

Examining the efficacy and feasibility of exercise counseling in individuals with schizophrenia:

A single-case experimental study

**Abstract**

Physical activity has been shown to help individuals with schizophrenia improve their physical and mental health. Despite these benefits, individuals with schizophrenia are less active than those in the general population. This mixed-methods study explored the feasibility of a theory-driven exercise counseling intervention on the psychological mediators of physical activity behaviours and levels of moderate and vigorous physical activity in obese adults with schizophrenia. A reversible A-B-A single-case experimental design was used to evaluate the effect of exercise counseling before, during, and after the intervention. Post-study interviews evaluated the acceptability of the intervention. Four obese adults with schizophrenia participated in the two-month study. Exercise counseling proved feasible with three participants progressing to the next stage of change. Increases in self-efficacy and perceived benefits of exercise were reported throughout the intervention. Accelerometry indicated moderate and vigorous physical activity levels did not change for three participants and decreased significantly for one. This study helped show that exercise counseling may be an effective way of strengthening the determinants of physical activity. Future research will need to address strategies to increase moderate and vigorous physical activity using exercise counseling.

*Keywords:* physical activity, single-subject methodologies, exercise, schizophrenia,  
mental health

### **Introduction**

Individuals with schizophrenia are less active than those in the general population (Lindamer et al., 2008). Physical inactivity has been associated with poorer ratings of physical quality of life and increased Body Mass Index (BMI) in this population (Vancampfort et al., 2011). Low levels of physical activity are concerning given the majority of individuals with schizophrenia are either overweight or obese and have high rates of cardiovascular disease (Hennekens et al., 2005; Lawrence, Hancock, & Kisley, 2013), resulting in reduced life expectancies (Laursen, Munk-Olsen, & Vestergaard, 2012). Increased physical activity has been associated with numerous physical and mental health benefits, including improved aerobic fitness, increased muscular strength, improved metabolic factors, higher quality of life, and reductions in positive and negative symptoms, anxiety, and psychological distress (Gorczynski & Faulkner, 2010; Faulkner & Gorczynski, 2013; Vancampfort et al., 2012b). Given its numerous benefits, researchers have called for theoretically designed and practical physical activity interventions to be part of overall treatment for people with schizophrenia (Richardson et al., 2005; Vancampfort et al., 2010; Vancampfort et al., 2011).

A limitation of the physical activity literature involving individuals with schizophrenia is that most interventions are designed atheoretically (Gorczynski & Faulkner, 2010). Research investigating the general population has shown that theoretical interventions are more effective, as information is known about intervention effects on mediating variables of physical activity (Kahn et al., 2002). Both qualitative and quantitative research that has focused on individuals with schizophrenia has shown promising results by incorporating theory-based strategies to

increase levels of physical activity (Arbour-Nicitopolous, Faulkner, Shyu, Cohn, Golding, & Hsueh, 2010; Beebe et al., 2011; Roman, Humphrey Beebe, & Burk, 2012). Studies have shown that by incorporating aspects of social cognitive theory to increase self-efficacy, using self-monitoring techniques, and addressing amotivation can help increase physical activity levels in this population. One theoretically informed behavioral intervention that aims to improve physical activity by incorporating strategies of improving self-efficacy and motivation is exercise counseling.

Exercise counseling is designed to increase physical activity by addressing an individual's needs, motivation, and barriers to activity (Smitherman et al., 2007). Exercise counseling draws from numerous theories of behavior change (Houde & Melillo, 2000), including social cognitive theory and the transtheoretical model (TTM) (Bandura, 1986; Prochaska & DiClemente, 1986). Social cognitive theory states that behavior is influenced and influences both environmental and personal factors. Environmental factors include group structures, equipment, or various facilities. Personal factors include cognitions such as self-efficacy, mood, and attitudes. Together, these three determinants influence one another and form what is known as triadic reciprocal causation (Bandura, 1986). The TTM allows researchers to assess whether clients are ready to change a particular behavior. Depending on their readiness to change, clients are placed into one of six stages: precontemplation (not considering changing behavior), contemplation (intending to change behavior in the next six months), preparation (intending to change behavior in next 30 days), action (actively engaged in behavior change for six months), maintenance (actively engaged in behavior change for more than six months), and termination (actively engaged in behavior change for more than five years) (Prochaska &

Velicer, 1997). The TTM also provides stage specific strategies that strengthen a client's self-efficacy and highlight the positive, rather than the negative, attributes of physical activity. Self-efficacy has been shown to be an important mediator of physical activity behavior change in people with schizophrenia (Vancampfort et al., 2012a).

