Yoga for Functional Fitness in Adults with Intellectual and Developmental Disabilities

Abstract

Background: Yoga is an effective intervention to improve functional fitness in adults with and without disabilities, but little research exists regarding yoga’s impact on functional fitness for individuals with intellectual and developmental disabilities (IDDs). Aims: The purpose of this study was to examine the benefits of a group yoga intervention on the functional fitness of adults with IDDs. Methods and Materials: This yoga intervention included 12 sessions of yoga over 7 weeks (60-min sessions twice a week) at a special population recreation and leisure program. The functional fitness test was used to examine physical functioning before and after the yoga intervention. Results and Conclusions: Eight adults completed the baseline and posttest measures (age mean = 31; standard deviation = 6.55; 50% male). There were significant improvements in lower-body strength (9.00 ± 4.63 vs. 11.50 ± 3.16, P = 0.04, 28% improvement), upper-body strength (11.25 ± 3.54 vs. 14.25 ± 3.37, P = 0.018, 27% improvement), and agility and balance (9.29 ± 4.1 vs. 6.60 ± 1.54, P = 0.036, 29% improvement). Functional fitness often declines for people with IDD at a faster rate than the general population; thus, these significant changes indicate that a yoga intervention may enhance functional fitness for people with IDD. Clinicians or other healthcare providers might consider yoga as a means to improve functional fitness in adults with IDDs.

Keywords: Functional fitness, intellectual and developmental disabilities, recreational therapy, yoga for disabilities

Introduction

Collectively, individuals diagnosed with a health condition classified as an intellectual or developmental disability are referred to as individuals with intellectual and developmental disabilities (IDDs). IDD encompasses multiple diagnoses including, but not limited to, autism spectrum disorder, Down syndrome, and fragile X syndrome.[1] Individuals with IDDs have impaired intellectual developmental functioning such as reduced cognitive, social, and practical skills, impaired physical functioning, learning, language, and behavior.[2] IDDs are congenital or occur during an individual’s developmental stages and are generally diagnosed before the age of 18 years.[2]

Adults with IDDs exhibit signs and symptoms of premature aging at an accelerated rate compared to the general population.[3] In particular, adults with IDDs are prone to physical decline in sensorimotor skills, coordination, muscular strength, flexibility, and balance in part due to physical inactivity.[4] Due to these physical limitations, adults with IDDs may be limited in activities required for vocation, recreation, and independent living, otherwise known as functional fitness.[4] Functional fitness is the capacity to safely and independently execute daily physical activities, such as walking longer distances without falling or lifting household items without undue lethargy.[5,6] Although functional fitness training and testing were developed to focus on strength, flexibility, endurance, and balance in older adults, these same issues are important for adults with IDD.[6,7]

To improve functional fitness in individuals with IDDs, it is suggested that physical activity should be adapted to and focused on age-appropriate activities that incorporate balance, flexibility, and strength training.[3,7] These activities should be social and incorporate low- to moderate-intensity training.[3,7] These activities should be social and incorporate low- to moderate-intensity training.

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Address for correspondence: Ms. Anita M Reina, Department of Health Promotion and Behavior, College of Public Health, University of Georgia, Athens, GA, 1Department of Parks, Recreation, and Tourism Management, College of Behavioral, Social, and Health Sciences, Clemson University, Clemson, SC, 2Department of Occupational Therapy, College of Health and Human Sciences, Colorado State University, Fort Collins, CO, USA

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exercises that target the major muscle groups for approximately 2½ h/week. Hatha yoga is a physical activity that improves functional fitness in adults with brain injuries after 6 weeks. To the best of our knowledge, no published studies have evaluated the impact of yoga on functional fitness in adults with IDDs. The purpose of this study was to examine the impact of a 7-week yoga intervention on the functional fitness of adults with IDDs.

Methods

Study design

This was a single-arm study with pre- and post-intervention assessments. The intervention included 12 1-h sessions of group yoga, twice a week for 7 weeks.

Participants

Participants were recruited through county's special population recreation and leisure program. Legally authorized representatives (LARs) of all potentially eligible individuals were given informational consent packets which contained a description of the study, a media release form, an informed consent form, and a demographic form. If the LAR consented to the study, assent was obtained from individuals with IDD who chose to participate in the study. To participate in the study, individuals must have met the following criteria: diagnosed IDD; LAR consent; participant assent; 18 years or older; a current participant in the special population recreation and leisure program; and answer “no” to all questions on the Physical Activity Readiness Questionnaire or receive permission from their physician.

