

A Peer Mentored Physical Activity Intervention: An Emerging Practice for Autistic College Students

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Abstract

Many autistic individuals are less fit and have more health problems than their nonautistic peers. These findings suggest a need to develop effective physical activity interventions. Motor skill deficits, lack of motivation, and limited opportunities for physical activity may restrict exercise participation. Peer mentors can help autistic college students increase their physical activity level and fitness. We developed a 10-week peer mentored physical activity program that affords autistic college students the opportunity to act in a self-determined manner in which students are encouraged to engage in preferred activities and self-directed instruction (autonomy), gain skills through access to expert instruction (competence), and engage socially with peers (relatedness). The ability to act with self-determination may increase students' motivation to participate in physical activity. From our pilot study, we learned that autistic college students could improve their cardiorespiratory fitness, flexibility, and upper body muscular endurance as a result of participating in Into Fitness Together. We also learned of three shared themes: students felt that they gained motor competence, improved their health, and felt a sense of belonging. The autistic students spent time with both autistic and nonautistic peers, which fostered this belongingness. Access to movement experts and peer mentors in an individualized program that affords choice in physical activity is a step in the right direction to eliminate the health disparities of autistic young adults.

Keywords: autistic adults, physical activity, fitness, college students, peer mentor

Lay Summary

Why was this program developed?

We developed a physical activity program because we saw the need for autistic individuals to benefit from regular physical activity. Motor skill challenges may keep autistic adults from engaging in regular physical activity and from reaping the benefits of improved fitness. Since participating in regular physical activity is important for the health of all individuals, it is important to design programs that address barriers so all people can benefit.

What new program was developed?

We developed a 10-week physical activity program called *Into Fitness Together (IFiT)* for autistic college students. The program is unique because it is individualized, tailored to autistic adults, fun, and has a built-in one-to-one peer support system.

What did the researchers do?

We wanted to learn whether the program had the potential to increase health-related fitness and how autistic college students experienced IFiT. Sixteen autistic college students participated in IFiT. They were paired one-on-one with another college student (known as a peer mentor) who was an expert in exercise science. The pairs worked out together 2.5 hours a week for 10 consecutive weeks. We examined change in participants' fitness levels at the start and end of IFiT. We also interviewed the autistic peers to understand their IFiT experience.

What was the result of participating in the program?

With regular participation in physical activity, the autistic peers improved their cardiorespiratory fitness levels, muscular endurance, and flexibility by the end of IFiT. There were three main themes that emerged from the interviews. At the end of the program, participants reported (1) greater competence in motor skills and a greater understanding of exercise, (2) improved

overall health, and (3) a sense of belonging. Participants said they learned new ways to exercise, how to exercise correctly, and stated that they felt healthy and fit. They also expressed a sense of belonging. Participants stated that they valued their time with their peer mentor not only because the peer mentor shared their expertise in physical activity and exercise, but also because the peers talked about school, hobbies, and life in general. Having ongoing opportunities for regular social interaction was a positive experience for IFiT participants.

What are the next steps for program development?

This emerging practice article describes a small pilot study performed at one university, thus results cannot be generalized. Also, we did not have data from a comparison group of autistic students who did not participate in the program. Future studies should use a control and comparison group and gather data at multiple institutions.

How will these findings help autistic adults now or in the future?

There is limited information on interventions focused on physical activity for autistic college students; therefore, our work provides insight into a promising program. Regular physical activity can lead to positive health outcomes, skill acquisition, and participating in IFiT can potentially set the stage for lifelong physical activity.

Introduction

AUTISTIC ADULTS EXPERIENCE a greater number of serious health problems,¹ including obesity, type 2 diabetes mellitus, cardiovascular disease, gastrointestinal issues, depression, and even earlier mortality than the general population.^{2,3} Participation in regular physical activity is recognized as a leading indicator of health and mediator for lifestyle-related diseases⁴; however, many autistic adults live sedentary lifestyles, which may contribute to their health problems.

