




The Effect of a Comprehensive Intervention Program Based on the World Health Organization's Functional Assessment Outcomes on the Functional Levels and Adaptive Behaviors of Adolescents with Intellectual Disabilities

Shahla. Akbari¹, Abbas Ali. Hosseinkhanzadeh^{2*}, Bahman. Akbari³

¹ PhD student of General Psychology, Department of Psychology, Rasht Branch, Islamic Azad University, Rasht, Iran

² Associate Professor, Department of Psychology, University of Guilan, Rasht, Iran

³ Professor, Department of Psychology, Rasht Branch, Islamic Azad University, Rasht, Iran

* Corresponding author email address: khanzadehabbas@guilan.ac.ir

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ABSTRACT

Objective: This study aimed to determine the effectiveness of a comprehensive intervention program based on the World Health Organization's functional assessment outcomes on the functional levels and adaptive skills of adolescents with intellectual disabilities.

Methods and Materials: The research method was a quasi-experimental pre-test – post-test design with a control group. The research population included all male adolescents with mild intellectual disabilities in Gilan province during 2020-2021. The sample consisted of 30 adolescents with mild intellectual disabilities living in small group homes under the supervision of the Welfare Organization, who were conveniently selected and randomly assigned to experimental and control groups. Participants in each group responded to a pre-test before the start of the sessions, then the experimental group underwent a comprehensive intervention based on the World Health Organization's functional assessment outcomes for 17 sessions of 90 minutes each, while the control group remained on a waiting list and received no intervention until the post-test. Data collection tools included the World Health Organization Disability Assessment Schedule 2 (2012) and the Vineland Adaptive Behavior Scale (1980). Data were analyzed using univariate and multivariate analysis of covariance with SPSS 22 software.

Findings: The findings indicated that the comprehensive intervention program based on the World Health Organization's functional assessment outcomes was effective on the components of personal care, interaction and coping, and activities of life functional levels and on the components of self-help in eating, self-help in dressing, self-direction, occupational issues and engagements, movement, communication, and socialization adaptive skills of adolescents with intellectual disabilities ($P < 0.001$), leading to their improvement; however, it had

no significant effect on the components of understanding and communication, mobility and relocation, participation in society, and general self-help.

Conclusion: It can be concluded that the comprehensive intervention program based on the World Health Organization's functional assessment outcomes was effective on the functional levels and adaptive skills of adolescents with intellectual disabilities.

Keywords: *Functional levels, Adaptive behaviors, Intellectual disability.*

1. Introduction

Intellectual disability is one of the most significant issues in human societies and one of the most challenging problems in children and adolescents, remaining into adulthood (Fidler & Lanfranchi, 2022). According to the eleventh edition of the American Association on Intellectual and Developmental Disabilities, it is defined as a disability characterized by significant limitations in both intellectual functioning and adaptive behavior, where adaptive behavior is conceptualized as conceptual, social, and practical adaptive skills. This disability begins before the age of 18 years (Lee et al., 2022). Individuals exhibit deficiencies in general mental abilities such as reasoning, problem-solving, planning, abstract thinking, judgment, academic learning, and learning from experience, leading to difficulties in adaptive functioning. As a result, individuals fail to meet personal standards and societal responsibilities in one or more aspects of daily life in home or community settings (APA, 2022). The severity levels of intellectual disability are classified into four main categories: mild, moderate, severe, and profound, based on the extent of limitations in adaptive functioning, with approximately 85% of individuals with this disorder falling into the mild intellectual disability group, many of whom can live independently and manage their families with support. The prevalence of intellectual disability is estimated to be between 1 to 3 percent of the total population and varies by age (Lee et al., 2022).

Mental functions play a crucial role in information processing, daily living skills, and effective self-care (Rezaei et al., 2019), and limitations in mental functions in individuals with intellectual disabilities lead to poor information processing and limited memory capacity. This results in significant problems in various life domains, including communication, learning, appropriate social interaction, and self-care (Erostarbe-Pérez et al., 2022; Hooper et al., 2018). The concept of mental function aims to provide a comprehensive picture of cognitive abilities, including the capacity for intellectual disabilities, problem-solving, knowledge accumulation, adaptation to new situations, and abstract thinking (Hooper et al., 2018). Various studies confirm lower functional levels in children

and adolescents with intellectual disabilities in cognition, communication, self-care, interaction and coping with others, life activities (home, family, and education), and community participation (Spaniol & Danielsson, 2022).

