The Effects of Self-Determination Theory-Based Exercise Program for Individuals with Disabilities

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Introduction

According to the Physical Activity Guidelines for Americans, it is recommended that all adults engage in regular physical activity for 150 minutes a week to reap the benefits of exercise (U.S. Department of Health and Human Services, 2018). Exercise has evidence that supports it to be beneficial for mental health, weight control, and reduces the risks of preventable chronic diseases such as type 2 diabetes, cancer, and heart disease (Centers for Disease Control and Prevention [CDC], 2019). The Center for Disease and prevention control also reports, that people with disabilities including individuals with Down Syndrome (DS) are an underserved population as it relates to access to the recommended exercise minutes, which leads to increased health-related issues that disproportionally affect individuals with disabilities (Shields & Synnot, 2016). Other Researchers have discussed that many individuals with a disability report that exercise programs have additional barriers such as practitioner lack of knowledge of disability that may seem to contribute to a lack of motivation for physical activity (Gillison et al., 2019; Puigarnau, 2017) The Self-Determination Theory (SDT) a well-established theoretical framework used in exercise research that focuses on understanding the conditions that contribute to intrinsic motivation for maintenance of behavior change. According to Ryan and Deci (2008), all people have an innate desire to learn, grow, and through their SDT theory they explain that an individual who has these three needs met is much more likely to engage in behavior change for well-being such as increased physical activity through autonomous motivation (Ryan & Deci, 2000). Therefore, when working with individuals with disabilities, it is important for practitioners to apply these concepts into programing for autonomous motivation and potentially increase exercise behavior for overall well-being (Burke et al., 2020). In this study, we aim to support the self-selected exercise goals of an individual with a disability through a 6-week exercise program based on SDT principles and hypothesize that we will see changes in behavior based on self-created goals.

SDT highlights the significance of social environments that support individuals' basic psychological needs assumed to increase autonomous motivation as it relates to exercise and physical activity: autonomy, relatedness, and competence (Deci & Ryan, 2008; Fortier et al., 2012). Autonomy is defined as having volition and control to make choices, relatedness as the feeling of connectedness with in the environment and feeling like part of a group, and competence as seeing oneself as effective and capable in respect to the activities they are involved in. SDT based interventions have been found to positively influence PA in rehabilitation, school, and across countries establishing credibility in its use for this study (Burke et al., 2020; Fortier et al., 2012; Gillison et al., 2019; Saebu et al., 2013) In Saebu et al.(2013) study, on SDT and autonomous motivation for rehabilitation found that when the three psychological needs were satisfied there was a positive link to changes on autonomous motivation and self-efficacy that were associated with increased physical activity during their intervention stay (Saebu et al., 2013). Similarly, Fortier et al. (2012)'s, meta-analysis research found that interventions based on SDT principles geared towards focusing on meeting the psychological needs though supportive environments had more autonomous motivation for predicting positive physical activity

Method

The purpose of this study is to explore how a structured exercise program based on self-determination theory principles enhanced the exercise performance of an individual adults with Down syndrome.

Participants

The participant in this study is female diagnosed with Down syndrome (DS) and intellectual disability (ID). The participant is 21 years old, 145lbs, and stands at 4.5" ft tall. The participant was asked demographic questions about her current levels of fitness. On the self-reported survey, the participant reported that she finds enjoy physical activities such as swimming and walking. She explained that she gets to engage in physical activity in a gym setting for 0-2 times a week, lifts weights 0-2 days, walks an average of 3-5 days but does not attempt push-ups or curl ups any time in a week.

Setting

The study was conducted in a Student Recreation Center at a University in Northern California. The fitness center offers a variety of exercise options for college students. The facility has four major areas specified for strength training/weight training, rock climbing, indoor field sports, and a cardio with ADA-accessible machines. The indoor field was used to measure the participant's progress in three different exercises. The indoor field is a weather-protected environment equipped with artificial turf crucial for safe and comfortable exercise opportunities. The participant was asked to perform laps on a 33-yard track marked by cones, curl-ups were performed on the field marks, and wall push-ups along the fieldhouse wall.

Dependent and Independent variables

Across the study, the researcher measured three dependent variables: walking distance, curl-ups, and pushups. Walking distance was measured by having the participant compete as many laps given a 6-minute time frame. Curl ups were measured by number completed by the participant in a minute. Similarly, push ups were measured by the amount completion with in one-minute.