The U.S. Department of Health and Human Services (HHS) established physical activity guidelines recommending that all adults engage in at least 150 minutes of moderate physical activity and two sessions of muscle strengthening activities per week.⁵ Regular participation in moderate to vigorous physical activity improves health-related fitness. According to the American College of Sports Medicine, health-related physical fitness includes cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, and body composition.⁶ Participating in recommended amounts of physical activity is important as it (1) improves health-related physical fitness and mental health, (2) helps maintain a healthy weight, (3) improves the ability to perform activities of daily living,⁷ and (4) can reduce the risk of developing secondary conditions associated with obesity such as high blood pressure, type 2 diabetes mellitus, and cardiovascular disease.⁷

Participation in physical activity for autistic people may be difficult due to poor motor skills,⁸ lack of motivation to be physically active,⁹ and limited opportunities for physical activity.¹⁰ Researchers have confirmed that the vast majority of autistic children and adolescents have poor motor skills^{8,11} and these deficits exist into adulthood and may lead to limited physical activity.^{12,13} Physical fitness is affected by physical activity levels; therefore, it is not surprising that fitness levels of autistic adolescents are lower than those of peers who are not on the autism spectrum.⁸ Poor motor skills may lead to a lack of competence and motivation to engage in physical activities. For these reasons, it is important to design physical activity interventions that can help break down these barriers. In this article, we describe how *Into Fitness Together* (IFiT) is grounded in the Self-Determination Theory; the rationale for developing it; what IFiT is, how it works, and the pilot study; lessons learned from our pilot study results; and limitations, implications, and next steps.

IFiT and Self-Determination Theory

IFiT is based on Self-Determination Theory, which posits that conditions supporting the basic psychological needs of autonomy, competence, and relatedness help foster motivation and engagement.¹⁴ IFiT provides opportunities for autistic college students to engage in preferred activities and self-directed instruction (autonomy), gain competence through access to expert instruction, and engage socially with peers (relatedness). When these psychological needs are met during an activity, individuals experience greater intrinsic motivation to engage in that experience.¹⁵

Motor competence appears to be a mediating factor in physical activity behavior. Stodden and colleagues assessed motor competence and physical fitness in 187 college students and found that the majority of students with high competence were quite fit, whereas more than half of students with low motor competence had poor fitness.¹⁶ The authors argue that there is a “proficiency barrier” to engagement in physical activity and that when people do not have adequate movement competence, they experience a barrier to engaging in physical activity. Similarly, Ball and colleagues surveyed 217 college students on self-determination, exercise behavior, and barriers to being active.¹⁷ The students reported that major barriers to being active included time, social influence, willpower, energy, and skill.¹⁷ Autistic individuals may experience a skill barrier as they often do not acquire mature motor skills during childhood.¹² The IFiT program provides access to a movement expert (i.e., the peer mentor), who can teach and help refine motor skills that are required to participate in physical activities of interest in a supportive environment.

Into Fitness Together

Description of program

IFiT is a physical activity program designed for autistic college students. Each autistic student is paired with a kinesiology student and the dyads engage in different physical activities together for 1 hour twice a week. The core components include mentoring and support by nonautistic peers and individually tailored programming.

Rationale

Two researchers with expertise in autism recognized the need to address the physical inactivity of autistic college

students. This need has emerged from the literature, which provides evidence to suggest that autistic young adults face barriers that restrict physical activity participation including motor skills deficits,^{8,11} lack of motivation,⁹ and lack of knowledge about physical activity.⁹ In addition, there may be limited knowledge of how to access opportunities for physical activity on a university campus.

The number of diagnosed autistic students who attend college is also increasing,¹⁸ making IFiT an important initiative. For example, on this large urban campus, the disability office reports >200 self-identified autistic students. The program has aligned well with the mission of the university's kinesiology department. The large department has the resources including students, facilities, and expertise to run a program that serves both autistic college students and peer mentors in terms of training them on health-enhancing physical activity.

How IFiT works

Recruiting and training peer mentors. Peer mentors were recruited from the kinesiology department. To apply, students had to have completed upper level courses pertaining to exercise and fitness training. They completed 10 hours of training on the diagnosis, symptoms, and characteristics of autism, as well as the strengths, virtues, and challenges of being autistic. Peer mentors also learned how to ensure the physical and psychological safety of their peers and how to engage with autistic individuals in a physical activity setting. Discussion of the role of peer mentor included inviting autistic students to express their preferences and choose activities, being aware of sensory stimulation in the environment, and participating in physical activity together as opposed to a "coach" role. On their own time, peer mentors read peer-reviewed articles and case studies, and viewed a documentary, which was then discussed as a group.

Recruiting autistic college students. We contacted campus and local community agencies as well as disability services at the university that provided services to autistic adults. We presented the IFiT research study to the coordinators and the students they serve. We also used flyers and word of mouth to reach students who were not part of an agency. Students who were autistic, at least 18 years of age, enrolled in college, and able to participate in moderate to vigorous physical activity were eligible.

Pairing process. We collected school and work schedules from participants and peer mentors. Next, we matched students based on their availability and at times, gender. That is, when available, female participants were paired with female peer mentors. We discussed the choice of pairing with the participants, letting them know that this would be their peer mentor for the program.

