

Let's Take A Walk: Exploring the Impact of an Inclusive Walking Program on the Physical and Mental Health of Adults with Intellectual Disability

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Abstract: *Background:* People with intellectual disabilities experience health disparities and poorer health outcomes than people without disabilities. Increased physical activity has been found to reduce the impact of chronic health conditions among people with intellectual disabilities.

Method: The current study explored the impact of an inclusive walking program on the physical and mental health of adults with intellectual disabilities. *Let's Take A Walk* paired adults with intellectual disabilities, hereafter referred to as Community Walkers ($n = 27$), with college students to walk around a college campus twice a week for 45 minutes across 10 weeks. Data on mental health outcomes, specifically depression and anxiety, were collected from 24 Community Walkers across four-time points (pre-, mid-, post-, and 3-months following intervention), and data on physical health outcomes were collected across two-time points (pre- and post-intervention).

Results: Community Walkers reported significant decreases in both depression and anxiety from pre to post-implementation. Particularly promising was clinically significant decreases in anxiety symptoms over the 10-week program. No differences were noted on Community Walkers' measures of physical health.

Conclusion: Inclusive walking programs are a valuable and promising mechanism for building social connections and inclusion and improving mental health for adults with intellectual disabilities.

Keywords: Social inclusion, intellectual disability, mental health, depression, anxiety, physical health.

INTRODUCTION

Disability is a natural and common feature of human diversity. With an estimated 15% of people globally and approximately one in four (61 million) U.S. adults experiencing a disability, individuals with disability make up the world's largest minority group [1, 2]. Disability can take many forms, including – but not limited to – hearing, vision, ambulatory, developmental, and intellectual [1]. Regardless of form, adults with disabilities are three times more likely to have chronic physical health conditions and are at a heightened risk for mental health concerns as compared to adults without disabilities [3]. Inadequate social support and persistent stigma and discrimination are among the factors associated with the health disparities faced by this minority group [3]. With the shift in understanding that everyone can adopt practices that improve their health and well-being, preventive health programs for adults with a disability have gained increasing attention [4]. The current article explores the impact of an inclusive walking program on the physical and mental health outcomes of adults with intellectual disabilities.

Intellectual Disability, Health, and Physical Activity

The American Association on Intellectual and Developmental Disabilities defines *intellectual disability* as originating before the age of 18 and characterized by significant limitations both in intellectual functioning (reasoning, learning, problem-solving) and in adaptive behavior, which covers a range of everyday social and practical skills (managing money, schedules, routines, and social interactions) [5]. Determining the current prevalence of intellectual disability in the United States is difficult as many projects of national significance assess intellectual disability in different ways or collect information on individuals who meet the criteria for both intellectual disability and developmental disability (e.g., [4]). Recent estimates indicate that intellectual disability is one of the most common developmental disabilities in the United States, with an estimated prevalence rate of approximately 1 to 3% of the population [6].

Although people with intellectual disabilities are living longer, they continue to experience health disparities and poorer health outcomes than their peers without disabilities [7]. Existing health disparities mean that people with intellectual disabilities are more likely to live with chronic and complex physical and mental

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health conditions [8]. Individuals with intellectual disabilities develop chronic, age-related health conditions more frequently and earlier than individuals without disabilities [9]. Among other physical health concerns, individuals with intellectual disabilities are more likely to have cardiovascular disease, osteoporosis, and hypertension [10]. Similar disparities in the mental health of individuals with intellectual disabilities have been observed for centuries as well. Prevalence estimates suggest that 30% to 50% of individuals with intellectual disability experience at least one mental health disorder [11, 12]. Common mental health disorders among individuals with intellectual disabilities include mood and anxiety disorders [13]. For individuals with intellectual disability, physical and mental health needs often introduce additional challenges in daily life, further impacting an already marginalized and stigmatized population.

Decades of research show that everyone benefits when individuals with disabilities are included and embraced in communities [14-16]. Yet, individuals with intellectual disabilities continue to encounter systemic and societal barriers that reinforce both conceptual and physical segregation and create additional barriers to health and wellness [17]. Creating and promoting communities of belonging can help combat segregation and the numerous negative health and social outcomes experienced by individuals with intellectual disabilities.