Jurado and Rosselli (2007) believe that functional levels are important in the development of complex adaptive behavior in humans, and low functional levels in adolescents with intellectual disabilities have caused problems in their adaptive behavior (Jurado & Rosselli, 2007). Adaptive behavior is a set of skills that enables a person to function effectively in daily life at home, school, and work. The ten adaptive skills include communication, community use, functional academics, home living, health and safety, leisure, self-care, self-direction, social skills, and work (Balboni et al., 2020; Tassé & Kim, 2023). Most children learn these behaviors and skills through interaction with their surroundings, including family members and others, effortlessly and automatically. However, children with intellectual disabilities face significant challenges in this area, resulting in more negative reactions from their surroundings (Johannsen & Krüger, 2022). Children and adolescents who have desirable social behaviors and skills are more successful in establishing relationships with others in educational environments (Ahmad et al.); therefore, the unachieved adaptive behavior of individuals with intellectual disabilities significantly affects family dynamics and others (Balboni et al., 2020). Individuals with adaptive skills and behaviors are those who: take care of their health, participate in community, school, or other activities, effectively apply what they have learned in school, regularly communicate with friends and family, and pay attention to their daily living needs (Aghayinejad et al., 2019). However, adolescents with mild intellectual disabilities often have weaknesses in many of these skills due to their low mental functions, both in acquiring skills and in using them appropriately. These adolescents act more immaturely in social interactions compared to their peers and face difficulties in understanding appropriate social cues and intentions of others (Van Rest et al., 2020). In other words, their understanding of risk in social situations is limited, they lack age-appropriate social judgment, making them prone to communicative-social harms (Tremblay et al., 2010).

Research findings indicate that children and adolescents with intellectual disabilities have low adaptive skills (Alexander & Reynolds, 2020; Tassé & Kim, 2023; Tassé et al., 2016).

To provide more effective interventions and efficient rehabilitation, it is necessary to conduct more accurate assessments and diagnoses with standardized tools. This will not only diagnose and classify the disorder but also determine the functional levels of these individuals, enabling more effective planning and implementation of intervention and rehabilitation programs. The World Health Organization has designed the WHO Disability Assessment Schedule to measure health and disability in individuals, assessing disability across six domains. This questionnaire, developed by the World Health Organization to evaluate problems resulting from health conditions, is recommended for use in the International Classification of Functioning, Disability and Health (ICF) approach to diagnose and determine the type and severity of disability. The questionnaire covers six domains: understanding and communication, mobility, personal care, interaction and coping with others, life activities (home, family, and education), and community participation. The goal of this questionnaire is to determine the extent of functional limitations in everyday activities and social participation, ultimately determining the severity of disability (Yen et al., 2014). Considering the research background, numerous studies have been conducted on the effectiveness of various trainings to improve the skills of individuals with intellectual disabilities; however, few studies have focused on adolescents with intellectual disabilities. On the other hand, the WHO Disability Assessment Schedule provides more comprehensive components, offering more information and identifying the limitations of these adolescents more clearly, enabling more precise planning based on their problems and potentially increasing the success of rehabilitation programs for this group. Given that intellectual disability presents significant challenges for society and especially for the families of those affected, having ongoing adverse effects on the structure and functioning of families, and considering that these adolescents face numerous challenges in adapting to their surroundings, displaying immature social behaviors in various domains such as communication, self-care, home living, self-leadership, health and safety, and leisure; therefore, their unachieved adaptive behaviors lead to psychological problems in all aspects of their lives and have a negative impact on their interactions with others. As such, it is necessary to identify and utilize more effective

intervention and rehabilitation programs. Specialists have proposed various educational suggestions to improve the cognitive, social, and communicative skills of these individuals, with training based on the WHO Disability Assessment Schedule being an example. To date, no similar example has been implemented in the country. Therefore, this research seeks to answer whether the implementation of a comprehensive intervention program based on the functional assessment outcomes of the World Health Organization is effective on the functional levels and adaptive skills of adolescents with intellectual disabilities. This study was conducted to determine the effectiveness of a comprehensive intervention program based on the World Health Organization's functional assessment outcomes on the functional levels and adaptive skills of adolescents with intellectual disabilities.

2. Methods and Materials

2.1. Study Design and Participants

The research method was a quasi-experimental design with a pre-test – post-test with a control group. The research population included all male adolescents with mild intellectual disabilities in Gilan province during the 2020-2021 period. The sample consisted of 30 adolescents with mild intellectual disabilities living in small group homes under the supervision of the Welfare Organization, who were conveniently selected and randomly assigned into two groups: experimental and control. Participants in each group responded to a pre-test before the start of the sessions, after which the experimental group underwent a comprehensive intervention based on the World Health Organization's functional assessment outcomes for 18 sessions of 90 minutes each, twice a week, and 3 independent sessions (practical exercises in the community and natural living environment). The control group remained on a waiting list and received no intervention until the post-test. The post-test was then conducted for both groups.