Two systematic reviews have confirmed that exercise counseling can have a positive impact on physical activity adoption, stages of change, and changes in physical activity level in the general population (Petrella & Lattanzio, 2002; Smitherman et al, 2007). Currently, no studies have examined the use of exercise counseling in individuals with serious mental illness; however, one study has examined its use in women with depressive symptoms and shown it to significantly increase physical activity (Vickers et al., 2009). Although this study did show that exercise counseling is feasible in individuals with mental illness, researchers neglected to measure mediating psychological variables of physical activity. The purpose of this proof-of-principle mixed-methods study was to examine the feasibility and acceptability of exercise counseling on the psychological mediators of physical activity behaviours and levels of moderate and vigorous physical activity in obese adults with schizophrenia.

## **Method**

### **Study Design**

An A-B-A single-case experimental design evaluated the effects of exercise counseling before, during, and after the intervention. Post-study interviews were conducted to examine intervention acceptability. This methodology has been shown to be rigorous and practical in pilot testing physical activity interventions (Gorczyński, 2013). Given the proof-of-principle nature of

this study, this methodology was specifically chosen to examine the feasibility and acceptability of exercise counseling in this population before conducting a larger-scale study.

### **Setting and Participants**

This study took place at the Mental Health and Metabolism Clinic at the Centre for Addiction and Mental Health (CAMH). To participate, individuals must have met the following criteria: (a) diagnosis of schizophrenia (any subtype (American Psychiatric Association, 1994)) confirmed by chart review by staff from the Mental Health and Metabolism Clinic, (b) 18 years of age or older, (c) body mass index  $\geq 25$  (overweight), (d) be in the contemplation or preparation stage of the TTM for physical activity, (e) capable of giving informed consent, and (f) indicate no complications on the Physical Activity Readiness Questionnaire (Thomas, Reading, & Shephard, 1992). All participants provided their consent to take part in the study.

Ethical approval was obtained from the CAMH Research Ethics Board and the University of Toronto Health Sciences Research Ethics Board. A convenience sample of four participants was included in the study. Pseudonyms were created for the participants to protect their identities. Participant demographic information is presented in Table 1.

### **Procedure**

**Data collection and materials.** At baseline, participants were asked about their age, sex, employment, marital status, and living arrangements. Stages of change, self-efficacy, and perceived benefits and barriers of physical activity were measured for two weeks before the intervention, each week throughout the study, and four, and five weeks after the intervention ended. Table 2 illustrates the data collection and intervention schedule.

Stages of change was assessed using a modified version of the stage of change question from the Patient-Centered Assessment and Counseling for Exercise (PACE) questionnaire (Long et al., 1996). For this study, physical activity was defined as moderate activity (i.e., breathing harder than normal) for 30 min on most days of the week totaling 150 min per week (Canadian Society for Exercise Physiology, 2011). Participants selected which stage of the TTM corresponded with their readiness to change their physical activity behavior. Self-efficacy and perceived benefits and barriers of physical activity were measured using questions from the PACE questionnaire. Each question was rated on a 5-point Likert scale, where higher values indicated greater confidence or importance. The self-efficacy, perceived benefits, and perceived barriers measures were found to be reliable with Cronbach's alphas of .77, .82, and .63, respectively.