Engaging in healthier lifestyles through increased physical activity is one noted way to encourage social engagement and improve the health status of aging adults with intellectual disabilities [10, 18, 19]. However, research consistently demonstrates that this population is less physically active compared to individuals without intellectual disability [20] and that sedentary time increases as adults with intellectual disability age [21]. Just like people without disabilities, people with intellectual disabilities may need support throughout their lives to ensure their quality of life. One such support is inclusive walking programs. Initial studies indicate walking programs to be feasible and have health benefits for adults with intellectual disabilities [22, 23]. To date, research exploring the impact of participation in walking programs has primarily focused on exploring physical health outcomes and physical activity levels of individuals with intellectual disabilities. Limited studies have explored psychological factors, limited to the quality of life and well-being measures [22]. As a population at greater risk of developing mental illnesses, inclusive walking programs should be further explored as a potential

means to improve mental health and reduce the possibility of developing more serious mental illnesses among adults with intellectual disabilities.

The current article aimed to expand understanding of the effectiveness of inclusive walking programs by investigating the impact of participation on physical health, as well as mental health outcomes of adult community members with intellectual disabilities. Exploring trends from data collected from the Oklahoma sample of the National Core Indicators Adult In-Person Survey between 2013 and 2018, the first two authors noted clear and consistent trends; adults with intellectual disabilities in Oklahoma desired more physical activity and social inclusion opportunities to develop relationships with individuals with and without disabilities. To address the trends found in the data, *Let's Take A Walk* was designed to foster social inclusion and physical activity on a university campus by pairing undergraduate students (hereafter referred to as Student Walkers) with adult community members with intellectual disabilities (hereafter referred to as Community Walkers). Together, Student and Community Walkers walked around campus for 45-minutes, twice per week, for 10 weeks during the spring 2018 semester.

MATERIALS AND METHODS

The current article explored quantitative health data collected from Community Walkers as part of the larger, multi-informant, and mixed-method intervention pilot study exploring the feasibility and impact of *Let's Take A Walk* [16]. The socially inclusive walking program and research study were conducted from January to August 2018. The university's Institutional Review Board approved all protocols and procedures within the original intervention study.

The larger, mixed-methods study included multiple informants: Community Walkers, caregivers of Community Walkers, Student Walkers, and a student control group. To assess the feasibility and impact of the inclusive walking program, the larger pilot study design included longitudinal quantitative data collected from all four participant groups across four-time points: pre-, mid-, post-, and 3-months following the intervention, as well as qualitative focus groups conducted with Student Walkers post-intervention. A previously published article explored qualitative focus group data collected from Student Walkers post-intervention [16]. The current article focuses on exploring the impact of the inclusive walking program

on the health outcomes of Community Walkers. Analyses of health outcomes in the current article used all data collected from Community Walkers, including quantitative physical health data collected pre- and post-intervention and quantitative mental health data collected pre-, mid-, post-, and 3-months following the intervention.

Participant Recruitment

A snowball sample of Community Walkers ($N = 27$) was recruited through a network of established relationships with local disability agencies and through existing university programs serving adults with intellectual disabilities. To participate in the walking program and research study, potential participants had to be over 18 years of age, comfortable walking for 45-minutes, twice per week with a Student Walker, and able to provide meaningful self-reports about daily activities and feelings. All potential participants who met the inclusion criteria were provided plain language information explaining the research study and walking sessions. Before data collection and the walking session began, written assent or consent was obtained from all Community Walkers and/or their legal guardians.