The 10-week program. Peers met twice a week for 60 minutes each time for 10 consecutive weeks. We required the dyads to exercise at moderate to vigorous intensity levels for a minimum of 30 minutes per session. The sessions needed to include aerobic and strength training exercises, as recommended by the HHS guidelines.⁵ Peer mentors documented physical activities after each session recording the

date, time, type of activity (e.g., strength and/or cardiorespiratory), location, weight, and repetitions. Dyads worked together to create a physical activity plan that was enjoyable and that they would commit to each week.

We encouraged dyads to attend a common meeting hour every Tuesday evening. Meeting each week allowed dyads access to a reserved fitness space in a large campus recreation center. Dyads could choose to work alone or in small groups if they had similar interests. The dyads who did not attend reported school or work conflicts. Our research team greeted dyads, took attendance, encouraged the use of space and fitness equipment, provided a nutritional snack, and encouraged socialization at the end of each session. Each week, we presented an educational topic and discussed it for 5–10 minutes after the workout time. Topics included how to meet physical activity recommendations, nutrition tips, and motivation. Participants were welcomed to suggest a topic as well.

Choosing one's own activities. A key design component to IFiT is promoting self-determined behavior. During sessions, we promoted autonomy by offering choice of activities, choice of time and place for dyads to meet, and self-directed instruction. Each week, the dyads chose the type of physical activity that they engaged in and the location where the activity would take place. Some students enjoyed the large busy Student Recreation Center, whereas others preferred a smaller quieter environment. Commonly chosen activities included weight machines, cardiorespiratory machines such as treadmills and elliptical machines, and small group games such as 2 on 2 basketball. IFiT provided opportunities for autistic college students to be agents of change in their own life, choosing activities of interest, and acquiring competence through instruction and practice.

Pilot study. Sixteen autistic college students participated in 10 weeks of IFiT (see Participant Information in Table 1). The purpose of our pilot study was to (1) examine the effects of the IFiT physical activity intervention on health-related fitness levels, (2) describe adherence rates to the program, and (3) report participant experience. We gathered anthropometric and fitness data before and after the intervention (see Table 2 for list of measures). All fitness tests were completed in one session, the Rockport 1-mile walk test was completed at the beginning of the session followed by the remaining tests in random order.

We used the Reliability Change Index (RCI) to determine whether an individual significantly improved his/her IFiT score from pre-IFiT to post-IFiT.¹⁹ If the participant's RCI showed significant difference in fitness scores that cannot be accounted for by sampling error, we then considered the IFiT intervention to be practically significant to the participant. Peer mentors calculated adherence rates from activity logs and adherence was measured by counting the number of completed exercise sessions between the dyads and dividing that number by the total number of sessions offered.

Participants were interviewed individually about their IFiT experience using open-ended questions and rating scale items. We transcribed the open-ended responses. *In vivo* coding served as the basis for analysis. We read the transcripts and used short phrases and words that stood out and captured the essence of what was being described to label sections of data.²⁰ We identified 106 phrases and words. Initial data codes were clustered by similarity and organized

TABLE 1. PARTICIPANT INFORMATION

Participant	Age (years)	Gender	Race	Diagnosis	Height (cm ⁴)	Weight (kg ⁵)	BMI ⁶	College standing
Harold	25	Male	White	ASD ¹	179.1	107.9	33.7	senior
Sally	28	Female	White	Asperger's Syndrome	166.4	127.2	46.7	junior
Brian	21	Male	White	ASD	170.2	86.9	30	senior
Chris	19	Male	White/Asian	ASD/ADHD ²	172.7	93.4	31.3	freshman
George	18	Male	White	ASD	174.0	99.1	32.7	freshman
Lawrence	22	Male	White	Asperger's Syndrome	180.3	122.9	37.8	junior
Jeff	23	Male	Asian	Asperger's Syndrome	186.7	108.6	44.5	senior
Mark	28	Male	Asian	ASD, OCD ³	162.6	83.2	31.5	senior
Lesley	28	Female	White	ASD, ADHD	147.3	51.3	16.2	junior
Noah	18	Male	Hispanic	Asperger's Syndrome	177.8	100.2	31.7	freshman
Peter	22	Male	White	ASD, Schizoaffective disorder	168.9	82.1	28.8	senior
Travis	19	Male	White	ASD	170.2	132.2	45.7	freshman
Ethan	21	Male	Hispanic	ASD	170.2	79.8	27.6	junior
Justin	23	Male	White	ASD	190.5	133.4	36.7	senior
Christina	23	Female	White	ASD	149.9	88.0	39	junior
Frank	19	Male	Asian	ASD	163.8	77.1	28.7	freshman