Ethical considerations in this research were such that participation was entirely voluntary. Before starting the project, participants were familiarized with the project details and regulations. The opinions and beliefs of individuals were respected. Members of both the experimental and control groups were allowed to withdraw from the study at any stage. Furthermore, members of the control group could receive the same intervention as the experimental group in similar therapeutic sessions after the project concluded, if interested. All documents,

questionnaires, and confidential records were exclusively accessible to the implementers. Informed consent was obtained from all volunteers.

2.2. Measures

2.2.1. Functioning

World Health Organization Disability Assessment Schedule 2 (Parent Form) was developed by the World Health Organization in 2012 to assess health-related issues in individuals; hence, its use in the country's Welfare Organization aims to determine the extent of functional limitations in daily activities and social participation, ultimately determining the severity of disability. It evaluates health status, diseases, physical, sensory, mental, psychological, and emotional damages. This questionnaire is not applicable for children under 6 years and is not used for individuals with neurological and psychiatric disorders. This test has three forms: 1- Child Behavior Checklist for ages 4 to 18, completed by parents; 2- Adolescent Self-Report for ages 11 to 18; 3- Teacher's Report Form for ages 5 to 18. Responses are scored on a Likert scale from 1-5, with minimum and maximum scores of 36 and 180, respectively. According to the WHO's algorithm, raw scores are converted to 0-100 scores. Individuals scoring 0-4 are considered without disability, and those scoring 5-25, 26-50, 51-75, and 76-100 are considered to have mild, moderate, severe, and very severe disabilities, respectively. Taheri Al-Din (2016) obtained the internal consistency reliability of this test through Cronbach's alpha, with factors ranging from 0.78 to 0.95 (WHO, 2019; Yen et al., 2014).

2.2.2. Adaptive Behavior

Vineland Adaptive Behavior Scale is a developmental scale that deals with an individual's ability to meet their practical needs and accept responsibilities. It was created by Edgar Doll and underwent a major revision in 1980. The scale contains 117 items and is applicable from birth to the end of 25 years. Items are divided into one-year age groups up to 12 years, with separate questions for each year, but from 12 years onwards, there are common questions for 12 to 15 years, 15 to 18 years, 18 to 20 years, 20 to 25 years, and above 25 years. The scale is divided into eight sub-scales: general self-care, self-care in eating, self-care in dressing, self-direction, employment, communication, movement and locomotion, and socialization. The test begins at an age close to that of the subject, and for those

suspected of having intellectual disabilities, it starts at lower ages. The baseline age of the subject is determined by regressing to the questions of younger ages until all questions of one age are answered. The test execution stops when no score is given to any question of a certain age range. The reliability of this test, through correlation with intelligence tests, ranged from 0.4 to 0.6. Among children with cerebral palsy, there was a very high correlation between the results of the Vineland test and the results of preschool achievements ($r=0.99$) and the Gesell Developmental Scale ($r=0.97$). The test-retest reliability after about 2 years on 250 subjects from the sample showed a high correlation between the initial results and the retest results regarding social age ($r=0.98$), but a lower correlation for social quotient ($r=0.57$). The correlation between the first and third evaluations, conducted after one year, was reported between ($r=0.99$ to 0.94). The validity and reliability of this scale for young age groups and individuals with intellectual disabilities in Iran were reported as 0.81 and 0.73, respectively (Alexander & Reynolds, 2020; Amin et al., 2020).

2.3. Interventions

2.3.1. Comprehensive Intervention Program Based on the World Health Organization's Functional Assessment Outcomes

The WHO Disability Assessment Schedule (2012) was developed for assessing health-related problems in individuals and is recommended for use in the International Classification of Functioning, Disability, and Health (ICF) approach to diagnose and determine the type and severity of disability. The country's Welfare Organization utilizes this approach and guideline for determining the type and severity of disability, with eligibility for services depending on confirmation by a medical commission that assesses based on the ICF approach. Accordingly, since the beginning of 2020, after conducting training courses for experienced specialists and members of the medical commission, the WHO Disability Assessment Schedule is used alongside the ICF approach. The goal of using this questionnaire in the country's Welfare Organization is to determine the extent of functional limitations in daily activities and social participation of individuals with disabilities. The disability assessment domains based on the World Health Organization's Disability Assessment Schedule version 2 include understanding and communication, mobility, personal care, interaction and coping with others, and life

activities - home and family - education/work. After administering the WHO Disability Assessment Schedule and determining the extent of functional limitations at each level of this program, an intervention program tailored to the affected levels was developed and implemented (Aghayinejad et al., 2019; Alexander & Reynolds, 2020; Rezaei et al., 2019; WHO, 2019).

