

Impact of inclusive recreational and life-skill activities on physical, personal care, and communication skills of students with intellectual disability

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Abstract

Background and Study Aim Students with intellectual disabilities (SwID) often face challenges in interpersonal communication, personal hygiene, and motor development, hindering their social integration and independence. Physical activity and socialization are key factors for improving these areas, but traditional fitness programs often do not address the specific needs of SwID. This study aims to determine the effect of Inclusive Recreational and Life-Skill Activities (IRLSA) on SwID, specifically in their physical abilities, personal hygiene, and interpersonal communication.

Material and Methods The study used a quasi-experimental pre-test/post-test control group design. Forty male students with mild intellectual disabilities were selected from special schools and academies in Coimbatore, Tamil Nadu. Their age was 15.9 ± 1.42 years, height 157.52 ± 8.32 cm, weight 57.57 ± 7.72 kg, and BMI 23.15 ± 2.04 . Participants were selected based on their ability to follow basic instructions and the absence of severe medical conditions restricting movement. They were divided into two groups: a control group (n=20) that continued their daily routine and an experimental group (n=20) that participated in 16 weeks of inclusive recreational and life-skill activities. The training sessions focused on cardiovascular endurance, physical strength, flexibility, personal hygiene practices, and communication skills. Pre- and post-intervention measures were conducted using standardized tests.

Results The experimental group showed significant improvements compared to the control group ($p < 0.05$) in all measured parameters: cardiovascular endurance (6-min walk test: $p=0.001$), flexibility (Sit and reach: $p=0.001$), muscular strength (lower body) (Sit-to-stand: $p=0.007$), muscular strength (upper body) (5 kg medicine ball throw: $p=0.002$), personal care and safety (Comprehensive assessment tool: $p=0.001$), and communication and interpersonal skills ($p=0.001$). In contrast, the control group showed minimal or no improvements in these variables ($p > 0.05$), reinforcing the need for structured interventions.

Conclusions The study demonstrates that IRLSA significantly enhance physical fitness, personal care, and communication skills among SwID. The structured, peer-supported approach fosters holistic development and social inclusion. These findings advocate for the systematic integration of IRLSA into educational and therapeutic programs to promote functional independence and well-being in this population.

Keywords: inclusive, recreation, life-skill, intellectual disability, physical, personal care

Introduction

Intellectual disabilities (ID) affect millions of individuals globally, impacting their cognitive, social, and physical abilities. Students with intellectual disabilities (SwID) often encounter challenges in various aspects of daily life, particularly in communication, personal care, and motor development. These challenges can hinder their social integration and limit their ability to live independently.

Individuals with Intellectual Disabilities (ID) experience significant challenges in motor development, personal care, and communication, which affect their ability to perform daily activities and integrate into society [1, 2, 3]. ID involves significant impairments in intellectual functioning, such as reasoning, learning, and problem-solving, and adaptive behavior, including conceptual, social, and practical skills necessary for everyday life [2, 4]. These challenges often result in difficulties with motor coordination, verbal and nonverbal communication, and self-care skills, limiting their ability to participate independently in social and

physical environments. The lack of well-structured, adaptive, and inclusive programs further exacerbates these issues, leading to sedentary lifestyles, reduced opportunities for peer interaction, and increased dependency on caregivers [5, 6].

Physical activity plays a crucial role in enhancing neurodevelopment, emotional stability, and social competence in individuals with ID [7, 8]. Structured physical exercise not only improves motor proficiency but also enhances cognitive abilities by stimulating neuroplasticity, promoting executive functioning, and fostering better decision-making skills [9, 10]. Consistent engagement in physical activities contributes to emotional regulation, helping to reduce symptoms of anxiety, depression, and behavioral difficulties commonly observed in intellectual disabilities (SwID) [11, 12]. However, despite these benefits, most conventional fitness programs fail to accommodate the specific needs of this population, as they often rely on standardized exercises that do not account for individual variations in physical and cognitive abilities [13, 14]. This highlights the urgent need for adaptive, structured, and socially integrated exercise programs that cater specifically to the developmental requirements of SwID.

Life-skill activities are not optional but essential components of education for SwID. These activities bridge the critical gap between academic learning and functional living by equipping students with the practical skills required to navigate everyday life confidently and independently. Without structured life-skill instruction, SwID may struggle to generalize classroom learning to daily tasks, limiting their ability to participate fully in home, school, and community environments.