Physical activity was assessed objectively using a uni-axial accelerometer (ActiGraph). Participants were asked to wear accelerometers one week before the start of the study to obtain baseline measures, one week following the intervention to assess intervention effects, and four weeks after the study to measure intervention maintenance results. The accelerometer is worn on the waist and continuously tracks movement in one dimension by providing output data on the anteroposterior y-axis in 1 min intervals. To establish a reliable estimate of habitual physical activity over both weekdays and weekend days, participants were asked to wear the accelerometer on the right side of their hip for five consecutive days during each of the measurement periods and provide information on when the unit was worn and what types of activity were performed. Participants were given instructions on how to wear the accelerometer and also to record the times the device was not worn. Additionally, the study author modeled to

each of the participants how the accelerometer should be properly worn. Participants were also provided with reminder magnets that acted as visual prompts and received reminder phone calls to ensure they were wearing their accelerometers. Data was collected using 60 s epochs. Days were considered complete and used in the analysis only if participants wore the accelerometers for 10 hr or more. A period of 60 min of consecutive zeros was used to indicate accelerometer removal as recommended (Evenson & Terry, 2009). To constitute a complete week, three complete weekdays and one complete weekend day were required. Counts between 100 and 3208 were classified as light activity, while counts over 3208 were classified as MVPA (Freedson, Melanson, & Sirard, 1998). Studies involving individuals with schizophrenia have shown accelerometer adherence between 45% (Jerome et al., 2009) to as high as over 80% (Janney et al., 2013).

**Exercise counseling.** The intervention was conducted over two months and included four 60 min weekly individual sessions. The first author delivered the intervention. The sessions were based on findings from systematic reviews mentioned above. Additionally, research by Carey et al. (2007) and Miller and Rollnick (2002) provided specific exercises to use with this population while the order of the sessions was influenced by research by Griffin (1986) and Hospes et al. (2009). Sessions were audio recorded and assessed for fidelity by an independent reviewer trained in social work with counseling experience.

Session one: Build rapport and gather knowledge. The first session allowed participants to become comfortable with the counseling style and gauge whether they were ready to commit to behavior change. Throughout the first session, various techniques were used to assess readiness to change. First, past, present, and future interests and physical activity were explored.

Additionally, confidence and importance scales were used to assess how confident each participant was about becoming more physically active and how important physical activity was to him or her (Miller & Rollnick, 2002; Carey et al., 2007). The use of the scales reinforced the client-centered approach of the sessions and stimulated 'change talk' by the participant. The first session provided a better understanding of why physical activity may or may not be important to the participant and what potential barriers existed. A thorough understanding of the participant's importance and confidence ratings determined how participants should be supported throughout the remaining exercise counseling sessions. In addition to the confidence and importance scales, the participants completed a decisional balance exercise (Miller & Rollnick, 2002; Carey et al., 2007). This exercise helped participants explore and overcome their ambivalence to behavior change by attempting to establish a discrepancy between the advantages and disadvantages of changing their behavior.

Session two: Goal setting. The second session helped participants develop an action plan to become more physically active by setting specific goals and strategies. Consistent with goal-setting theory (Locke & Latham, 1990), participants had to be sufficiently interested and free from goal conflict in order to follow through with their goals. This meant that participants had to recognize the particular advantages of physical activity and not feel burdened by the various costs associated with becoming or being physically active. The option existed at this point to offer participants the opportunity to repeat the decisional balance exercise before moving on to developing an action plan. Because all participants were sufficiently interested in becoming more active, this step was not necessary.

Within the second session, participants were guided by two sets of questions. First, participants had to establish a particular physical activity goal, identify its importance, create a series of steps to help them follow through with their goal, and be provided with a list of available support structures both in- and outside the hospital. Second, participants were asked to identify how to handle potential barriers and seek out individuals who may render assistance.

Throughout this session, participants were asked about their goals, their goals' perceived importance, and also how to overcome potential barriers. These questions were intended to increase the level, strength, and specificity of not only exercise self-efficacy, but also barriers self-efficacy through verbal persuasion (Bandura, 1986). Additionally, these questions were designed to promote a client-centered approach, one that continually aimed to strengthen a person's autonomy, competence in physical activity, and relatedness to other individuals. Essentially, the action plan was designed to address a client's three basic psychological needs and increase intrinsic motivation as identified in self-determination theory (Ryan & Deci, 2000). Additionally, the session allowed participants to identify potential barriers that may cause relapse, and explore possible solutions.