The intervention protocol of the study involved a comprehensive approach based on the World Health Organization's functional assessment outcomes, tailored to improve the functional levels and adaptive skills of adolescents with mild intellectual disabilities. The program was structured into 18 sessions of 90 minutes each, held twice a week, along with 3 independent sessions focusing on practical exercises in the community and natural living environments. This protocol aimed to address personal care, interaction and coping mechanisms, and life activities while also attempting to enhance understanding and communication, mobility, and social participation, although improvements in these latter areas were not achieved as expected.

In the initial sessions, participants were introduced to the program's objectives and the importance of understanding and communication in daily and social life. Practical exercises aimed at improving verbal and non-verbal communication skills were conducted, with scenarios mimicking real-life interactions to facilitate learning. These sessions aimed to bolster the participants' ability to express themselves clearly and understand others effectively, using role-playing and peer feedback to reinforce learning outcomes.

Subsequent sessions focused on personal care, teaching adolescents self-help skills such as hygiene practices, dressing, and eating independently. Through hands-on activities and demonstrations, participants learned how to perform these tasks with minimal assistance, emphasizing the importance of personal hygiene and neatness in fostering self-confidence and social acceptance. Caregivers and instructors provided personalized feedback and encouragement to help each adolescent achieve mastery in these essential life skills.

The program also dedicated sessions to enhancing mobility and physical activities. Participants engaged in exercises designed to improve their gross and fine motor skills, including walking, running, and coordination tasks. These activities were tailored to each adolescent's level of ability, with the aim of increasing their independence in

navigating their environment and performing daily tasks such as moving between locations and handling objects.

To address social interaction and participation, the intervention included activities that simulated social settings and required participants to interact with peers and adults. These sessions focused on teaching the norms of social behavior, understanding social cues, and developing appropriate responses in various social contexts. Group activities encouraged teamwork, sharing, and empathy, while outings to public places provided real-world practice in social participation.

Educational and vocational skills were also a focus of the intervention, with sessions dedicated to teaching practical academic skills and exploring vocational interests. Participants were guided through tasks that improved their academic abilities, such as reading, writing, and basic mathematics, tailored to their individual learning levels. Vocational sessions introduced various job-related tasks and the skills needed for employment, aiming to identify and foster each participant's interests and potential career paths.

The final sessions of the program were designed to integrate and apply all skills learned throughout the intervention. Participants were encouraged to demonstrate their personal care, communication, mobility, social interaction, and educational/vocational skills in structured and unstructured settings. The objective was to assess the adolescents' ability to apply these skills independently and to identify areas needing further development. The program concluded with a review of progress made, setting individual goals for future skill enhancement, and providing participants and caregivers with resources for ongoing support.

Throughout the intervention, ethical considerations ensured participants' comfort and willingness to engage in the program. Voluntary participation, informed consent, respect for individual differences, and confidentiality were paramount, creating a supportive and positive environment conducive to learning and development.

2.4. Data analysis

Descriptive analysis of data included statistical indices for each research variable. In the inferential statistics section, multivariate analysis of covariance and SPSS-22 software were used.

3. Findings and Results

In Table 1, descriptive indicators of research variables, including means and standard deviations for experimental

and control groups at both pre-test and post-test stages, are reported.

Table 1

Descriptive Statistics of Research Variables by Experimental and Control Groups (n=15)

Variable	Condition	Group	Mean	Standard Deviation	S-W	p
Understanding and Communication	Pre-test	Experimental	17.13	2.532	.938	.352
		Control	20.33	2.92	.930	.274
	Post-test	Experimental	9.07	3.535	.952	.552
		Control	15.13	5.579	.937	.345
Mobility and Relocation	Pre-test	Experimental	8.73	1.981	.949	.509
		Control	9.4	3.247	.971	.087
	Post-test	Experimental	2	2.104	.874	.059
		Control	5.4	3.795	.919	.188
Personal Care	Pre-test	Experimental	12.47	1.685	.892	.071
		Control	12.87	2.326	.915	.164
	Post-test	Experimental	4.73	1.624	.955	.605
		Control	10.53	3.998	.951	.541
Interaction and Coping	Pre-test	Experimental	14.33	2.44	.905	.114
		Control	15.6	2.197	.976	.093
	Post-test	Experimental	5.73	3.195	.966	.796
		Control	12.2	5.281	.921	.203
Life Activities	Pre-test	Experimental	25	3.665	.935	.324
		Control	27.47	3.067	.959	.679
	Post-test	Experimental	40.12	5.816	.957	.635
		Control	22.07	6.819	.917	.167
Participation in Society	Pre-test	Experimental	25.6	2.694	.921	.201
		Control	27.87	2.9	.952	.606
	Post-test	Experimental	12.13	4.324	.951	.054
		Control	20.4	7.278	.948	.050
Total Functional Levels	Pre-test	Experimental	117.62	2.366	.908	.176
		Control	118.65	2.062	.960	.701
	Post-test	Experimental	107.54	2.675	.949	.505
		Control	114.28	4.944	.928	.256
General Self-Help	Pre-test	Experimental	13.07	1.163	.882	.058
		Control	12.47	1.743	.929	.326
	Post-test	Experimental	14.2	1.207	.894	.071
		Control	13.67	1.047	.925	.293
Self-Help in Eating	Pre-test	Experimental	8.73	0.884	.934	.324
		Control	8.01	0.845	.962	.791
	Post-test	Experimental	10.93	1.033	.911	.187
		Control	9.87	1.407	.900	.096
Self-Help in Dressing	Pre-test	Experimental	8.67	1.988	.954	.592
		Control	7.07	3.081	.893	.106
	Post-test	Experimental	11.57	2.078	.922	.202
		Control	8.7	3.261	.914	.158
Self-Direction	Pre-test	Experimental	3.17	0.523	.915	.162
		Control	3.33	1.291	.894	.111
	Post-test	Experimental	5.8	4.052	.896	.084
		Control	2.07	3.535	.882	.075
Occupational Issues and Engagements	Pre-test	Experimental	8.1	1.628	.923	.215
		Control	8.13	2.709	.889	.064
	Post-test	Experimental	14.13	4.373	.925	.229
		Control	10.2	4.165	.938	.362
Movement	Pre-test	Experimental	5.37	0.611	.918	.182
		Control	5.03	0.399	.896	.116