To bridge the gap in physical and life-skill development and social participation for SwID, the IRLSA have emerged as a powerful and adaptable intervention. These activities go beyond traditional physical activity programs by integrating physical skill development, personal care awareness, and communication enhancement within a structured, socially engaging environment. Unlike conventional models that focus solely on fitness, the IRLSA promote holistic development by fostering independent living skills, emotional expression, and interpersonal interaction. By incorporating sensorimotor activities, functional movement play, and group-based interactive challenges, inclusive games enhance body awareness, motor planning, and spatial coordination – skills essential for improved mobility and daily functioning among SwID [15, 16, 17].

These activities can be individualized and adjusted according to each participant's ability level, learning pace, and developmental goals. Grounded in principles of motor learning and behavioral reinforcement, such games allow gradual

progression, reduce frustration, and maintain sustained interest and motivation [18]. A defining feature of IRLSA is their unified nature—participants with ID engage alongside their typically developing peers in cooperative and enjoyable formats [19, 20, 21]. This inclusive approach fosters social integration through peer modeling, observational learning, and reciprocal communication, thereby building confidence and improving social adaptability [22, 23]. Structured interactions within play settings create natural learning opportunities that support teamwork, problem-solving, and the understanding of social norms and shared responsibilities [24, 25].

Beyond its direct impact on physical fitness, inclusive activities contribute to self-regulation, sensory processing, and functional independence [26]. Many individuals with ID experience challenges in proprioception, balance, and motor sequencing, which hinder their ability to perform everyday tasks efficiently [27]. Through systematic exposure to task-oriented games and functional movement training, kinesthetic awareness, postural control, and reaction time improve, enabling individuals to navigate their surroundings with greater ease and confidence [28]. Structured movement-based games support neural connectivity, enhancing information processing speed and working memory, which are critical for cognitive and communicative development [29, 30].

Despite the promising benefits of inclusive activities, challenges persist in implementation, including the need for trained instructors, accessibility to inclusive fitness spaces, and long-term sustainability of such programs. Limited resources, societal stigma, and lack of awareness further restrict the adoption of inclusive game interventions [31, 32]. Addressing these barriers requires collaborative efforts between educators, healthcare professionals, and sports scientists to design evidence-based, scalable, and culturally adaptable programs that integrate into mainstream educational and community settings. Therefore, this study hypothesizes that participation in 16 weeks of task-oriented recreational and life-skill activities leads to significant improvements in the physical abilities, personal care skills, and interpersonal communication of SwID.

Materials and Methods

Participants

The power analysis was conducted using G*Power version 3.1.9 for sample size estimation, based on previous data on the intervention effects on upper body strength. The effect size in the study was 0.80. With a significance criterion of $\alpha = 0.05$ and Power = 0.90, the minimum sample size needed with this effect size was 20. Thus, the obtained sample size of 20 was adequate to test the study hypothesis. The

study involved forty students aged 13 to 18 years, diagnosed with mild intellectual disabilities, from special schools and academies in Coimbatore, Tamil Nadu. Participants were selected based on specific inclusion criteria, including a formal diagnosis of mild intellectual disability, the ability to follow basic instructions, the absence of severe medical conditions restricting movement, and written informed consent from parents/legal guardians. The selected subjects were equally assigned to the experimental group (n=20) and the control group (n=20). The experimental group participated in IRLSA alongside partner peers. The partner peers were selected based on their willingness to participate and their understanding of inclusive engagement with SwID. Overall, the characteristics of the subjects in the two groups did not show any significant differences ($P > 0.05$). Details of the analysis results can be seen in Table 1.

Research Design

This study employed a quasi-experimental pre-test/post-test control group design to examine the impact of IRLSA. Selected participants were divided into two groups: an experimental group, which engaged in a structured 16-week IRLSA alongside partner peers, and a control group, which continued their regular daily activities without any structured exercise intervention. The IRLSA consists of systematically designed activities aimed at engaging all participants, irrespective of ability level, within a supportive, adaptive, and enjoyable environment. These activities prioritize collaboration over competition, fostering the development of physical, social, and communication skills. The IRLSA Program spans a period of 16 weeks, comprising five sessions per week, each lasting 90 minutes, resulting in a total of 120 hours of structured training. The training is organized into four progressive phases: Adaptation, Learning Together, Working as a Team, and Leadership & Independence, each targeting specific developmental goals to enhance participant growth and engagement throughout the program. The detailed training program is given in Table 2. Participants in the control group followed their regular daily routine, which included classroom learning, leisure time, and self-care routines without guided training. This setup allowed researchers to compare the outcomes of those who participated in the IRLSA with those who did not.