Measures

The LAR reported participant’s demographic data, including age, sex, race, education level, and participation in other exercise. Physical performance measures, using the functional fitness test (FFT), were completed at the special population recreation and leisure program by trained research assistants.

Functional fitness test

Functional fitness was assessed with the FFT, which includes six functional tasks considered to be required for independent living. The FFT was developed for use with older adults and has not been used in its entirety in IDD populations. However, individual assessments in the FFT have been used with good reliability in the study samples with IDD. The FFT was used as there are a limited number of assessments of physical function considered to be reliable and valid in adults with ID.

Intervention (Yoga program)

The intervention protocol was developed, standardized, and taught by a team of certified yoga teachers and a yoga therapist. The yoga intervention targeted muscular strength and balance [Table 1 for poses]. Participants were given the option of hands-on assistance, modifications, and alternatives to yoga postures from trained staff members as needed. Props such as chairs, wall space, straps, and bolsters were used for posture modification. All sessions ended with a supine relaxation pose.

Data analysis

Data analysis was conducted using IBM’s SPSS version 25 (IBM Corporation in Armonk, NY, USA). Demographic data were analyzed using descriptive statistics, including means, standard deviation, frequencies, and proportions. Normality was assessed with the Shapiro–Wilk test; data were nonnormally distributed; thus, nonparametric statistics (Wilcoxon signed-rank test) were used to evaluate change between pre- and post-yoga assessment scores. Pre- and post-yoga assessment scores were further examined with a percent change calculation (Time1 − Time2 / Time1 × 100).

Results

Twelve participants assented although four participants did not complete postyoga assessments and were eliminated from the sample. Data from the eight participants who completed pre- and post-yoga assessments were used for analysis [Table 2]. Significant improvements were observed in lower-body strength via the chair stand test (28%; P = 0.04), upper-body strength via the arm curl test (27%; P = 0.018), and agility and balance via the timed up-and-go test (29%; P = 0.36). Nonsignificant improvements occurred in the lower-body flexibility via chair sit-and-reach test (47.31%; P = 0.73), upper-body flexibility via back-scratch test (53%; P = 0.49), and endurance via 2-min step test (21.32%; P = 0.09) [Table 3].

Discussion

Results from this 7-week yoga intervention showed significant improvements in functional fitness related to lower-body strength, upper-body strength, and agility and dynamic balance. Similar findings show that upper- and lower-body strength improved in a healthy adult sample after 8 weeks of Hatha yoga practice due to improved isokinetic strength, likely as a result of holding postures for an extended period of time in combination with controlled transitions from one pose to the next. Similar to the findings investigating yoga with adults with disabilities, agility and dynamic balance was significantly improved in the current sample, which is particularly important in this population due to increased risk of falls at younger ages. Given the significant improvements in the current sample, it is plausible that yoga may improve strength and agility and dynamic balance for adults with IDD, although additional research is necessary.

Although flexibility and endurance did not significantly improve postyoga intervention in the current sample,
lower-body flexibility still improved by 47%. The lack of significant results is contrary to the findings in other studies in various diagnostic populations\cite{8,14} and surprising given the percent change in lower-body flexibility. Meanwhile, the evidence for yoga and endurance is conflicted with some sources, suggesting that endurance is not better than brisk walking.\cite{15} Some of the participants in the current study were also involved in other forms of exercises which may have improved their endurance, potentially skewing results. The lack of significant improvement in flexibility could be explained by participants having previous experience with yoga or participation in other physical activities. Although participants were asked if they participated in other physical activities, the frequency and types of activity were not obtained potentially confounding results. Further investigation is needed to clarify the effects of yoga on flexibility while controlling for other physical activity types in adults with IDDs.