Communication	Post-test	Experimental	7.97	1.043	.928	.256
		Control	6.33	1.622	.883	.078
	Pre-test	Experimental	6.43	1.266	.962	.723
		Control	6.17	1.809	.927	.248
Socialization	Post-test	Experimental	10.07	2.625	.938	.354
		Control	7.9	3.141	.911	.139
	Pre-test	Experimental	5.13	1.986	.942	.409
		Control	5.53	2.1	.882	.056
Total Adaptive Skills	Post-test	Experimental	11.57	3.448	.887	.059
		Control	7.98	3.704	.942	.405
	Pre-test	Experimental	38.62	15.88	.932	.291
		Control	29.08	10.79	.945	.455
Post-test	Experimental	96.97	36.804	.935	.326	
	Control	53.41	33.653	.884	.058	

To assess the effectiveness of the comprehensive intervention program based on the functional assessment outcomes of the World Health Organization on functional levels, multivariate analysis of covariance (MANCOVA)

was utilized. Initially, its assumptions were checked, followed by the test execution, with results presented in [Table 2](#).

Table 2

Results of Multivariate Analysis of Covariance (MANCOVA) for Functional Level Components in Experimental and Control Groups

Test Name	Value	F	Hypothesis DF	Error DF	Significance Level	Effect Size	Statistical Power
Pillai's Trace	0.538	2.663	7	16	.05	0.538	0.729
Wilks' Lambda	0.496	2.663	7	16	.05	0.538	0.729
Hotelling's Trace	1.015	2.663	7	16	.05	0.538	0.729
Largest Root	1.015	2.663	7	16	.05	0.538	0.729

According to [Table 2](#), the F value from the MANCOVA examining differences between experimental and control groups in functional level components ($F = 2.663$) is significant at the level ($P = .05$). Thus, it can be stated that

there is a significant difference between the experimental and control groups concerning the components of functional levels in the post-test. [Table 3](#) reports the results of the analysis of variance.

Table 3

Analysis of Variance (ANOVA) Results for Differences Between Experimental and Control Groups in Functional Level Components

Component	Experimental SS	Error SS	Experimental MS	Error MS	F	p	Effect Size	Statistical Power
Understanding and Communication	24.816	248.736	24.816	11.306	2.195	.153	0.091	0.294
Mobility and Relocation	22.482	198.792	22.482	9.036	2.488	.129	0.102	0.326
Personal Care	72.334	103.299	72.334	4.695	15.405	.001	0.412	0.963
Interaction and Coping	70.208	230.999	70.208	10.5	6.686	.017	0.233	0.696
Life Activities	144.363	757.33	144.363	34.424	4.194	.05	0.16	0.499
Participation in Society	86.076	543.735	86.076	24.715	3.483	.075	0.137	0.431

As per [Table 3](#), the F values for personal care (15.405), interaction and coping (6.686), and life activities (4.194) are significant at levels .001, .017, and .05, respectively. This indicates significant differences between the experimental and control groups in these components. However, the F values for understanding and communication (2.195), mobility and relocation (2.488), and participation in society

(3.483) are not significant at the .05 level, suggesting no significant differences between the groups in these components. To examine which group's post-test mean is higher for each component of functional levels, corrected means were used. [Table 4](#) presents the results of the corrected means, employing the Bonferroni correction method for estimating means.