Testing Procedures

To assess cardiovascular endurance, the 6-Minute Walk Test (6MWT) was conducted on a 400-meter standard track. Participants walked continuously for six minutes, covering as much distance as possible at their own pace. If necessary, they could slow down or stop but were instructed to resume walking as soon as possible. At the end of six minutes, researchers recorded the total distance covered in meters.

To assess flexibility, researchers used the Sit-and-Reach Test. Participants used a standardized sit-and-reach box (DSI, DANESH SALAR Ltd.). They sat with their knees flat on the floor and slowly extended their arms forward as far as possible, holding the position for two seconds. Each participant completed three trials, and researchers recorded the best measurement.

For lower body strength, researchers conducted the Sit-to-Stand Test. Participants sat on a sturdy chair (43–46 cm in height) with their feet flat on the floor and arms crossed over their chest. Upon instruction, they stood up fully and sat back down as quickly and safely as possible. Researchers recorded the number of complete sit-to-stand repetitions completed in 30 seconds, counting only full stands where participants reached an upright position.

To measure upper body strength, participants performed the 5 kg Medicine Ball Put. They sat with their back fully against a wall, legs extended, and feet slightly apart. Holding a 5 kg medicine ball at chest level with both hands, they pushed the ball forward forcefully using only their arms and shoulders without lifting their back off the wall. Each participant performed three trials, and researchers recorded the farthest distance. Rest periods were provided between trials to allow for recovery, and the best attempt was measured as shoulder strength.

To assess personal care ability and interpersonal communication skills, researchers used the Comprehensive Assessment Tool for Adults with Intellectual Disabilities (CATAID, 2020). They conducted a pre-test to establish baseline competency levels, followed by targeted training interventions. After the intervention, researchers conducted a post-test using the same criteria to measure progress.

The Table 2 presents the weekly progression

Table 1. Subject Characteristics

Outcome	Total	Experimental Group	Control Group	ρ
Age (years)	15.9 ± 1.42	15.95 ± 1.39	15.85 ± 1.5	0.828
Height (cm)	157.52 ± 8.32	156.4 ± 9.06	158.65 ± 7.57	0.399
Weight (kg)	57.58 ± 7.72	58.0 ± 7.94	57.15 ± 7.67	0.733
BMI (kg/m ²)	23.16 ± 2.05	23.64 ± 1.78	22.67 ± 2.23	0.136

Table 2. Weekly Progression Plan of Inclusive Recreational Games Program

Week	Physical	Personal care	Communication	Games
1 to 4 Phase 1- Adaptation	Walking, jumping & balancing Eye hand coordination Throwing & catching Group movement	Brushing teeth role play Washing face & hands Wearing shoes and socs Packing a hygiene kit	Greeting & name games Answer Yes/No Asking for help Making choices	Follow the leader
				Name game
				Balloon Tap
				Beanbag target
				Obstacle relay
5 to 8 Phase 2- learning Together	Large motor play Movement rhythm Balance & posture Coordination in groups	Nutrition talk (food cards) Drinking water routines Hair combing routine Bathing & clothing sequence	Requesting turns Encouraging peers Sharing feelings (emoji cards) Describing actions	Partner catch
				Parachute games
				Simon says
				Team Relay
				Bowling
9 to 12 Phase 3 – working as a team	Team coordination Hand-eye tracking Strength & endurance Adaptive sport play	Hygiene game boards First aid basics Healthy snack preparation Rest and sleep hygiene	Role play (shopping/ café) Asking questions Giving instructions Expressing needs	Musical Chairs
				Freeze Dance
				Cone Walk
				Mirror Movement
				Beanbag Balance Race
13 to 16 Phase 4 - Leadership & Independence	Game creation Agility & movement Peer coaching Celebration	Dressing races Role play (school/home routine) Pack-my-bag challenge Recap of all routines	Giving feedback Question & Answer circle Introductions & thanks Presenting experience	Tunnel Tag
				Passing Circle
				Tail Tag
				Kick Cricket
				Catch Me If You Can
				Hoop Relay
				Obstacle Maze
				Mini Soccer
				Mini Volleyball
				Create-a-Game
				Peer Challenges
				Activity Stations
				Team Tournaments
				“Fun Olympics” – Game Carnival

plan for the Inclusive Recreational Games Program, detailing the activities and focus areas for each phase. It outlines how physical, personal care, and communication skills are incorporated into the program through a series of fun and engaging games.

Statistical Analysis

The data were analyzed using SPSS 21.0. The normality of the data was checked before conducting statistical tests. The independent t-test was applied to compare pre-test scores between the experimental and control groups. To assess

the effectiveness of the intervention, Analysis of Covariance (ANCOVA) was applied to analyze post-test scores while controlling for baseline values. Additionally, the effect size was measured to determine the magnitude of differences. In all cases, statistical significance was set at $p < 0.05$.