**Limitations**

The results of this study should be taken within the context of certain limitations, such as a small sample size, no control group, and in only one location. In addition, the sample was recruited from a small group currently involved in the special population recreation and leisure program, with previous yoga experience and ongoing extracurricular participation in physical activities. It is unclear if a practice effect had any impact on improved scores, or if lack of tester blinding could have impacted scores. Due to the small sample size, formal IDD diagnosis, comorbid illnesses,

| Position               | Yoga posture name (if applicable) | Sanskrit Name   | Anatomical purpose                              |
|------------------------|-----------------------------------|-----------------|-------------------------------------------------|
| Seated                 | Yogic breathing                    | Pranayama       | Slow, deep, rhythmic breathing                  |
|                        | Locust arms and cactus arms       | Salabhasana     | Spinal extension                                |
|                        | Boat pose, puppy pose             | Uttana Shishosana| Hip and spinal flexion                          |
|                        | Fold forward, staff pose          | Dandasana       | Hip and spinal flexion                          |
|                        | Boat pose                         | Navasana        | Abdominal and hip strengthening                  |
|                        | Cat pose, cow pose                | Marjariasana /Bitilasana | Spinal flexion and extension               |
|                        | Child’s pose                      | Balasana        | Hip rotation                                    |
| Standing               | Chair pose, awkward chair         | Utkatasana      | Knees flexed; shoulders extended                |
|                        | Mountain pose                     | Tadasana        | Anatomical position                             |
|                        | Mountain pose with cactus arms    | Tadasana (variation) | Hip extension while standing                |
|                        | Warrior I and Warrior II pose     | Virabhadrassana A and B | Prolonged lungs                                   |
|                        | Tree pose                         | Vrikasana       | Balance on one leg                              |
|                        | Forward fold                      | Uttanayasan      | Supine extension, leg stretches, and core strengthening |
|                        | Lunge                             | Anjaneyasana    | Hamstring flexibility                            |
|                        | Goddess pose to five-pointed star | Utkata Konasana | Hip rotation                                    |
|                        | Reversed warrior pose             | Viparita Virabhadrassana | Arm flexion with hip extension through lunges |
|                        | Downward dog pose                 | Adho Mukha Svansana | Hip flexion, should extension and strengthening |
| Floor postures         | Bridge pose                       | Setu Bandha Sarvangasana | Leg and glute strengthening                     |
|                        | Tabletop                          | Bharmanasana    | Arm extensions                                  |
|                        | Reclining hand to big toe pose    | Supta Padagusthasana | Stretching hamstrings and hip flexion          |
|                        | Caterpillar and cobra             | Bhujangasana    | Spinal extension                                |
|                        | Staff pose                        | Dandasana       | Seated hip flexion                              |
|                        | Supine gentle twist               | Supta Matsyendrasana | Spinal rotation                               |
|                        | Supine cobbles pose               | Supta Baddha Konasana | Hip rotation and stretching                   |
|                        | Corpse pose with meditation       | Savasana        | Supine relaxation                               |

**Table 2: Demographics for the 11 participants who completed pre-yoga testing**

| M ±SD                | Frequency (%) |
|----------------------|---------------|
| Age, mean±SD         | 31±6.55       |
| Sex, frequency (%)   |               |
| Male                 | 4 (50)        |
| Female               | 4 (50)        |
| Race                 |               |
| White                | 6 (75)        |
| Black                | 2 (25)        |
| Marital status       |               |
| Single               | 8 (100)       |
| Education            |               |
| Grades 7-12          | 1 (12.5)      |
| High school graduate | 4 (50)        |
| Special education certificate | 2 (25) |
| Not specified        | 1 (12.5)      |
| Involved in other exercises? |         |
| Yes                  | 7 (87.5)      |
| No                   | 1 (12.5)      |

SD = Standard deviation
and adaptive functioning were not able to be accounted for statistically. Finally, the planned dose was impacted by special population recreation and leisure program scheduling limitations, such as operational hours and holidays.

Future studies may include multiple comparison groups to assess the differences between control, physical activity, and yoga conditions. The IDD condition varies greatly along with diagnosis of comorbidities. Therefore, comparisons for the effects of yoga between various IDD diagnoses, adaptive functioning, and comorbid illness are warranted. Finally, valid and reliable assessments for this population are needed to improve future studies.

Despite the limitations, this study provides preliminary results that yoga may be an effective approach to increasing functional fitness in adults with IDD. Given that the needs of adults with IDD are often overlooked, the results may inform further investigations into the clinical and social significance of addressing functional fitness with yoga in the population.

Conclusion

This study contributes novel information as it was the first known study to examine the benefits of yoga on the functional fitness of adults with IDDs. It is recommended that validity, reliability, and norms be established for the FFT with this population, which would make the FFT more useful in future yoga intervention studies. These preliminary results indicate that yoga may be a valuable intervention to improve physical strength, flexibility, endurance, and agility and balance for people with IDD, a population often overlooked in yoga research.