Sessions three and four: Evaluate, revise, inform. During sessions three and four, the action plan was reviewed and adjusted, if necessary. Participants were encouraged to discuss their set goals and any anticipated and unanticipated barriers they may have encountered during the previous week. Throughout these sessions, participants were reminded about their individual personal strengths and support systems, asked to brainstorm ideas of how to overcome difficult barriers, and provided with additional information about various resources to help them achieve their physical activity goals.

**Data analysis.** Accelerometry data and mediating psychological variables of physical activity were grouped by study phase and paired *t*-tests were used to compare mean scores (Kazdin, 1982). An alpha level of .05 was used for statistical tests. Post study interviews were transcribed verbatim and analyzed thematically by the first author (Braun & Clarke, 2006). An inductive analytic approach was taken to assess program experiences, learned skills, as well as proposed changes to the program. Interview results were supplemented with field notes from the intervention sessions.

## Results

### Physical Activity

**Accelerometer data: Average daily minutes of MVPA.** All participants wore their accelerometers the necessary amount of time to provide adequate data during study. For participant three there was a significant decrease between the baseline phase and the follow-up phase,  $t = 3.26, p < .05$ . The three other participants exhibited no significant changes in MVPA levels. Total minutes of light physical activity were also examined and no significant differences between the three phases for any of the participants were found. Figure 1 provides the total minutes of average daily MVPA during each measurement period.

### Stages of Change

Participants two and four moved from the preparation stage to the action stage while participant three moved from contemplation to the preparation stage. Participant one stayed in the preparation stage throughout the study.

### Mediating Psychological Variables of Physical Activity

Mean scores indicate that all participants increased their levels of self-efficacy as the study progressed. These results were consistent with theory, but were not significant,  $t = -.92, p = .40$ . Overall mean scores for all participants increased from 3.4 baseline to 3.8 follow-up

Mean scores indicate that perceived benefits of physical activity increased for participants one and two and remained unchanged for participants three and four. Overall mean scores for all participants increased from 4.1 baseline to 4.3 follow-up and revealed that results were consistent with theory, but failed to reach significance,  $t = -.47, p = .66$ .

Mean scores indicate that participants three and four perceived fewer barriers as the study progressed, while participants one and two had increased perceptions of barriers by follow-up. Overall mean scores for all participants between baseline and follow-up decreased from 2.0 baseline to 1.9 follow-up and were consistent with theory, but not significant,  $t = .22, p = .83$ . Mean scores and standard deviations for each mediating psychological variable during each study phase can be found in Table 3.

### **Exercise Counseling Compliance and Treatment Fidelity**

Participants attended all counseling sessions and fulfilled each session's objectives. All treatment sessions followed the exercise counseling framework and all necessary components were addressed.

### **Post Study Interviews**

All participants enjoyed the sessions and found the intervention helpful. Participants mentioned they learned to set physical activity goals and overcome barriers.

James spoke about the importance of regular exercise for physical health. When James faced exercise facility scheduling difficulties that prevented him from using the gym, he walked

more often. “I feel more motivated now to do things... Before I wasn’t walking, but I am now. After the study I really am doing more things.”

Kevin also faced scheduling challenges with the community gym when his day programming at an outreach clinic changed its hours. Through the action plan, Kevin was able to reschedule his gym visits and maintain his attendance at the outreach clinic. “It gave me a chance to find out more about myself. It gave me a chance to organize my ability to exercise on a regular basis.”

Kristen rode her bicycle to weekly acupuncture classes and walked in the neighborhood. Toward the end of the study, Kristen lost her bike-lock key and experienced frequent flat tires. When biking was not an option, she compensated by walking more. “It was pretty good. It gave me, you know, that thing where we made the goals... Yeah like I still want to make sure that I go walking.”

Judy was very active during the study and made a sincere effort to attend the gym. Unfortunately, Judy experienced health complications during the study including a cold, a urinary tract infection, and sore joints that forced her to reduce her activity level. Despite her health complications, she described herself as remaining active. “I learned, I think, I can actually stick to things that I’ve set out for myself... It was good. It made me want to pursue more activities.”