Table 4

Estimated Final Means in Functional Level Components

Component	Group	Mean	Mean Difference	Standard Error	Significance Level
Understanding and Communication	Experimental	10.968	-2.265	1.529	.153
	Control	13.232			
Mobility and Relocation	Experimental	2.622	-2.156	1.367	.129
	Control	4.778			
Personal Care	Experimental	5.7	-3.867	0.985	.001
	Control	9.567			
Interaction and Coping	Experimental	7.062	-3.81	1.473	.017
	Control	10.872			
Life Activities	Experimental	14.502	-5.463	2.668	.05
	Control	19.965			
Participation in Society	Experimental	14.158	-4.218	2.26	.075
	Control	18.376			

Regarding [Table 4](#), in the understanding and communication component, the experimental group's mean (10.968) and the control group's mean (13.232) show a mean difference of -2.265, which is not significant at the .153 level. For the mobility and relocation component, the experimental group's mean (2.622) and the control group's mean (4.778) with a mean difference of -2.156 is not significant at the .129 level. In the personal care component, the experimental group's mean (5.7) and the control group's mean (9.567), with a mean difference of -3.867, is significant at the .001 level. For the interaction and coping component, the experimental group's mean (7.062) and the control group's mean (10.872), with a mean difference of -3.81, is significant at the .017 level. In the life activities component, the experimental group's mean (14.502) and the control group's mean (19.965), with a mean difference of -5.463, is significant at the .05 level. For the participation in society component, the experimental group's mean (14.158)

and the control group's mean (18.376), with a mean difference of -4.218, is not significant at the .075 level. Since a lower score on the functional levels assessment questionnaire indicates improvement; thus, based on these findings, it can be concluded that implementing the comprehensive intervention program based on the functional assessment outcomes of the World Health Organization leads to improvements in the components of personal care, interaction and coping, and life activities of male adolescents with intellectual disabilities. However, the program does not yield improvement in the components of understanding and communication, mobility and relocation, and participation in society. To evaluate the effectiveness of the comprehensive intervention program based on the World Health Organization's functional assessment outcomes on adaptive skills, multivariate analysis of covariance was used. Initially, its assumptions were checked, followed by the test execution, with results presented in [Table 5](#).

Table 5

Results of the Multivariate Analysis of Covariance (MANCOVA) for Adaptive Skill Components in the Experimental and Control Groups

Test Name	Value	F	Hypothesis DF	Error DF	Significance Level	Effect Size	Statistical Power
Pillai's Trace	0.772	5.34	8	13	.007	0.772	0.959
Wilks' Lambda	0.228	5.34	8	13	.007	0.772	0.959
Hotelling's Trace	3.358	5.34	8	13	.007	0.772	0.959
Largest Root	3.358	5.34	8	13	.007	0.772	0.959

According to [Table 5](#), the F value from the MANCOVA examining differences between the experimental and control groups in adaptive skill components ($F = 5.34$) is significant at the level ($P = .007$). Therefore, it can be stated that there

is a significant difference between the experimental and control groups concerning adaptive skill components in the post-test. [Table 6](#) reports the analysis of variance results.

Table 6

Analysis of Variance (ANOVA) Results for Differences Between the Experimental and Control Groups in Adaptive Skill Components

Component	Experimental SS	Error SS	Experimental MS	Error MS	F	p	Effect Size	Statistical Power
General Self-Help	2.06	21.506	2.06	1.075	1.916	.182	0.087	0.261
Self-Help in Eating	7.571	17.536	7.571	0.877	8.634	.008	0.302	0.798
Self-Help in Dressing	45.375	86.28	45.375	4.314	10.518	.004	0.345	0.87
Self-Direction	90.008	308.020	90.008	15.401	5.844	.025	0.226	0.633
Occupational Issues and Engagements	78.518	238.342	78.518	11.917	6.589	.018	0.248	0.685
Movement	18.776	28.397	18.776	1.42	13.224	.002	0.398	0.933
Communication	27.953	110.426	27.953	5.521	5.063	.036	0.202	0.572
Socialization	61.525	188.824	61.525	9.441	6.517	.019	0.246	0.68

As per Table 6, the F values for self-help in eating (8.634), self-help in dressing (10.518), self-direction (5.844), occupational issues and engagements (6.589), movement (13.224), communication (5.063), and socialization (6.517) are significant at levels .008, .004, .025, .018, .002, .036, and .019, respectively. This indicates significant differences between the experimental and control groups in these components. However, the F value for

general self-help (1.916) is not significant ($p = .182$), suggesting no significant difference between the groups in this component. To examine which group's post-test mean is higher for each adaptive skill component, corrected means were used. Table 7 presents the results of the corrected means, employing the Bonferroni correction method for estimating means.