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Conflicts of interest

There are no conflicts of interest.

Table 3: Participants pre- and post-yoga intervention functional fitness test scores

| Functional fitness variable | FFT item                  | Mean±SD        | Pre                  | Post                  | P        | Percent change |
|-----------------------------|---------------------------|----------------|----------------------|----------------------|---------|----------------|
| Lower-body strength         | 30-s chair stand          | 9.00±4.63      | 11.50±3.16           | 0.040*               | †27.78  |
| Upper-body strength         | Arm curl                  | 11.25±3.54     | 14.25±0.37           | 0.018*               | †26.67  |
| Lower-body flexibility      | Chair sit-and-reach       | −1.86±6.34     | −0.98±7.44           | 0.735                |         |
| Upper-body flexibility      | Back-scratch              | −7.54±5.92     | −7.56±6.73           | 0.499                |         |
| Endurance                   | 2-min step                | 44.00±15.98    | 53.38±22.18          | 0.092                | †21.32  |
| Agility and dynamic balance | Up-and-go                 | 9.29±4.1       | 6.60±1.54            | 0.036*               | †28.96  |

*P<0.05. FFT=Functional fitness test, SD=Standard deviation. †=denotes an increase in change from baseline to posttest, †=denotes a decrease in change from baseline to posttest

References

1. American Association on Intellectual and Developmental Disabilities. Definition of Intellectual Disability; Published 2019. Available from: http://aaidd.org/intellectual-disability/definition. [Last accessed on 2019 Mar 12].
2. National Institute of Child Health and Human Development. Intellectual and Developmental Disabilities (IDDs): Condition Information; Published 2016. Available from: https://www.nichd.nih.gov/health/topics/idds/conditioninfo/default. [Last accessed on 2019 Mar 12].
3. Carmeli E, Imam B. Health promotion and disease prevention strategies in older adults with intellectual and developmental disabilities. Front Public Health 2014;2:31.
4. Carmeli E, Bar-Yossef T, Ariav C, Paz R, Sabbag H, Levy R. Sensorimotor impairments and strategies in adults with intellectual disabilities. Motor Control 2008;12:348-61.
5. Carmeli E, Zinger-Vaknin T, Morad M, Merrick J. Can physical training have an effect on well-being in adults with mild intellectual disability? Mech Ageing Dev 2005;126:299-304.
6. Jones J, Rikli R. Measuring functional. J Act Aging 2002;24:24-30.
7. Carmeli E, Merrick J, Berner YN. Effect of training on health and functional status in older adults with intellectual disability. Int J Ther Rehabil 2005;11:481-5.
8. Schmid AA, Miller KK, Van Puymbroeck M, Schalk N. Feasibility and results of a case study of yoga to improve physical functioning in people with chronic traumatic brain injury. Disabil Rehabil 2016;38:914-20.
9. Thomas S, Reading J, Shephard RJ. Revision of the Physical Activity Readiness Questionnaire (PAR-Q). Can J Sport Sci 1992;17:338-45.
10. Rikli RE, Jones CJ. Development and validation of a functional fitness test for community-residing older adults. J Aging Phys Act 1999;7:129-61.
11. Tran MD, Holly RG, Lashbrook J, Amsterdam E. A. Effects of hatha yoga practice on the health-related aspects of physical fitness. Prev Cardiol 2001;4:165-70.
12. Schmid AA, Van Puymbroeck M, Altenburger PA, Schalk NL, Dierks TA, Miller KK, et al. Poststroke balance improves with yoga: A pilot study. Stroke 2012;43:2402-7.
13. Hsieh K, Rimmer J, Heller T. Prevalence of falls and risk factors in adults with intellectual disability. Am J Intellect Dev Disabil 2012;117:442-54.
14. Van Puymbroeck M, Walter AA, Hawkins BL, Sharp JL, Woschkolup K, Urrea Mendoza E, et al. Functional improvements in Parkinson’s disease following a randomized trial of yoga. Evid Based Complement Alternat Med 2018;2018:1-8.
15. Raub JA. Psychophysiologic effects of hatha yoga on musculoskeletal and cardiopulmonary function: A literature review. J Altern Complement Med 2002;8:797-812.