¹Autism Spectrum Disorder (ASD).
²Attention Deficit Hyperactivity Disorder (ADHD).
³Obsessive Compulsive Disorder (OCD).
⁴Centimeters.
⁵Kilograms.
⁶Body Mass Index [(weight (kg)/height (cm)²] \times 10,000.

into categories. We used second level pattern coding to reduce the data to themes.²¹

Lessons Learned

Anthropometric and fitness measurements obtained before the start of IFiT showed that 15 of the 16 autistic students were overweight (body mass index [BMI kg/m²] ranging from 25 to 29.9) or obese (BMI >30) and had generally poor levels of fitness when compared with standardized scores for the fitness measures. After the IFiT program, at the individual level, 30% of participants showed significant RCI in cardio-respiratory fitness, and 25% in upper body muscular endurance (see results in Table 2). Moreover, the means of these fitness measures together with flexibility are seen to have statistically significant improvement after the IFiT program. Core body endurance (i.e., sit-ups) increased; however, the change from

pre- to post-IFiT did not reach statistical significance. There was little change in mean BMI after completion of IFiT (BMI pre-IFiT = 33.27, post-IFiT = 33.68).

Adherence rate to the IFiT program was 89.1%, which indicates that on average each student attended 18 out of 20 possible sessions. Consistent participation is key to reaping the benefits of regular physical activity.

We report on three themes that emerged from participant interviews: (1) gains in motor competence and knowledge of exercise, (2) improved overall health, and (3) a sense of belonging. Participants shared that they learned new ways to exercise and how to exercise correctly. One participant reported that "...before IFiT I was unorganized with what parts of my body to workout and thanks to the IFiT program my coach helped get me organized with sets, reps, weight and correct form." Participants also expressed that they valued having readily available access to instruction. During the interviews, participants expressed feeling healthy and fit. For

TABLE 2. FITNESS TEST RESULTS BEFORE AND AFTER 10-WEEK INTO FITNESS TOGETHER PROGRAM (% RELIABILITY CHANGE INDEX AND PAIRED SAMPLES T-TEST)

Fitness test	Pre M \pm (SD)	Post M \pm (SD)	% RCI ^a	t	p
VO ₂ Max ^b [mL(kg·min)]	32.58 \pm 9.66	36.97 \pm 11.81	31.25	3.29	0.005
Sit-up ^c	31.81 \pm 13.22	33.06 \pm 15.07	6.25	0.346	0.734
Push-up ^d	12.81 \pm 8.07	16.00 \pm 10.47	25.0	2.94	0.010
Sit and reach ^e (cm)	24.53 \pm 8.62	27.38 \pm 8.32	0.0	2.76	0.014

Statistical significance $p \leq 0.05$.
^aPercentage of individuals with RCI²² ≥ 1.96 .
^bRockport 1-mile walk test: Estimate of cardiorespiratory fitness, time (minutes) to walk a mile and heart rate at completion of the mile are recorded and entered into an equation to obtain VO₂.²⁰
^cSit and Reach box: Measure of lower body and hamstring flexibility, the distance reached forward while seated on the floor with legs straight is recorded in centimeters.⁶
^dAmerican College of Sports Medicine Push-up test: Measure of upper body muscular endurance, number of push-ups performed with correct form (elbows bent to 90°) to exhaustion is recorded.⁶
^eYMCA half-sit up test: Measure of abdominal muscular endurance, the score denotes the number of half sit-ups performed in 1 minute.²³
M, mean; RCI, Reliability Change Index; SD, standard deviation.

example, they reported better sleep, increased energy, feeling physically strong, and improved gastrointestinal health. One participant shared, “I have less bloating of the stomach and less gastrointestinal symptoms.” For sense of belonging, participants reported enjoying time with other autistic college students, making new friendships with their peer mentors, and valuing the weekly social time provided by the program.

Discussion

We examined the effects of a peer mentored physical activity program (IFiT) for autistic college students and report two main findings. First, participants improved their fitness levels when scores were measured before and after IFiT. The American College of Sports Medicine publishes normative fitness data, these data were used to understand how autistic college students compared to the standardized norms.⁶ Norms are provided for men and women and are divided into six age and seven fitness categories ranging from very poor to excellent. Average cardiorespiratory fitness scores fell into the “very poor” category before IFiT, but improved to the “fair” category during the post-test for young men 20–29 years of age.⁶ Two of the three females improved one category (from “very poor” to “poor” and from “above average” to “good”), and one student remained at the “very poor” level. The average number of push-ups completed during the pre-test fell into the “very poor” category of ≤ 13 ,⁶ which improved to an average of 16 push-ups at post-test. Participants improved their flexibility as measured by the Sit and Reach test, with mean pre-test scores falling into the poor category and post-test into the fair category.⁶ The results show that fitness improves with regular participation in moderate to vigorous physical activity.