Table 7

Estimated Final Means for Adaptive Skill Components

Component	Group	Mean	Mean Difference	Standard Error	Significance Level
General Self-Help	Experimental	14.253	0.639	0.462	.182
	Control	13.614			
Self-Help in Eating	Experimental	11.012	1.225	0.417	.008
	Control	9.788			
Self-Help in Dressing	Experimental	11.633	2.998	0.925	.004
	Control	8.634			
Self-Direction	Experimental	6.045	4.223	1.747	.025
	Control	1.822			
Occupational Issues and Engagements	Experimental	14.139	3.944	1.537	.018
	Control	10.195			
Movement	Experimental	8.114	1.929	0.53	.002
	Control	6.186			
Communication	Experimental	10.16	2.353	1.046	.036
	Control	7.807			
Socialization	Experimental	11.479	3.491	1.368	.019
	Control	7.988			

According to Table 7, in the general self-help component, the experimental group's mean (14.253), the control group's mean (13.614), and the mean difference between these two groups (0.639) is not significant at the .182 level. In the self-help in eating component, the experimental group's mean (11.012) and the control group's mean (9.788), with a mean difference of 1.225, is significant at the .008 level. In the self-help in dressing component, the experimental group's mean (11.633) and the control group's mean (8.634), with a

mean difference of 2.998, is significant at the .004 level. In the self-direction component, the experimental group's mean (6.045) and the control group's mean (1.822), with a mean difference of 4.223, is significant at the .025 level. In the occupational issues and engagements component, the experimental group's mean (3.139) and the control group's mean (10.195), with a mean difference of -3.944, is significant at the .018 level. In the movement component, the experimental group's mean (8.114) and the control

group's mean (6.186), with a mean difference of 1.929, is significant at the .002 level. In the communication component, the experimental group's mean (10.16) and the control group's mean (7.807), with a mean difference of 2.353, is significant at the .036 level. In the socialization component, the experimental group's mean (11.479) and the control group's mean (7.988), with a mean difference of -3.491, is significant at the .019 level. Given these findings, it can be concluded that implementing the comprehensive intervention program based on the World Health Organization's functional assessment outcomes leads to improvements in the components of self-help in eating, self-help in dressing, self-direction, occupational issues and engagements, movement, communication, and socialization of male adolescents with intellectual disabilities. However, the program does not yield improvement in the general self-help component.

4. Discussion and Conclusion

The current study aimed to determine the effectiveness of a comprehensive intervention program based on the functional assessment outcomes of the World Health Organization on the functional levels and adaptive skills of adolescents with intellectual disabilities. The first result of the research showed that the implementation of the comprehensive intervention program based on the functional assessment outcomes of the World Health Organization led to improvements in the components of personal care, interaction and coping, and life activities of the functional levels of male adolescents with intellectual disabilities. However, this program did not bring about improvements in the components of understanding and communication, mobility and relocation, and participation in society.

Children and adolescents with mild intellectual disabilities have significant limitations in mental functions (Lee et al., 2022) which impact their abilities in verbal comprehension, working memory, perceptual reasoning, problem-solving, learning generalization, abstract thinking, and cognitive efficiency. These limitations affect their performance in information processing, daily life skills, and effective self-care, causing numerous problems in various life domains (Zheng et al., 2021). These individuals lack the cognitive flexibility for change or substitution between decision-making and operational efficiency; memory function for updating and monitoring data related to sequential events occurring over time; and appropriate behavioral regulation towards achieving a goal. These

limitations complicate their understanding of communication and the communication process, interaction with others, and social participation (Tassé & Kim, 2023; Tassé et al., 2016). They also face challenges in personal care.

In this study, adolescents with intellectual disabilities were assessed using the World Health Organization Disability Assessment Schedule to initially determine the extent of functional limitations in daily activities and social participation and, consequently, the severity of their disabilities. A program tailored to this assessment was then implemented for these adolescents, providing training and tasks for all identified functional limitations in daily activities and social participation. Through practical and model training, these adolescents encountered situations and events relevant to their lives, learning appropriate responses, which, through repetition and practice, led to learning stability and reduced memory-related issues. To address another functional challenge, the weak ability to generalize learning from one situation to another, these tasks were performed in various situations to help adolescents generalize them to other environments. Initially, the program taught the importance of understanding and communication, followed by specific exercises in this area, aiding the adolescents in learning and applying these activities in broader environments, thereby enhancing the retention and application of what they learned. In addition to understanding and communication, training in functional aspects included mobility and relocation, personal care, interaction and coping with others, familiarity with private body parts and their care, life activities - home and family, and their importance, and life activities - education/work and their importance. For instance, sessions familiarized them with household and family responsibilities and proper execution of primary duties at home and family through practical exercises both in the training course and at home. School-related activities were similarly conducted, overall assisting adolescents with intellectual disabilities in becoming familiar with and addressing their personal, family, social, and educational issues through trained problem-solving strategies, enabling them to practice and apply these solutions across situations. This capability improvement led to betterment in the components of personal care, interaction and coping, and life activities of the functional levels of male adolescents with intellectual disabilities but did not yield improvements in the components of understanding and communication, mobility and relocation, and participation in society. Given that one