Overall, three of the four participants self-reported that they had increased their physical activity over the intervention, while Kristen, participant three, self-reported decreased levels of activity.

## **Discussion**

This mixed-methods study examined the feasibility and acceptability of exercise counseling in schizophrenia and its effect on MVPA and the mediating psychological variables underpinning changes in physical activity. All four participants attended and willingly participated in each of the exercise counseling sessions. An examination of the mediating psychological variables of physical activity revealed that as individuals progressed through the intervention, changes in mediating psychological variables moved in the directions predicted by the TTM. Although no significant increases in levels of physical activity were seen for three participants when accelerometer data was examined, participants did increase their readiness to become active. The results of this study are in line with previous reviews examining exercise counselling in the general population (Petrella & Lattanzio, 2002; Smitherman et al, 2007) which report improvements in short-term physical activity behaviour. Overall, the study findings support the feasibility and acceptability of using exercise counseling to engage individuals with schizophrenia to increase levels of psychological mediators of physical activity; however, further research needs to examine the effect of the intervention on MVPA.

A major finding of this study was that changes in psychological mediators were detected in accordance to the TTM. Self-efficacy improved for all participants throughout the intervention, although not significantly. Perceived benefits of and barriers to physical activity improved for two participants, again, although not significantly. Changes in psychological mediators did not correspond to objective measures of physical activity. Although previous cross sectional research has shown that increased levels of self-efficacy and perceived benefits of physical activity and decreased levels of perceived barriers to physical activity are associated

with higher levels of activity (Gorczyński et al., 2010), no experimental research has examined the psychological processes of physical activity in individuals with serious mental illness.

There could be several reasons why objectively measured physical activity increases were not detected. First, changes in mediators of physical activity behavior change do not necessarily translate into changes in physical activity behavior. In a review conducted by Rhodes and Pfaeffli (2010), interventions based on behavioral theory involving adults from non-clinical populations were examined for their effects on physical activity behavior and mediator change. Of the 22 included studies that employed mediators of change analyses, only five studies reported that changes in behavior were a result of changes in at least one mediator caused by the intervention. Incorporating mediator analyses into future research will help confirm if any action theory links or conceptual theory links exist between theoretical frameworks and desired behavioral goals.

Second, it may also be that the intervention lacked sufficient dosage – more sessions over a longer period of time may be needed to develop the self-regulatory skills that exercise counseling aims to develop. Self-regulatory skills proved successful in increasing levels of physical activity in women with schizophrenia who took part in a six-week group-based weight management program (Arbour-Nicitopolous et al., 2010). Participants in this program were taught to plan and self-monitor their physical activity behaviour. It is possible that the exercise counseling intervention should offer more sessions to teach self-regulatory skills and reinforce the learning.

Third, it is possible the TTM may not provide sufficient strategies to challenge individuals to increase their levels of MVPA once they enter the action stage. People may have

intentions of challenging themselves to exercise at a greater intensity once they become active at a light level, but may lack the ability of turning those intentions into actions. This *intention-behavior gap* may require additional behavioral strategies to be overcome (Sheeran, 2002). The findings from the current study may also suggest that future exercise counseling interventions may wish to structure the intervention in a way that further supports, maintains, and pushes individuals to increase their levels of MVPA by focusing on explicit and clearly defined goals that incorporate the frequency, intensity, time, and type of physical activity. By altering the exercise counseling intervention to incorporate the Health Action Process Approach (Schwarzer, 2008), intentions would be supported through action planning, coping planning, and both maintenance and recovery self-efficacy. Potentially, more sessions would be required to accommodate these strategies. Currently, no research has yet examined the use of the Health Action Process Approach in individuals with schizophrenia.