Intervention Procedures

Twice-per-week, across the 10-week intervention program, Student Walkers, Community Walkers, and members of the research team met in a designated meeting spot on the university's campus deemed convenient and accessible. From there, Community Walkers, Student Walkers, and research team members embarked on a 45-minute walk around the university campus. Student Walkers were all undergraduate students recruited to participate in the program and research study through announcements made by research team members in undergraduate classes and clubs at the beginning of the semester. Each Community Walker was paired with a Student Walker. While the pairing of walking partners was not random, pairs were initially assigned by the first two authors using limited knowledge of student and community members' experiences and personalities based on data and interaction with participants at pre-program data collection. Reassignment of walking partners was made throughout the semester based on student or community members' absences as well as observations of partner dynamics by research team members. For example, if conversation and communication did not appear to come with ease

between walking partners, team members attempted to facilitate the identification of topics of common interest and/or made changes to the partner pairings. Participants walked primarily on the same path each walking session, which led them past the university library, student union, and the main student concourse. Participants were encouraged to engage with campus members and activities as time permitted spontaneously.

The program was aligned with a systemic and social-ecological approach to disability. This approach focuses not on fixing or curing the individual but rather on changing the understanding of individuals across contexts to provide supports that promote not only individual physical health and mental well-being but has the potential to enhance community engagement and belonging [24]. The social-ecological perspective highlights that individuals with intellectual disabilities are not inherently different from individuals without intellectual disabilities in regard to daily activities such as working, living, and playing. Individuals with intellectual disabilities may simply require different environmental supports to carry out some activities [25]. Thus, specific training on "working with" individuals with disabilities was intentionally omitted from the study protocol. A more hands-on approach was utilized that emphasized coaching and modeling for both Student and Community Walkers. This approach included three to six research team members joining Student and Community Walkers for each walking session. During this time, team members floated easily among the group and embedded instructional coaching into walking sessions by modeling desirable behavior and supports (e.g., helping facilitate conversations, gently reminding walkers about appropriate physical boundaries, modeling how to physically support an individual with an unsteady gait).

Data Collection

Community Walkers completed quantitative research measures across four-time points: pre-intervention, mid-intervention, post-intervention, and 3-months following the intervention. All pre-intervention measures were completed by Community Walkers in January 2018, 1 to 2 weeks prior to beginning the intervention. Mid-intervention measures were completed in March 2018 following the fifth week of the 10-week intervention. Post-intervention measures were completed in April 2018 within two weeks of completing the intervention. Follow-up measures were completed

in August 2018, approximately 3-months following the intervention. Data across all four-time points were collected in the Laboratory for Applied Nutrition and Exercise Science. Community Walkers were paid a maximum of \$140 in increasing installments for participating in the intervention and research protocols.

Measures

Demographics

Community Walkers were self-reported on age, gender, and race at pre-intervention.

Mental Health

Community Walkers were self-reported on symptoms of depression and anxiety across all four-time points – pre-, mid-, post-, and 3-months following the intervention.

Anxiety

Anxiety symptoms were assessed using the Glasgow Anxiety Scale for People with an Intellectual Disability (GAS) [26]. The GAS is a 27-item self-report measure specifically designed and validated for individuals with intellectual disabilities. The scale comprises the 'three systems' of cognitive, behavioral, and somatic symptoms known to co-present in anxiety disorders. The scale is completed in an interview-style format using visual cues; however, if the person is able to read, they are invited to read along. Items are rated on a three-point Likert scale ranging from 0 to 2. Items are then summed, yielding a total score ranging from 0 to 54. Higher scores reflect more symptoms of anxiety. Although the GAS is not intended as a diagnostic tool, total scores of 15 and over are potentially indicative of clinical levels of anxiety psychopathology. In the current study, alphas for the GAS across the four-time points ranged from 0.73 to 0.81.

Depression

Depression symptoms were assessed using the Glasgow Depression Scale for people with a Learning Disability (GDS) [27]. The GDS is a 20-item self-report measure specifically designed and validated for individuals with a learning disability. The scale is useful for screening and monitoring changes in depressive symptoms—items gauge "present state" symptom levels across one week. The scale is completed in an interview-style format using visual cues; however, if the person is able to read, they are invited to read along. Items are rated on a three-point Likert scale ranging from 0 to 2. Items are then summed, yielding a total

score ranging from 0 to 40. Higher scores reflect more symptoms of depression. Although the GDS is not intended as a diagnostic tool, scores of 13 and over are potentially indicative of clinical levels of depression psychopathology. In the current study, alphas for the GDS across the four-time points ranged from 0.74 to 0.84.

