the participant selects clothes, distinguishing between clean and dirty items

through program commands that identify clothing cleanliness. The child then takes a shirt from the wardrobe and puts it on independently. They proceed to fasten the shirt buttons and put on their shoes with gradual, sequential assistance provided by the system.

PROCEDURES

The study problem was identified after a comprehensive review of previous research. Following the purposive selection of the study sample, a pre-test was administered using the Vineland Adaptive Behavior Scales (VABS), focusing on the specified dimensions. Subsequently, a virtual reality program was developed for mobile devices and VR headsets.

This study was conducted at a private special education center, the Autism Consulting Center, in Amman, Jordan, during the second academic semester of the 2024/2025 academic year, specifically in February and March 2025. The study procedures were explained to the teachers assisting the researcher, and their consent was obtained. The Vineland Social Maturity Scale (VSMS) was used to assess the social age of the participants.

Teachers conducted a baseline assessment of eating and dressing skills through direct observation prior to the intervention. Each participant was given the opportunity to practice eating and dressing tasks one by one, according to the assessment items for these skills. Simultaneously, a research assistant observed and evaluated the participant's skills using an assessment rubric prepared by the researcher. Each teacher observed one participant. The pre- and post-tests were conducted over 5 days, with 10-14 participants tested daily. Each participant took 10 to 15 minutes to practice eating and dressing.

The experimental group received the intervention in the form of a virtual reality-based program delivered over nine sessions, with each session lasting 50 minutes.

The training procedures for each VR session involved providing instructions to the participants. Participants then donned the VR headsets, connected to mobile devices, with the assistance of teachers and in the presence of their guardians. The instructor presented the eating and dressing software as separate lessons. The teacher then explained the eating and dressing skills procedures step-by-step for 15 minutes. Following this, the teacher provided participants with 20 minutes to practice the eating and dressing skill procedures. After the practice, the instructor assessed each participant's eating and dressing skills through observation for 7 minutes.

Validity of the Virtual Reality-Based Program: The initial version of the virtual reality-based program was presented to eleven professors from colleges of education at Jordanian universities. This presentation was accompanied by an introductory overview clarifying the research area, its objective, and the operational definitions of its terms. The purpose was to ensure the program's suitability, construct validity, and its ability to improve certain eating, drinking, and dressing skills for individuals with mild intellectual disabilities. The following table (which would typically be provided here) shows the percentages of agreement among the expert reviewers regarding the virtual reality-based program.

RESULTS

To address the question: Are there statistically significant differences at the $\alpha \leq 0.05$ level between the mean scores of the pre-test and post-test for the study sample in daily living skills (eating, dressing) attributable to the virtual reality program?

We calculated the means and standard deviations of the scores for individuals with intellectual disabilities on the daily living skills scale (eating and drinking, and dressing) in both pre- and post-applications. To determine the statistical significance of the differences between these means, a paired-samples t-test was used. Table 7 illustrates these findings.

Table 7

Means, Standard Deviations, and Paired-Samples t-test for Daily Living Skills Scores in Pre- and Post-Applications

Domain	Application		Mean	Std. Deviation	t-value	df	Sig.	Cohen's d (Effect Size)
Eating & Drinking	Pre-test	5	1.84	0.192	6.638	4	0.000	2.70
	Post-test	5	2.45	0.255				
Dressing	Pre-test	5	1.64	0.280	6.910	4	0.000	2.52
	Post-test	5	2.36	0.292				
Total Score	Pre-test	5	1.75	0.188	7.678	4	0.000	3.13
	Post-test	5	2.41	0.231				

Table 7 reveals statistically significant differences between the mean scores of students with intellectual disabilities in daily living skills (eating and drinking, dressing, and total score) between the pre- and post-applications. The paired-samples t-test confirmed the significance of these differences. For eating and drinking skills, the pre-test mean performance was 1.84 with a standard deviation of 0.192, which rose to 2.45 with a standard deviation of 0.255 as per the post-test. The t value was -6.638, and the value of significance was 0.000. Equally, dressing skills changed by 1.64 to 2.36 with a t-value of -6.910 and significance of 0.000. In total score, the mean rose by 1.75 to 2.41, and the value of t was -7.678, and its significance was 0.000. Similarly, dressing skills showed an increase from a mean of 1.64 to 2.36, with a t-value of -6.910 and a significance of 0.000. For the total score, the mean increased from 1.75 to 2.41, with a t-value of -7.678 and a significance of 0.000. The Cohen's d effect size values (2.70, 2.52, and 3.13, respectively) indicate a very large effect of the intervention, according to Cohen's classification. Thus, the results demonstrate that the program effectively contributed to the development of daily living skills in students with intellectual disabilities.

To address the question: Are there statistically significant differences at the $\alpha \leq 0.05$ level between the mean scores of the post-test and follow-up test for the study sample in daily living skills (eating, dressing) attributable to the virtual reality program?

We calculated the means and standard deviations of the scores for individuals with intellectual disabilities on the daily living skills scale (eating and drinking, and dressing) in both post- and follow-up applications. To determine the statistical significance of the differences between these means, a paired-samples t-test was used. Table 8 illustrates these findings.