Independent Variable

The independent variable in this study, is the exercise program based on the theoretical framework of SDT. The exercise program was written by the researcher with direct input and control by the participant. The participant created goals for herself for walking distance and number of curl-ups. The participant advocated to complete modified push-ups and created a goal for wall push-ups. All of the participants goals were used to establish criterion levels.

Design

This study was conducted using a single-subject changing criterion design. The ultimate goal of this design was to document functional relationships between independent and dependent variables.

Baseline Phase

The baseline phase measured the participance performance for walking distance, number of curl-ups, and number of wall push-ups. The researcher collected data through direct observation of the targeted exercises.

Intervention

The participant participated in the exercise program one day a week for six weeks. The participant was asked to perform the three target exercises during the initial start of every session throughout the span of the program. Prior to measuring, the participant participated in a group warm-up routine that encompassed light stretching for safety. Following the warm-up, the participant and the researcher discussed self-selected goals and criterion goals for the day. The participant was shown a visual chart with self-selected goals and criterion to facilitate understanding. The participant was then asked to complete the 6-minute walking distance, one-minute curl-up, and one-minute wall push-up assessment. The participant had a minute resting period between each assessment to control for unexpected fatigue. Upon completion of the assessment the participant proceeded to complete a self-selected workout regime that included 30 minutes of aerobic exercise and circuit strength training.

Data Collection

The researcher recorded baseline and weekly performance of the targeted exercises though out the light of the study. Timers were used for all exercise variables and tallies were used to indicate completion of task for each lap completed, curl up, and wall push up. After the measurement of each exercise the participant was notified of her performance

Figure 1

The Total Number of Laps Completed by the Participant

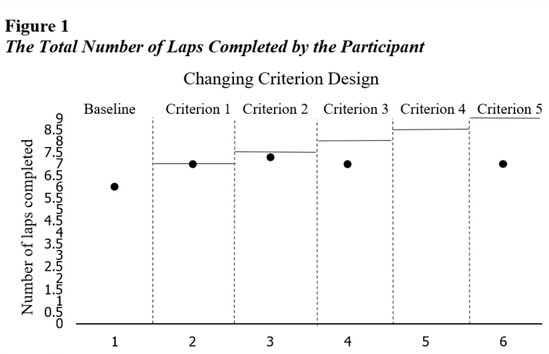


Figure 2

Total Number of Push-Ups Completed by the Participant

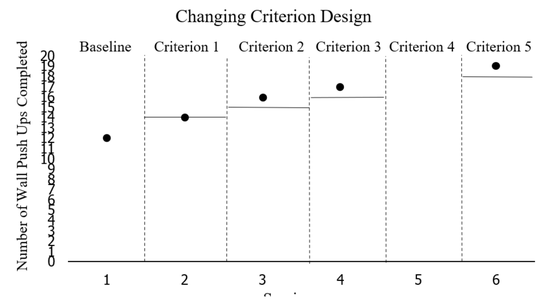
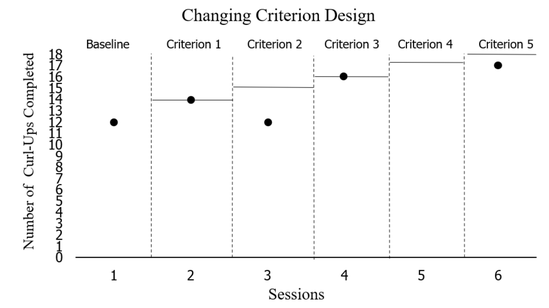


Figure 3

Total number of Curl-Ups Completed by the Participant



Results

This study utilized a changing criterion design based on SDT to assess the participants self-established exercise goals over a six-week period. The information below represents the participants performance across the 6-week time frame and progress in achieving the self-selected goals.

Participant 1

Participant 1 is a 23-year-old adult male with Down syndrome. Participant 1 weighs 177 lbs. and is 65" tall. Participant 1 is highly verbal and responsive in social interactions. Participant 1 has a good memory and is able to stay focused on the task or exercise in front of him. Additionally, Participant 1 demonstrated endurance and coordination in each task with little prompting. Prior to Participant 1 engaging in this study, he identified that this was his second time as a participant in this program. Additionally, Participant 1 was familiar with other participants and expressed excitement about beginning the program. Finally, the mother of Participant 1 also expressed how excited he was and that there were not many opportunities for this type of programming available.