Physical Health

Community Walkers completed physical health assessments across two-time points – pre- and post-intervention. Height was measured only at pre-intervention. Body mass and blood pressure were measured pre- and post-intervention.

Height

Height was measured with a portable stadiometer (Seca 213 portable stadiometer; Seca GmbH; Hamburg, Germany). Height was measured at least twice, with a third measurement taken if the first two measurements were greater than 5 mm different.

Body Mass

Body mass was measured with a digital scale (Seca mBCA 514; Seca GmbH; Hamburg, Germany).

Blood Pressure

Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were measured via a commercial automated blood pressure cuff (Omron 5 series BP742N; Omron; Kyoto, Japan). Blood pressure was measured at least twice, with a third measurement taken if the first two measurements (either SBP or DBP values) were greater than 5 mmHg different.

Analysis

After data were collected, it was entered and analyzed using SPSS 28.0. Data were initially screened for missing data and outliers and checked for normality. Preliminary analysis found less than 5% of the data were missing (0.3 - 1.3%), and the missing values were not related to other variables based on Little's MCAR test ($p > .05$). [28]. Noting previous literature indicating that deletion of observations with missing data can yield biased findings in psychiatric and developmental self-report research [29], an expectation-maximization procedure was performed in SPSS to account for missing values. Although replacement procedures do pose limitations, it was utilized for the current data set, recognizing that the low percentage of missing data would have little effect on the analysis outcomes.

Descriptive statistics were computed in order to assess the composition of the sample. Pre-, mid-, post-, and 3-months following intervention anxiety and depression data were checked for normality using the Shapiro-Wilk normality test. Anxiety data were normally distributed across all four time points: (Pre: $W = 0.98$; Mid: $W = 0.97$; Post: $W = 0.94$; 3-months: $W = 0.96$). Depression data were normally distributed across the first three-time points of data collection (Pre: $W = 0.95$; Mid: $W = 0.94$; Post: $W = 0.96$). The Shapiro-Wilk test of depression data 3-months following intervention evidenced non-normality in the distribution ($W = 0.91$). Repeated measure analysis of variance (ANOVA) analyses was used to explore potential changes in both the anxiety and depression variables across the four-time points.

Pre- versus post-intervention body mass and blood pressure data were checked for normality using the Shapiro-Wilk normality test. Body mass data were not normally distributed (Pre: $W = 0.87$; Post: $W = 0.84$), so a non-parametric Wilcoxon matched-pairs signed-rank test was used to compare pre- and post-intervention. Blood pressure data were normally distributed (Systolic Pre: $W = 0.97$; Systolic Post: $W = 0.96$; Diastolic Pre: $W = 0.94$; Diastolic Post: $W = 0.96$), so means were compared using a paired t -test.

RESULTS

Demographics

Participants in the current manuscript included a subsample of 24 of the 27 Community Walkers who participated in the inclusive walking program. Due to measurement challenges and missing self-report data, complete mental and physical health data were only available for 24 participants. There were no significant differences between the total sample and the subsample regarding demographic characteristics collected. Community Walkers included in the current article were primarily male ($n = 20$, 83.3%; female $n = 4$, 16.7%), and ranged in age from 19 to 49 years ($M = 29.2$; $SD = 7.1$). The majority of Community Walkers were White ($n = 15$, 62.5%), with the remainder identifying as American Indian ($n = 5$, 20.8%), Black ($n = 3$, 12.5%), and Hispanic/Latino ($n = 1$, 4.2%). The average number of walking sessions attended by Community Walkers was 17.5 of the 19 total walking sessions. The majority of Community Walkers (54.2%, $n = 13$) missed no more than one of the 19 walking sessions. The minimum number of sessions attended by a Community Walker was 13 sessions ($n = 1$).

Mental Health

Descriptive statistics on mental health measures collected across the four-time points are displayed in Table 1.

