Examining strategies to improve accelerometer compliance for individuals living with

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Objective: This study examined the feasibility and effect of two investigator-based and two

participant-based strategies on accelerometer wear time in individuals living with schizophrenia

in order to improve accelerometry compliance. **Methods:** Four adults with schizophrenia were

asked to wear an accelerometer for one week during the baseline, intervention, and follow-up

phases of a study that evaluated exercise counseling. To encourage participants to wear their

accelerometers, investigators modeled proper accelerometer use, provided verbal and written

instructions, and placed reminder phone calls. Participants were also given wear time logs and

reminder magnets. **Results:** All participants wore their accelerometers for the required amount of

time during the study. **Conclusions and Implications for Practice:** Researchers should use

multiple techniques to help ensure compliance. Research is needed to identify the most effective

combination of strategies for this population.

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Levels of physical activity are low in individuals living with schizophrenia and

improving physical activity in this population has been suggested to decrease the risk of chronic

health conditions and delay early mortality (Faulkner & Gorczynski, 2013). Researchers have

noted that objective physical activity measurement, like accelerometery, can better capture

temporal trends, incidental activity, and moderate and vigorous levels of physical activity than

self-report questionnaires (Katzmarzyk & Tremblay, 2007). Most physical activity research

involving individuals with schizophrenia has relied on recall questionnaires, which can be

affected by recall challenges and social desirability. In order to produce useful data that allows

researchers to determine minutes spent in different intensities of activity, accelerometers must be

worn by participants for a certain period of time. An accepted definition of minimal wear time,

or compliance, is at least 10 hours a day for 3 to 5 days in a span of 7 days (Trost, McIver, &

Pate, 2005). A US study that examined accelerometer results from the 2003-2004 National

Health and Nutritional Examination Survey found that out of 7,176 individuals aged 6 years and

older, 67.8% of individuals provided at least 4 valid days of data with average wear time for a

valid day being 14.2 hours (Troiano, Berrigan, Dodd, Masse, Tilert, & McDowell, 2008).

Although no large-scale accelerometer studies have been conducted in schizophrenia,

some studies have reported low compliance of 45.4% (Jerome et al., 2009), while other studies

have reported compliance rates over 80% (Dubbert, White, Grothe, Jile, & Kirchner, 2006;

Janney et al., 2013; McKibbin et al., 2006; Wichniak et al., 2011). Missing data poses a threat to

the validity and interpretation of trials using physical activity data from accelerometry. It also

has resource implications given the potential need to increase sample sizes to compensate for

noncompliance. Several strategies have been recommended to help participants wear their

accelerometers for the necessary amount of time to produce valid data. Ward and colleagues

(2005) have suggested that researchers use investigator based strategies (e.g., phoning

participants) and/or participant based strategies (e.g., wear time logs) to improve wear time.

Research that has compared different strategies to improve wear time in adolescents in the

general population has found that compensation contingent on number of complete days was

most successful at encouraging participants to wear their accelerometers for the necessary

amount of time followed by self-report journals and phone calls (Sirard & Slater, 2009). Studies

involving individuals with schizophrenia have provided brief descriptions of their accelerometer

protocols, but none have examined strategies to help improve accelerometer wear time in order

to provide valid data.

Objective

This study examined the feasibility and effect of two investigator-based and two participant-

based strategies on accelerometer wear time in individuals living with schizophrenia in order to

improve accelerometry compliance.

Methods

Participants and Procedures

Ethical approval was obtained from the Health Sciences Research Ethics Board at the

University of Toronto and the Centre for Addiction and Mental Health (CAMH) Research Ethics

Board. The study took place at the Mental Health and Metabolism Clinic at CAMH. Adults

diagnosed with any form of schizophrenia (American Psychiatric Association, 1994), who were

overweight or obese (Body Mass Index $\geq$ 25), who were in the contemplation or preparation

stage of the Transtheoretical Model for physical activity (Prochaska & DiClimente, 1986), with

no physiological complications, and able to provide consent were recruited with the assistance

of clinic staff.