The results suggest that this group of autistic college students was overweight and not fit, which is in line with current findings of health record surveys of autistic adults.¹ It is important to note that the fitness scores for autistic students were low when compared with national averages. Our finding reinforces the need for regular physical activity.

Second, autistic college students shared common experiences as a result of their participation, including improved (1) motor competence, (2) health benefits, and (3) sense of belonging. Autistic students reported how much they learned about how to exercise, what exercises to do to meet their goals, how to use the exercise machinery, and how to execute an exercise with good form. One student aspired to reach the top of the rock climbing wall and his peer mentor explained that working on upper body strength would help him meet this goal. He learned specific upper body strength exercises and reached the top of the wall during week 9. Many students explored new activities, which in itself may be a significant challenge for autistic people. One participant tried rock climbing, another pursued boxing, and yet another participant found enjoyment using weight training machines when he gained competence in performing the exercise. The vast majority of participants commented on “feeling better” or “more fit,” having better sleep, fewer gastrointestinal issues, more energy, and feeling physically stronger.

Having an ongoing opportunity for regular social interaction was motivating and positive for our participants. Participants stated that they valued their time with their peer mentor not only because the mentor provided expertise in exercise, but

also because they developed friendships where they could talk about school, pastimes, and everyday problems. Time with other autistic peers was also perceived as valuable as one student stated, “... so it was a nice change to be with people like me even if we are socially awkward and stare at the wall.” Another student stated, “this [IFiT] is my respite for the week.” During the program, several dyads chose to work out together in a small group at the request of their autistic peer, which speaks of their desire to be with others.

Limitations

Although this pilot study helped us gather information on autistic college students, the limitations must also be considered. First, the study was carried out at one 4-year institute of higher education and, therefore, the findings cannot be generalized to all autistic college students. Future researchers should include larger samples and pool from varied institutions to increase representation. Second, it is assumed that all participants gave their best effort during fitness testing (e.g., walking as fast as they could for 1 mile), but we could not confirm this. Third, we did not have a control group.

Implications

IFiT afforded 16 autistic college students ample opportunity for one-to-one direct instruction and peer mentoring while improving their physical fitness. Participants reported a positive experience after completing the program and exercised and socialized with peers on a weekly basis. Our IFiT program allows autistic college students to increase self-determination by choosing their own activities and engaging in preferred activities and self-directed instruction (autonomy), gaining skills through access to expert instruction (competence), and engaging socially with peers (relatedness).

Next steps

The goal for research is to test IFiT using a randomized controlled trial (RCT) with follow-up as RCTs are the hallmark of evidence-based practice. Future RCTs can help translate the intervention research into practice. Any group differences will help us understand whether IFiT is the catalyst for change. The goal for practice is to share our program widely to institutions of higher education that strive to support their autistic students.

Summary

This study is the first of its kind to report the findings of an individualized peer mentored physical activity program for autistic college students. As such, we advance the literature in at least three ways. First, our focus was on the physical activity of autistic college students, which to date has gained little attention. Second, we learned what autistic college students experience as a result of their participation, adding to the dearth of literature on the first-hand accounts of autistic people. Third, the barriers to physical activity including poor motor skills, lack of motivation to be physically active, and limited opportunities to participate can be directly addressed and fitness gains can be achieved. Thus, researchers gain information from well-designed physical activity programs because these programs are a means to improving health-related fitness. The time is ripe to implement empirically

based fitness programs so that autistic young adults can increase their physical activity, health-related fitness, and self-determination.

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Authors' Contributions

T.T. is a principle investigator of this project and participated in participant recruitment, data collection, data analysis and interpretation, and article preparation. N.M. is a principle investigator of this project and participated in participant recruitment, data collection, data analysis and interpretation, and article preparation. S.C.B. completed her master's of science in kinesiology at California State University. She participated in data collection, data analysis and interpretation, and article preparation. A.Z.Z. performed Reliability Change Index analysis on the data and assisted in interpretation of those results. All coauthors have reviewed and approved this article. We confirm that this article has been submitted solely to *Autism in Adulthood* and is not published, in press, or submitted elsewhere.

Author Disclosure Statement

No competing financial interests exist.

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