Table 8

Means, Standard Deviations, and Paired-Samples t-test for Daily Living Skills Scores in Post- and Follow-up Applications

Domain	Application		Mean	Std. Deviation	t-value	df	Sig.	Cohen's d

								(Effect Size)
Eating & Drinking	Post-test	5	2.45	0.255	1.718	4	0.108	0.44
	Follow-up	5	2.40	0.227				
Dressing	Post-test	5	2.36	0.292	1.468	4	0.164	0.38
	Follow-up	5	2.33	0.294				
Total Score	Post-test	5	2.41	0.231	2.045	4	0.060	0.53
	Follow-up	5	15	2.37	0.220			

Table 8 indicates that the mean scores for the daily living skills domains (eating and drinking, dressing, and total score) in the follow-up application were close to those in the post-application. The results of the paired-samples t-test showed no statistically significant differences at the $\alpha=0.05$ level. The significance values ranged between 0.060 and 0.164, suggesting that there was no substantial decline in skill levels two weeks after the training program concluded.

DISCUSSION

Daily living skills are fundamental for individuals with intellectual disabilities to achieve independence and actively participate in their home, school, and social environments. Virtual Reality (VR) stands out as one of the most significant technological advancements in our current world, offering a promising, safe, and positive tool with clear beneficial effects on real-world situations. This study represents one of the pioneering efforts to leverage VR technology for training individuals with intellectual disabilities in daily living skills, aiming to foster their independence and reduce reliance on others. The primary objective of this research was to examine the effectiveness of VR-based programs in enhancing specific daily living skills (eating and dressing) and to facilitate the transfer of these trained skills from the virtual to the real environment.

Our study results demonstrated a significant improvement in the targeted daily living skills (eating and dressing) through the use of VR technology. Specifically, the findings showed a considerable difference between pre-VR training and post-VR training performance, favoring the VR intervention. In eating and drinking skills, the pre-test mean performance was 1.84 (SD = 0.192), which rose to 2.45 (SD = 0.255) in the post-test, with a t-value of -6.638 and a significance level of 0.000. For dressing skills, the mean increased from 1.64 to 2.36, with a t-value of -6.910 and a significance of 0.000. Furthermore, the total score for daily living skills increased from 1.75 to 2.41, with a t-value of -7.678 and a significance of 0.000. The calculated Cohen's d effect sizes (2.70, 2.52, and 3.13, respectively) indicate a very large effect of the intervention, according to Cohen's classification. These results conclusively show that the program effectively contributed to the development of daily living skills among students with intellectual disabilities.

A crucial finding of this study was the participants' ability to apply these learned skills in the real world, indicating skill retention for over two weeks post-training. The statistical significance values for retention ranged between 0.060 and 0.164, suggesting no substantial decline in skill levels. These findings are particularly noteworthy given the inherent challenges in educating individuals with intellectual disabilities. The results of this study align with a limited number of previous studies that have utilized VR for teaching individuals with intellectual disabilities (Jakubow et al., 2024; Danon et al., 2025; Alfarani & Al-Selmi, 2025; Cheung et al., 2022; Panerai et al., 2018; Michalski et al., 2023; Susilowati, Rustiyaningsih, Hartini, 2018).

Despite the promising outcomes of our study, we encountered certain challenges. The study was limited to a single experimental group due to the difficulty in finding a comparable control group. Time constraints also posed a limitation. Therefore, we advocate for future longitudinal, rigorously controlled studies with larger sample sizes.

Nevertheless, the strengths and significance of this study lie in its implementation of a randomized controlled experiment, utilizing multiple assessment tools to examine the impact of VR-based daily living skills training, while accounting for covariates such as age and baseline IQ.

CONCLUSION

Leveraging virtual Reality for training individuals with intellectual disabilities in daily living skills is essential for fostering independence and self-reliance, especially considering the challenges these individuals face in relying on specialists and caregivers. Virtual Reality (VR) can offer a more engaging and safe emerging application. The study aimed to evaluate the training effects of a VR program on improving certain daily living skills (eating and dressing) for individuals with intellectual disabilities and to assess the level of daily living skill retention two months after the program's conclusion.

Suggestion

Based on the outcomes revealed in the current research, the study recommends Attention to the training of special education teachers on the assistive technology and virtual reality, and Providing VR Systems and Resources Access to virtual reality systems and their supportive tools from various sources should be ensured,and Transferring VR Skills to Real-Life Context especially training individuals with intellectual disabilities in daily living skills.

Declarations

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The author acknowledges using Grammarly (https://app.grammarly.com/) for proofreading. ” also was used to generate citations in Chicago style. The prompt provided to ChatGPT was specifically “Chicago Citation” to ensure the proper format for

Author Contributions. MMN designed and coordinated the study protocol. WAA and ABM collected the data, and conducted the statistical analyses. MMN drafted the manuscript. All authors helped in drafting the manuscript, and all authors approved the final draft.

Conflicts of Interest.The author declares that they have no conflict of interest.

Ethical Approval. The study was conducted in accordance with the Declaration of Helsinki, and ethical approval was obtained from the Institutional Review Board. The Ethical Committee of Ajloun National University, Jordan, granted approval for this study on 30 March 2025 (Ref No. 3018/UN37.11/TU/2025).

Data Availability Statement. The data that support the findings of this study are not publicly available reasons participant confidentiality but are available from the corresponding author upon reasonable request.

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