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Increasing physical activity in young adults with autism spectrum disorders[☆]



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ABSTRACT

Although regular physical exercise is clearly beneficial, many people with autism spectrum disorders do not exercise regularly. The present study used a multiple-baseline-across-participants design with a reversal to demonstrate that a treatment package comprising goal-setting and reinforcement substantially increased walking by young adults with autism spectrum disorders while at school. During the initial baseline condition participants were given pedometers to wear. Once each participant's number of steps stabilized, she/he sets daily goals for minimum number of steps taken and received access to valued objects or activities (reinforcers) for meeting those goals. By the end of the first treatment condition each of five participants was successfully meeting his or her goal and walking at or above 10,000 steps each day. Walking decreased when a return to baseline was implemented, then increased when treatment was reinstated. Social validity assessment indicated that both the participants and their teacher found the intervention highly acceptable. These findings suggest that simple strategies based on goal setting and reinforcement merit further investigation as interventions for increasing exercise.

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1. Introduction

As indicated in a recent review (Lang et al., 2010) and a recent meta-analysis (Sowa & Meulenbroek, 2012), inducing physical exercise in people with autism spectrum disorders (ASD) has been shown to produce a substantial range of behavioral improvements, as well as increased physical fitness. Lang et al. provide a clear and concise summary of the 18 studies they reviewed:

A variety of exercise activities were employed (e.g., jogging, weight training, bike riding). Following the exercise interventions decreases in stereotypy, aggression, off-task and elopement were reported. Fatigue was not likely the cause of decreases in maladaptive behavior because on-task behavior, academic responding, and appropriate motor behavior (e.g., playing catch) increased following physical exercise. (p. 565).

[☆] The reported data were collected as part of the first author's doctoral dissertation.

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It is interesting that each of the 18 studies focused on the beneficial effects of exercise on subsequent behavior, rather than on engendering a consistent pattern of regular physical activity *per se*. It is widely recognized that most people do not engage in sufficient physical exercise to confer health and other benefits (US Department of Health and Human Services, 2008), and it is also known that exercise levels are characteristically lower in people with ASD than in people without ASD (Draheim, Williams, & McCubbin, 2002). The purpose of the present study was to examine a simple procedure for inducing young adults with ASD to walk long and often enough to meet or exceed minimum guidelines for aerobic activity. Although walking was not used as a form of exercise in any of the studies examined by Lang et al. (2010) or Sowa and Meulenbroek (2012), walking is a simple, convenient, and inexpensive way to exercise (Trosts, Owen, Bauman, Sallis, & Brown, 2002). Nearly everyone knows how to walk, so no special training is needed for this form of exercise, and walking requires only minimal equipment, in the form of comfortable shoes and clothing, so it is inexpensive. Moreover, walking can be easily and accurately quantified (in terms of steps taken) through the use of automated pedometers (Crowley-Koch & Van Houten, 2013; Iwane et al., 2000), which is an advantage in both research and everyday settings.

Although to the best of our knowledge no study in which walking was substantially increased in people with ASD has appeared, previous research has used behavioral interventions to increase the number of steps taken by sedentary adults (Kurti & Dallery, 2013), overweight adults (VanWormer, 2004), healthy, nonobese adults (Normand, 2008), and typically developing obese preschool children (Hustyi, Normand, & Larson, 2011). The main components of these interventions were goal setting with feedback and reinforcement. For example, Hustyi et al. (2011) demonstrated modest increases in steps taken by obese preschool children during 20-min sessions using goal setting and reinforcement. Half way through each session, the experimenter provided feedback to the participant and, if the daily goal was met, at the end of the session the participant took an item from a prize box. Kurti and Dallery (2013) used an online goal setting and feedback program for sedentary adults with no diagnostic label. If participants met their daily goals, which increased every 5 days, they received monetary rewards. For 5 of 6 participants, the number of steps increased substantially during treatment, eventually meeting national recommendations. These studies suggest that goal setting and reinforcement may be a viable treatment option for increasing the number of steps taken by individuals with ASD to a specified level, such as 10,000 steps per day, a level likely to have health benefits (Iwane et al., 2000). The present study examined the effects of such a procedure.

2. Methods and materials

2.1. Participants and setting

Four men (herein called Billy, Casey, Charlie, and Peter, not their real names) and one woman (herein, Rose) volunteered for the study. All participants were between 21 and 26 years, were healthy, and were able to walk without difficulty. At the end of the study four participants had body mass index indices as calculated by the school nurse that placed them in the “obese” range as defined by the Centers for Disease Control and Prevention (2014); the other student’s body mass index placed him in the “overweight” range. Informed consent for participation in the study was obtained from each participant and experimental arrangements were approved by the Western Michigan University Human Subjects Institutional Review Board and conducted in accordance with the Helsinki Declaration of 1975.

The study took place at a young adult educational program located in the Midwest. This post-secondary educational program is part of the public school system and provides a range of transition services to young adults (i.e., those 17–26 years of age) with disabilities. The participants in the study were from the same 12-student ASD classroom. Students attended the program from 8 a.m. to 2 p.m., Monday through Friday. Activities at the program were typically flexible and tailored to meet the needs of students, who were transitioning to less structured activities. Informal observation and discussion with school staff indicated that considerable free time was available to students and that it would be feasible for them to walk around the school grounds during that time.

One of the students, Peter, left campus two days a week to work in the community and therefore participated in the study three days a week. All of the students in the classroom took trips out in the community to practice independent living skills such as shopping and eating at restaurants a few times each week. All of the participants lived at home except for Marvin, who lived in a group residence.

2.2. Pedometer and dependent variable

The dependent variable in the present study was the number of steps taken daily, which was tracked through the use of Zip™ Wireless Activity Trackers by Fitbit (San Francisco, CA). Each participant was given one of these devices to wear in her or his pocket or attached to a garment at the waistline. The Zip™ device is a pedometer that uses a 3-axis accelerometer that automatically measures motion patterns to determine the number of steps taken (other outcomes, such as calories burned, can also be measured but this was not done in the present study). The cumulative number of steps taken is displayed on the front screen and can be viewed by tapping the screen. The Zip™ is a small device (0.55 cm × 0.43 cm × 0.15 cm) that weighs about 8 g. It can store data for up to seven days and be synchronized with a computer to transfer information to it. In the present study all of the Zip™ devices were synchronized with a laptop computer and programmed to transport data at the end of each school data. This allowed for easy and accurate data recording.

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