Results

The pre-test comparisons between the experimental and control groups across all the variables are given in Table 3. The results revealed no statistically significant differences between the two groups. This indicates that both the experimental

Table 3. Pre-test comparison between the experimental and control group

Outcome	Experimental Group	Control Group	p
CVS (m)	564.2 ± 22.82	563.95 ± 16.22	0.968
FLEX (cm)	16.85 ± 1.18	16.65 ± 1.04	0.573
MSL (counts)	8.4 ± 1.27	8.2 ± 1.4	0.639
MSU (m)	2.34 ± 0.45	2.50 ± 0.43	0.263
PCS (points)	29.6 ± 4.39	31.65 ± 3.88	0.126
CIS (points)	28.25 ± 2.84	28.45 ± 2.98	0.829

CVS = Cardiovascular Endurance, FLEX = Flexibility, MSL = Muscular Strength Lower Extremities, MSU = Muscular Strength Upper Extremities, PCS = Personal Care & Safety, CIS = Communication and Interpersonal Skills. Data expressed as the Mean ± SD, p values indicate the difference between the experimental and control group.

Table 4. Changes in outcomes before and after the intervention in the experimental and control groups

Outcome	Experimental Group (n=20)	Control Group (n=20)	ρ	η _p ²
	Pre-test	Post-test	Pre-test	Post-test
CVS (m)	564.2 ± 22.82	600.6 ± 24.67	563.95 ± 16.22	564.05 ± 17.18
FLEX (cm)	16.85 ± 1.18	19.7 ± 1.69	16.65 ± 1.04	16.6 ± 1.05
MSL (counts)	8.4 ± 1.27	10.05 ± 1.61	8.2 ± 1.4	8.55 ± 1.5
MSU (m)	2.34 ± 0.45	2.85 ± 0.57	2.50 ± 0.43	2.45 ± 0.48
PCS (points)	29.6 ± 4.39	32.4 ± 4.68	31.65 ± 3.88	31.8 ± 3.85
CIS (points)	28.25 ± 2.84	31.1 ± 3.28	28.45 ± 2.98	28.6 ± 3.23

CVS = Cardiovascular Endurance, FLEX = Flexibility, MSL = Muscular Strength Lower Extremities, MSU = Muscular Strength Upper Extremities, PCS = Personal Care & Safety, CIS = Communication and Interpersonal Skills, Pre = before intervention, Post = after the intervention, η_p² = partial eta squared, m = meters, cm = centimeters. Data expressed as the mean ± SD.

and control groups were equivalent at baseline, with similar levels of physical, personal care, and communication abilities before the intervention (Table 4).

Discussion

The primary objective of this study was to assess the impact of IRLSA on the physical abilities, personal care, and interpersonal communication development of SwID. The findings from the pre-test and post-test comparisons of the experimental group indicate that structured IRLSA interventions significantly enhance endurance, flexibility, muscular strength, personal care, and interpersonal communication in SwID.

In contrast to the experimental group, the SwID in the control group showed minimal, non-significant improvements in selected variables. This emphasizes the necessity of structured interventions rather than relying on general physical activity alone. These findings align with previous research studies that highlight the positive effects of structured, unified exercises on individuals with ID [33, 34, 35, 36, 37].

The structured nature of IRLSA, which involved progressive exercises and day-to-day life-skill activities, likely contributed to these gains.

Activities such as running, dancing, and dynamic movement drills have been shown to enhance cardiovascular efficiency by improving oxygen uptake, stroke volume, and heart rate regulation [38, 39]. These physiological adaptations enable participants to sustain physical exertion for longer durations, reflecting improved stamina and overall cardiovascular health. SwID often have lower baseline cardiovascular fitness due to reduced physical activity levels, making such interventions crucial for improving overall well-being [40, 41].

Regular stretching and movement-based activities embedded in IRLSA likely improved muscle elasticity and joint mobility. Stretching exercises increase the length and compliance of muscle-tendon units, reducing stiffness and enhancing the range of motion [42, 43]. Improved flexibility is particularly beneficial for SwID, as they often experience motor coordination challenges, hypotonia, and muscle tightness that can impede functional movements [44, 45]. Enhanced flexibility also reduces the risk of musculoskeletal injuries, which is particularly important for individuals who may already have compromised movement patterns.

The experimental group demonstrated a statistically significant increase in muscular strength, particularly in core, upper, and lower-body muscles.