of the challenges faced by individuals with intellectual disabilities is a limited ability to accurately judge or comprehend social discourse norms and interactions (Van Rest et al., 2020), it's necessary for these individuals to engage more in social situations and gain more experiences to improve their understanding of communication and its outcomes, and to communicate more effectively and actively participate. The intervention, due to its limited duration and the scope of skills taught, might not have been sufficient to strengthen these skills, and the possible lack of generalization of these skills in their living environments may have contributed to the lack of improvement in certain functional levels like mobility and relocation, understanding and communication, and participation in society.

Another finding indicated that the comprehensive intervention program based on the functional assessment outcomes of the World Health Organization is effective on the components of self-help in eating, self-help in dressing, self-direction, occupational issues and engagements, movement, communication, and socialization of adaptive skills in male adolescents with intellectual disabilities, leading to their improvement. However, the program does not have a significant effect on the component of general self-help and does not bring about improvement.

One of the main challenges for individuals with intellectual disabilities is the limitation and disorder in adaptive behaviors. Social life requires adapting to others, agreeing with them, and to some extent, striving for their expectations. Adolescents with intellectual disabilities are significantly lacking in social maturity compared to their typical peers and have low social competencies (Johannsen & Krüger, 2022). Moreover, these adolescents have specific communication problems, difficulty adapting to their social environment, disorders in social and family relationships, problems with peer relationships, and exhibit significant unachieved adaptive behaviors, leading to rejection by peers and ultimately isolation (Alexander & Reynolds, 2020; Tassé & Kim, 2023; Tassé et al., 2016).

The present study, having planned and implemented an intervention program tailored to the assessment of the extent of functional limitations in daily activities, social participation, and ultimately determining the severity of their disabilities, executed activities in the intervention program based on the adaptive behavior problems of this group of participating adolescents with intellectual disabilities. In educational sessions, adolescents were familiarized with the importance of personal care, practicing self-help tasks in various areas such as hygiene, dressing, eating, and sexual

self-care, and were practically introduced to correct behaviors in these areas through role-playing, practicing, and repeating. To aid in generalizing learning, these exercises were conducted in various situations. The intervention also highlighted the importance of life activities - home and family, and with the training conducted, helped adolescents to perform home and family-related activities such as house cleaning, shopping with caregivers, and watering plants correctly and at a suitable pace. They, with the assistance of the education coach, wrote a targeted plan for doing school homework at home and were introduced to solutions for school exam challenges. Performing school homework according to the written plan and seeking help from the educational coach to clarify and strengthen school subjects improved these adolescents' abilities in educational and school issues. To strengthen social participation, the importance of community participation was initially explained, followed by further elaboration through stories, with more necessary details explained. Social programs, including attending a religious ceremony with 5 participants under full health protocol observation to enhance community participation, were conducted, and the staff reinforced the children's positive aspects. Exercises aimed at empowering these adolescents in recognizing, understanding, and expressing emotions, practicing expression of feelings by home caregivers and adolescents were conducted. The repetition and practice of these teachings, and their application in other situations, helped them feel empowered in this task and enabled them to participate in social situations, contributing to the retention of training and improving adaptive behavior.

5. Limitations & Suggestions

This research faced limitations, including the intervention being conducted by the researcher, which could lead to a halo effect and influence the results. Future research is suggested to have an expert other than the researcher perform such interventions to prevent a halo effect. Given the effectiveness of the comprehensive intervention program based on the functional assessment outcomes of the World Health Organization and improvements in various aspects of functional levels and adaptive behavior of adolescents with intellectual disabilities, it is recommended that this intervention program be more widely used in the rehabilitation of individuals with intellectual disabilities. Identifying functional levels and adaptive behaviors with more significant weaknesses and implementing a completely

suitable and more efficient program could lead to further improvement in functional levels and adaptive behavior.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Patients were free to withdraw from the research at any time. This article is derived from the first author's doctoral dissertation at the Islamic Azad University, Rasht Branch, Rasht, Iran, and has

the ethical code IR.IAU.RASHT.REC.1400.017 from the Ethics Committee of the Islamic Azad University, Rasht Branch. We extend our deepest gratitude to all participants in this research.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contributed in this article.

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