Baseline Phase

At the beginning of the program baseline data was collected to assess the starting point of the participant. The participant completed a total of 6 laps during the 6-minute walk. Additionally, the participant performed a total of 12 modified standing push- ups and 12 curl ups during 1 minute timeframe assessment. Heart Rate (HR) data was also collected from the participant during the exercise portion of the baseline phase. The participants' resting HR was at 91and peak level of 101. Finally, the participant maintained a moderate to vigorous heart rate level of 0 min during this phase.

Criterion Phase 1

During the criterion phase 1 the participant completed 7 laps within the 6-min walking test. Additionally, the participant 14 modified standing push-ups and 14 curl-ups within the 1-min time frame. During the exercise portion of criterion phase 1, the participants' resting HR was at 59and peak level of 149. Finally, the participant maintained a moderate to vigorous heart rate level of 1 min during this phase.

Criterion Phase 2

During the criterion phase 2, the participant completed 7 laps within the 6-min walking test. Additionally, the participant 16 modified standing push-ups and 12 curl-ups within the 1-min time frame. During the exercise portion of criterion phase 2, the participants' resting HR was at 59and peak level of 118. Finally, the participant maintained a moderate to vigorous heart rate level of 0 min during this phase.

Criterion Phase 3

During the criterion phase 3, the participant completed 7 laps within the 6-min walking test. Additionally, the participant 17 modified standing push-ups and 16 curl-ups within the 1-min time frame. During the exercise portion of criterion phase 3, the participants' resting HR was at 60and peak level of 130. Finally, the participant maintained a moderate to vigorous heart rate level of 1 min during this phase.

Criterion Phase 4

The participant was not present for data collection within this phase.

Criterion Phase 5

During the criterion phase 5, the participant completed 7 laps within the 6-min walking test. Additionally, the participant 19 modified standing push-ups and 17 curl-ups within the 1-min time frame. During the exercise portion of criterion phase 5, the participants' resting HR was at 60and peak level of 132. Finally, the participant maintained a moderate to vigorous heart rate level of 2 min during this phase. Below is an illustration of the participants performances across the 6-min walking test, push-up test, and curl-up test

Discussion

The purpose of this study is to explore how a structured exercise program based on SDT principles enhanced the exercise performance of an individual with DS. The results from this study indicate that the participant was able to meet self-selected goals and meet or exceeded criteria on several sessions throughout the study. The total number of lap criterion was met one time by the participant within the program. This could be due to past health related injuries that inhibited the participants ability to walk at a faster pace without the presence of pain. It should be noted that throughout the program, the participant performance remained consistent; thus, suggesting that motivation levels remained stable. Regarding, the modified pushups, the participant met performance criteria in 5 out of the 6 sessions. Interestingly, the data for the curl-up assessment demonstrated an initial improvement followed by a dip scoring in the third session of the program. Despite this, the participant successfully met the established performance criteria in 2 of the 6 sessions. Overall, the researcher believes the socially supportive environment may have contributed to the participant's motivation to continue despite the intensity of the self-selected goals. The findings of this research align with other research findings that support the efficacy of SDT (Allison et al., 2021; Zhao et al., 2022).

Limitations

Limitations of this study are listed below. First the small sample size of participants in this study makes it difficult to suggest these results would be similar for other individuals with DS at the same age. Despite the size of the sample, there is substantial evidence supporting the efficacy of using SDT for individuals, including those with DS (Gillison et al., 2019; Landuran et al., 2022; Wu et al., 2017). Another limitation is the length of the study, which may have limited the impact on the participant performance. However, the researcher attempted to control for this by ensuring a standardized program approach that included a warm-up, walking, wall push-ups, curl-ups, as well as the adherence to a structured exercise program designed by the researcher and controlled by the participant. Finally, the lack of a valid motivation assessment tool made it difficult to determine if the participant wanted to meet their established goals. Despite these limitations, the research here provides additional support for the use of SDT for individuals, including those with DS.

Future Research

It is recommended that future researchers expand on the findings of this study to further confirm the causal relationships between a gym exercise program for individuals with disabilities and SDT. Further research is needed to measure the impact of a program with a focus beyond 6 weeks and increased number of participants. A longer and larger sample size would further solidify evidence for SDT specifically geared towards a gym setting exercise program. Additionally, a standardized or valid survey measuring the participants' feelings before and after the program is warranted. This could measure the sense of relatedness of the study. Finally, future research can focus on the different kinds of autonomy-supportive teaching styles used could be used to further amplify results.