Strength-based exercises, resistance training, and bodyweight exercises were incorporated in IRLSA. Resistance training enhances motor unit recruitment and synchronization, leading to greater force production and stability [46, 47]. Engaging in multi-joint movement during training stimulates muscular endurance and develops overall strength [48]. Continuous movement, including running, jogging, and change of direction, places significant demands on the muscular system [49, 50].

The unified concept of training in structured physical activity programs plays a crucial role in enhancing personal care and safety by fostering self-regulation, motor coordination, and cognitive control [51-53]. The training involved both the individual with ID and their partners in synchronized activities. Participants learned essential self-care tasks through guided repetition, modeled behavior, and interactive reinforcement. Engaging in structured physical routines strengthens the prefrontal cortex, which is responsible for planning, impulse control, and decision-making, all of which are critical for maintaining hygiene, dressing, and safety awareness [51, 54]. The interactive nature of the training promoted spatial awareness and controlled movement, reducing the risk of falls and improving energy regulation, which in turn encouraged greater participation in daily self-care tasks [55]. The social reinforcement within the training, where peers and partners provided encouragement and feedback, helped reinforce self-care habits, making them more consistent and sustainable [56, 57].

Similarly, the unified training model, where individuals with ID participated alongside partners in structured activities, significantly enhanced communication and interpersonal skills. Through partner-based and group exercises, participants engaged in real-time social learning, reinforcing key behaviors such as turn-taking, eye contact, and following verbal or non-verbal cues [58, 59]. The cooperative nature of the training encouraged shared decision-making and patience, allowing participants to develop confidence in expressing themselves and interacting with others. Because the activities required mutual coordination and response, participants naturally improved their ability to process social cues and regulate emotions. Physical activity triggers the release of oxytocin and endorphins, hormones linked to trust, bonding, and positive social interactions, which helped create a supportive and engaging environment [60]. The structured interactive format of the training meant individuals with ID were not just learning in isolation but also actively engaging with others, making the improvements in communication and social skills more meaningful and lasting. The findings suggest that without guided, individualized programs, SwID could not experience substantial

physical or behavioral improvements.

The findings of this study highlight the importance of structured programs like IRLSA in improving physical fitness, personal care, and communication skills among students with intellectual disabilities. The program led to significant improvements in key areas such as endurance, flexibility, muscular strength, and social skills, demonstrating the effectiveness of inclusive approaches. The results also emphasize the need for individualized and interactive participation in learning processes to achieve sustainable and meaningful outcomes. These findings provide valuable insights for the development of future programs aimed at enhancing the quality of life for students with intellectual disabilities and offer practical recommendations for educational and rehabilitation settings.

Limitations

Despite the valuable insights provided by this study, several limitations should be considered when interpreting the findings. First, the study's sample size was relatively small, consisting of only 40 participants, which may limit the generalizability of the results. A larger and more diverse sample could offer a more comprehensive understanding of the effects of IRLSA across different populations of students with intellectual disabilities. Additionally, the study was conducted in a specific geographical location, which may affect the applicability of the findings to other regions with different cultural, social, or educational contexts.

Another limitation is the absence of long-term follow-up assessments to determine the sustainability of the improvements observed after the intervention. Future research should include post-intervention follow-ups to evaluate whether the benefits of IRLSA persist over time. Furthermore, the study did not explore potential differences in outcomes based on the severity of intellectual disabilities or other individual characteristics, such as age or gender. Investigating these variables could provide a more nuanced understanding of how IRLSA affects different subgroups of students.

Finally, while the study focused on the immediate effects of IRLSA, the impact of other factors, such as the role of family involvement, peer support, or the wider community, was not examined. These external influences could contribute to the success of the intervention and should be considered in future research.

Conclusions

This study provides empirical evidence supporting the impact of IRLSA in promoting multidimensional development among SwID. The statistically significant improvements observed across domains of cardiovascular endurance, muscular strength, flexibility, personal care, and

communication skills in the experimental group underscore the value of structured, inclusive, and task-oriented interventions. Unlike conventional fitness programs, IRLSA adopts a holistic framework that integrates physical activity with functional skill-building and peer-mediated interaction, thereby fostering both individual competence and social participation.

These findings reinforce the necessity of embedding adaptive physical education and life-skill activities within special education and rehabilitation contexts. The unified training approach not only addresses physical limitations but also mitigates barriers to communication, self-regulation, and autonomy, which are critical for the long-term well-being and inclusion of SWID. Given the increasing demand for inclusive

pedagogical models, this research contributes to the growing body of literature advocating for evidence-based, scalable, and developmentally appropriate interventions.

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Conflict of Interest

The authors declare that there are no conflicts of interest related to this study.

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