The strengths of this pilot mixed-methods study lie in its methodological design. First, the single-case experimental design offered the ability to examine the effects of exercise counseling on four obese individuals with schizophrenia who were physically inactive. This research will support larger scale experimental research that can provide generalizable results. Second, high adherence levels in this study indicated that conducting motivational exercise programs in this population is feasible and acceptable. Third, the use of accelerometers showed the need for further research to use objective measures of physical activity as memory recall in this population may be poor (Brekke et al., 1997). Additionally, all four participants wore their accelerometers the necessary amount of time, indicating that accelerometer use in individuals with schizophrenia in intervention studies is possible.

This pilot study had a number of limitations. First, the study design does not allow results to be generalized given the small sample size used. A small sample size also limited the ability to potentially detect significant changes. Second, participants may have had high levels of cognitive functioning or motivation that would have facilitated participation in exercise counseling (Foussias et al., 2011). Levels of cognitive functioning and motivation should be evaluated in future studies. Third, based on baseline accelerometry findings, three participants were sufficiently active at the start of this study (i.e., accumulating >30 min/day of MVPA), despite indicating they were in the contemplation or preparation stages of the TTM. It may have been difficult to increase MVPA among these individuals who were already active at a level recommended for public health although increased physical activity may be necessary for increased health benefits in this population (Jerome et al., 2009). Inclusion criteria for future studies should be specified to include low levels of objectively measured MVPA. Fourth, the internal consistency reliability of the perceived barriers measure was found to be less satisfactory, indicating caution should be used when interpreting these results.

### Conclusion

Exercise counseling has been shown to be a feasible and acceptable intervention to help improve the psychological mediators associated with physical activity. Further research is necessary to examine the effects of exercise counseling on levels of MVPA. The results of this study convey several important clinical and research implications. First, given that all participants struggled with unique personal barriers that arose during the course of this study, more time needs to be devoted to problem solving during the exercise counseling sessions. Potentially more sessions may be required to help individuals address these challenges.

Additionally, it may be necessary to address issues of amotivation, as this sub-domain of negative symptoms has a profound effect on overall functioning and may impact overall physical activity. Second, participants in this study helped show exercise counseling may be an effective way of helping people become active by strengthening the determinants of physical activity. Long-term follow-up in future studies is necessary to examine the sustainability of change in psychological mediators of physical activity. Further research is still required as to how exercise counseling can help increase levels of MVPA among sedentary individuals. Lastly, it is necessary to structure and deliver physical activity interventions in individuals with schizophrenia using a theory-based approach. The approach described was developed to allow ease of transfer to clinical settings and implementation by a range of health professionals in these settings. As seen in the general population, targeting the underpinning psychological mediators of behavior change may result in physical activity interventions being more effective. Additionally, as Rhodes and Pfaeffli (2010) suggested, incorporating mediator analyses into future research will help confirm if any action theory links or conceptual theory links exist between theoretical frameworks and desired behavioral goals.

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**Figure Legend**

**Figure 1.** Average daily Moderate and Vigorous Physical Activity for each participant across each study phase. \* $p < .05$ .

**Table 1.** Participant demographic information

Participant	Age, Sex, and Marital Status	BMI	Years Since Psychiatric Diagnosis	Medication	Occupation	Living Arrangements	Self-identified Goal
James, participant one	29, male, single	45.2	10	Clozapine	Various retail jobs	Hospital, in-patient	Start weight lifting to lose weight.
Kevin, participant two	28, male, single	45.4	10	Loxapine	Not working	Group home	Play basketball and football and attend the gym regularly.
Kristen, participant three	25, female, single	31.9	13	Clozapine, Benztropine, and weight reduction medication	Not working	Hospital, in-patient	Walking more often and riding her bicycle.
Judy, participant four	36, female, single	32.4	14	Clozapine and Lipitor	Retail clothing store	Independently	Attend the gym 2 to 3 times per week.

Table 2. Sessions and Measurement Schedule.