Table 1: Descriptive Statistics for Mental Health Measures at Pre-Intervention, Mid-Intervention, Post-Intervention & 3-Month Following Intervention

Anxiety	M	SD
Pre-intervention	15.89	7.10
Mid-intervention	15.04	7.83
Post-intervention	11.71	7.02
3-month follow up	15.66	8.27
Depression	M	SD
Pre-intervention	10.10	5.78
Mid-intervention	9.70	6.28
Post-intervention	7.48	5.20
3-month follow up	7.57	6.00

Anxiety

Results of a one-way repeated-measures ANOVA with sphericity assumed ($X^2(5) = 3.78$, $p = .581$) identified a significant main effect of intervention time points on mean GAS scores ($F(3, 69) = 5.57$, $p = 0.002$) with a large effect size ($\eta^2 = 0.195$). Bonferroni post-hoc pairwise comparisons identified significantly higher GAS scores at pre-intervention than post-intervention ($p=0.002$) as well as significantly lower GAS scores at post-intervention than at 3-months following intervention ($p = 0.017$). The difference between GAS scores at mid- and post-intervention was approaching significance at the $p < 0.10$ level ($p = 0.138$).

Depression

Results of the one-way repeated-measures ANOVA with sphericity assumed ($X^2(5) = 2.43$, $p = 0.788$) identified a significant main effect of the intervention time points on mean GDS scores ($F(3, 66) = 3.36$, $p = 0.024$) with a medium effect size ($\eta^2 = 0.132$). Bonferroni post-hoc pairwise comparisons did not identify significant differences across specific time points (pre-, mid-, post-, or 3-months following intervention); however, the difference between pre- and post-intervention was approaching significance at the $p < 0.10$ level ($p = 0.108$).

Table 2: Descriptive Statistics for Physical Health Measures at Pre and Post-Intervention

	Pre-Intervention	Post-Intervention	P-value
Height (cm)	174.5 ± 11.2	–	–
Body mass (kg)	95.5 ± 25.9	96.0 ± 26.6	0.17
Systolic BP (mmHg)	126.2 ± 16.2	126.1 ± 15.3	0.98
Diastolic BP (mmHg)	81.1 ± 12.6	78.7 ± 10.3	0.17

Note. Height was measured pre-intervention only. Body mass and blood pressure were measured pre- and post-intervention, with no significant differences ($p > 0.05$). BP, blood pressure.

Physical Health

Descriptive statistics on physical health measures collected across two-time points are displayed in Table 2. There were no significant differences from pre- to post-intervention on measures of body mass, SBP, or DBP ($p > 0.05$).

DISCUSSION

The purpose of the current study was to examine the impact of an inclusive walking program, *Let's Take a Walk*, on the physical and mental health outcomes of Community Walkers, all adults with intellectual disabilities. Results suggest that 10 weeks of twice-per-week, socially inclusive walking for 45 minutes was sufficient to induce statistically significant improvements in depression and anxiety symptomology self-reported by Community Walkers throughout the intervention. Although the measures used to assess anxiety and depression in the current study are not intended as diagnostic tools, it is particularly notable that participants' mean scores on the GAS at pre-intervention and mid-intervention were potentially indicative of clinical levels of anxiety psychopathology. Thus, in addition to the statistically significant decrease in anxiety symptoms from pre- to post-intervention, participants' mean scores of anxiety at post-intervention represent clinically significant reductions in symptoms with Community Walkers moving from clinical ranges to subclinical ranges across the 10-week inclusive walking program. However, data suggest that reported improvement in depression and anxiety symptoms were not sustained 3-months following the conclusion of the intervention. Participants' mean scores showed increased anxiety and depression symptoms at follow-up, with anxiety symptoms returning to a potential clinical range. The current findings are noteworthy in light of previous research, noting no significant effects of community-based walking on other psychological factors, including

quality of life and well-being of adults with intellectual disability [22].

Improvements in mental health outcomes among Community Walkers in *Let's Take a Walk* occurred despite no significant change in the physical health outcomes assessed pre and post-intervention (i.e., body mass, SBP, or DBP). Previous research exploring the effects of a longer, 16-week walking program for obese individuals with intellectual disability in a residential care facility found that the body weight, body composition (BMI, body fat, and abdominal fat), and waist circumference decreased significantly, while baseline fitness (muscle strength and flexibility) improved significantly [30]. Importantly, however, the adult sample included in this study consisted of healthy adults free of chronic disease at baseline; thus, changes in these outcomes would not be expected or warranted. Further, the lack of observed differences in physical health outcomes in the current study may be related to the bi-weekly walking sessions. The amount of walking may not have been sufficient to produce clinically meaningful body mass and blood pressure changes. Lastly, changes in other physical health outcomes, such as metabolic outcomes (i.e., total serum cholesterol, glucose, and triglycerides), may have improved following the intervention; however, we did not measure such outcomes.

Findings support previous research indicating inclusive walking programs are a valuable and promising mechanism for encouraging physical activity while building social connections and inclusion. Our previous research highlighted the benefits of inclusive walking programs for Student Walkers [16]. The current article highlights the additional benefit of improved mental health among Community Walkers, demonstrated through self-reported decreases in depression and anxiety symptoms. However, the loss of improvements in depression and anxiety 3 months following the last walking session highlights the need for inclusive preventative health practices that move

beyond physical activity and target social stigma and segregation. While well-intended, community-engaged programming that does not result in sustained social and community inclusion may be harmful, further contributing to the cascade of disparities already experienced by individuals with intellectual disabilities.

The current study was limited by a small and relatively homogeneous sample of relatively healthy adults at baseline. While Community Walkers represented a wide age range, as well as diverse communication and mobility support needs, all participants in the current study were comfortable walking for 45-minutes and able to provide meaningful self-report on study measures. The significance of the current findings was further limited to the specific university/community setting and the lack of comparison with a Community Walker control group. Given the exploratory nature of our study, we did not determine the needed sample size prior to data collection. A *post hoc* power analysis revealed that the pre- versus post-intervention comparison of means for anxiety (GAS) was adequately powered (83% power), while the comparison of pre- versus post-intervention means for depression (GDS) was under-powered (63% power).

Given the limitations, the present findings should be considered preliminary and indicative of the need for further research to understand better the effectiveness of inclusive walking programs at inducing positive health outcomes for adults with intellectual disabilities. Future research should explore a more diverse sample of adults with intellectual and/or developmental disabilities and consider programs or interventions targeted for participants who experience specific physical or mental health diagnoses, and consider measuring other markers of metabolic health (e.g., total cholesterol, glucose, triglycerides). In addition, longer program or intervention models including longer or more vigorous physical activity are needed to explore the potential impact of community preventative health programs on physical health outcomes. Finally, future research including observations of participants' physical activity levels and community inclusion may provide important insight into the lack of sustained benefits within the current study.

CONCLUSIONS

In conclusion, our findings indicate that 10 weeks of twice-per-week, socially inclusive walking for 45

minutes demonstrated benefits on the mental health of adults with intellectual disabilities. The current findings provide further evidence that community-based, preventative health programs provide practical ways to address the health disparities experienced by individuals with intellectual disabilities. While great inequities exist, even small projects, such as *Let's Take A Walk*, can have a powerful and positive impact when implemented with care and intentionality. Our work suggests that the thoughtful and purposeful design of community-engaged research and programming leads to healthier adults with intellectual disabilities, and sustainability of such programs must become a priority to ensure long-term impact. Sustainability will require building strong and equitable partnerships among individuals, family members, practitioners, and researchers.

LIST OF ABBREVIATIONS

DBP = diastolic blood pressure

GAS = Glasgow Anxiety Scale for people with an Intellectual Disability

GDS = Glasgow Depression Scale for people with a Learning Disability

SBP = Systolic blood pressure

DATA AVAILABILITY STATEMENT

The data presented in this study are available on request from the corresponding author.

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HUMAN RIGHTS AND ETHICS APPROVAL

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Institutional Review Board of Oklahoma State University (IRB#: HS-17-70, Approval Date: 12/4/2017).

INFORMED CONSENT STATEMENT

Informed consent was obtained from all participants involved in the study.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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