Week	Baseline		Intervention				Follow-Up			
	1	2	3	4	5	6	7	8	9	10
Demographic Information	x									
Accelerometer	x					x			x	
Stages of Change	x	x	x	x	x	x			x	x
Self-efficacy	x	x	x	x	x	x			x	x
Benefits & Barriers	x	x	x	x	x	x			x	x

**Table 3.** Mediating Psychological Variables of Physical Activity

Participant	Baseline		Intervention		Follow-up	
	M	SD	M	SD	M	SD
	Self-efficacy					
1	4.1	0.59	4.4	0.29	4.3	0.0
2	3.7	0.47	3.9	0.10	4.3	0.24
3	2.7	0.24	2.9	0.44	3.2	0.0
4	3.3	0.24	3.4	0.21	3.5	0.24
	Perceived benefits of physical activity					
1	4.3	0.71	4.7	0.36	5.0	0.0
2	4.7	0.0	4.7	0.21	4.8	0.12
3	3.6	0.35	3.8	0.35	3.6	0.35
4	3.8	0.12	3.8	0.0	3.8	0.12
	Perceived barriers of physical activity					
1	1.0	0.0	1.6	0.42	1.7	0.0
2	2.3	0.35	2.1	0.22	2.6	0.59
3	2.2	0.24	1.5	0.44	1.1	0.12
4	2.4	0.12	2.4	0.28	2.1	0.12

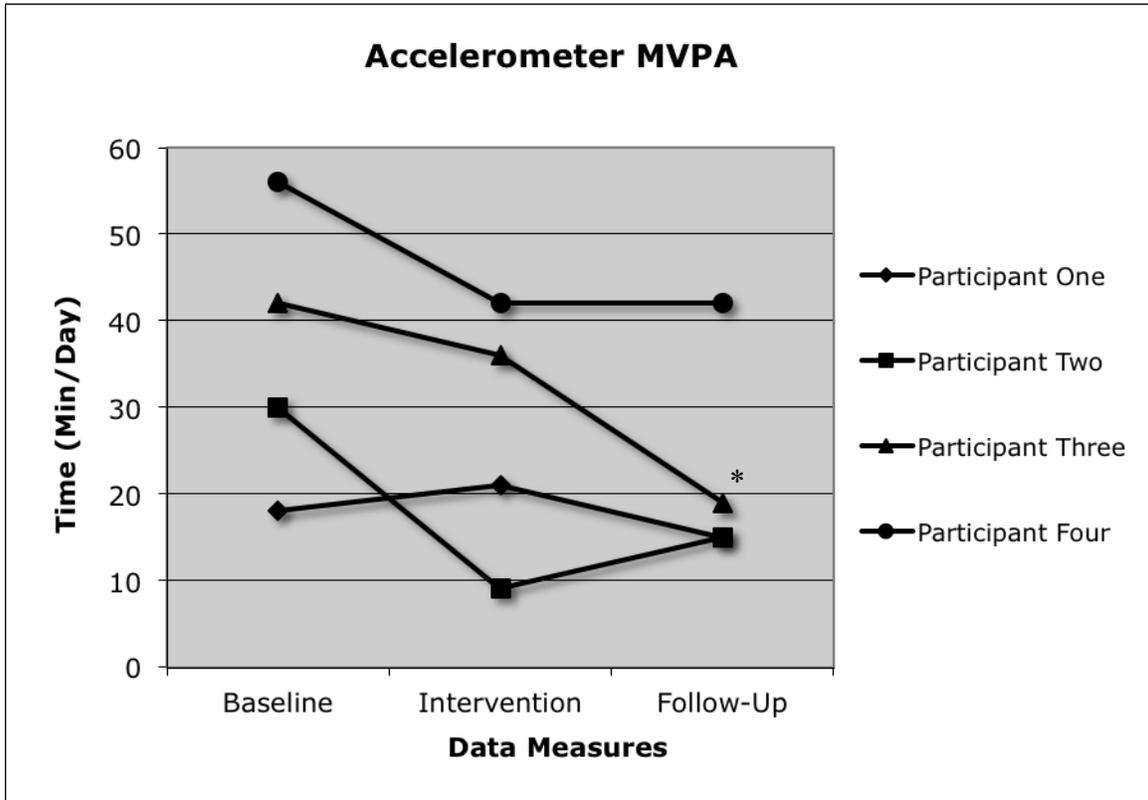


Figure 1.