Participants were asked to take part in a 2-month single-case experimental study that

evaluated the efficacy of exercise counseling in increasing levels of moderate and vigorous

physical activity. Participants were asked to wear their ActiGraph GT1M uni-axial

accelerometers, unless showering or swimming, for one week during the baseline, intervention,

and follow-up phases of the study. Accelerometer data were considered complete if participants

wore their accelerometers a minimum of 10 hours per day on a least three weekdays and one

weekend day. Accelerometers were set to capture data using 60-second epochs. Sixty straight

minutes of zero counts indicated non-wear time. Two investigator-based and two participant-

based strategies were employed with each participant during each phase of the study to help

improve wear time based on previous research (Faulkner, Cohn, & Remington, 2006) and best

practice recommendations (Ward, Evenson, Vaughn, Rodgers, & Troiano, 2005). Investigator-

based strategies included modeling and providing verbal and written instructions about how and

when accelerometers should be worn. Reminder phone calls were placed on three weekdays and

one weekend day. Participant-based strategies involved providing participants wear time logs

that allowed self-monitoring of accelerometer use. Reminder magnets that had pictures of their

accelerometers were provided to participants based on suggestions provided by Ward and

colleagues (2005) to have reminders in prominent places.

Analysis

Accelerometry wear time data was consolidated by study phase and paired t-tests, with

alpha levels of .05, were used to compare different phase means.

Results

Demographic Information

Four high functioning individuals, two males and two females, participated in the study.

Individuals were aged 25, 28, 29, and 36 years, respectively. Two participants were employed

during the study and three participants lived at the hospital or in a group-housing complex. One

individual lived independently.

Accelerometer Wear Time

All participants wore their accelerometers for the required amount of time during each phase of

the study. Average daily wear times for the baseline, intervention, and follow-up phases were

14.8 hours (SD = 5.9 hours), 14.4 hours (SD = 5.5 hours), and 12.5 hours (SD = 1.0 hours),

respectively. Overall, average mean wear time decreased from baseline to follow-up, but did not

reach significance, t = .77, p = .47. Individual daily wear time averages per phase can be seen in

Figure 1. Paired *t-tests* used to compare different phases revealed that only one participant had

significantly different amounts of daily wear time between baseline and follow-up (t = 7.291, p

< .05), however, this individual still achieved the necessary amount of wear time during all three

phases.

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Discussion

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Results from this study showed that all four participants complied with the accelerometer

protocol and wore their accelerometers the necessary amount of time to produce valid data.

Average daily wear times were similar to those found in a large-scale study within the general

population (Troiano et al., 2008). The production of valid data can help researchers examine

physical and mental health rehabilitation outcomes of exercise more accurately and determine

the specific dosage of exercise that is necessary to render such outcomes.

Findings from this study offer several suggestions to help improve accelerometer wear

time in schizophrenia research. First, researchers should strive to report detailed accelerometer

protocols and compliance rates in their manuscripts. Providing these details will help improve

future objective physical activity measurement by allowing different strategies to be compared

for their effectiveness in improving wear time, as has been done in other populations (Sirard &

Slater, 2009). Second, although it not possible to distinguish which strategy used in the current

study was most successful at improving wear time, researchers should use multiple techniques to

ensure compliance until future research can help clarify which strategy or combination of

strategies is most effective. Throughout each phase of the study, connecting by telephone with

participants who lived in the hospital or in group housing was challenging and required multiple

attempts. Other strategies were not fully used by other participants. One individual neglected to

fully complete his wear time logs during the study and another individual only partially

completed her wear time log in the follow-up phase. Two individuals misplaced their reminder

magnets during the baseline phase.

Improving wear time is only one consideration researchers must be aware of when using

accelerometers to capture valid physical activity data with individuals living with schizophrenia

where minimal wear time has been achieved. Statistical imputation techniques have been

presented in order to account for missing data from accelerometers (Catellier et al., 2005),

however no one has determined the single best approach for dealing with missing data from

accelerometers nor has such an approach been used among individuals living with schizophrenia.

It is likely that such statistical approaches will be needed to complement strategies to increase

accelerometry compliance in order to most efficiently maximize the utility of data collected in

the field.

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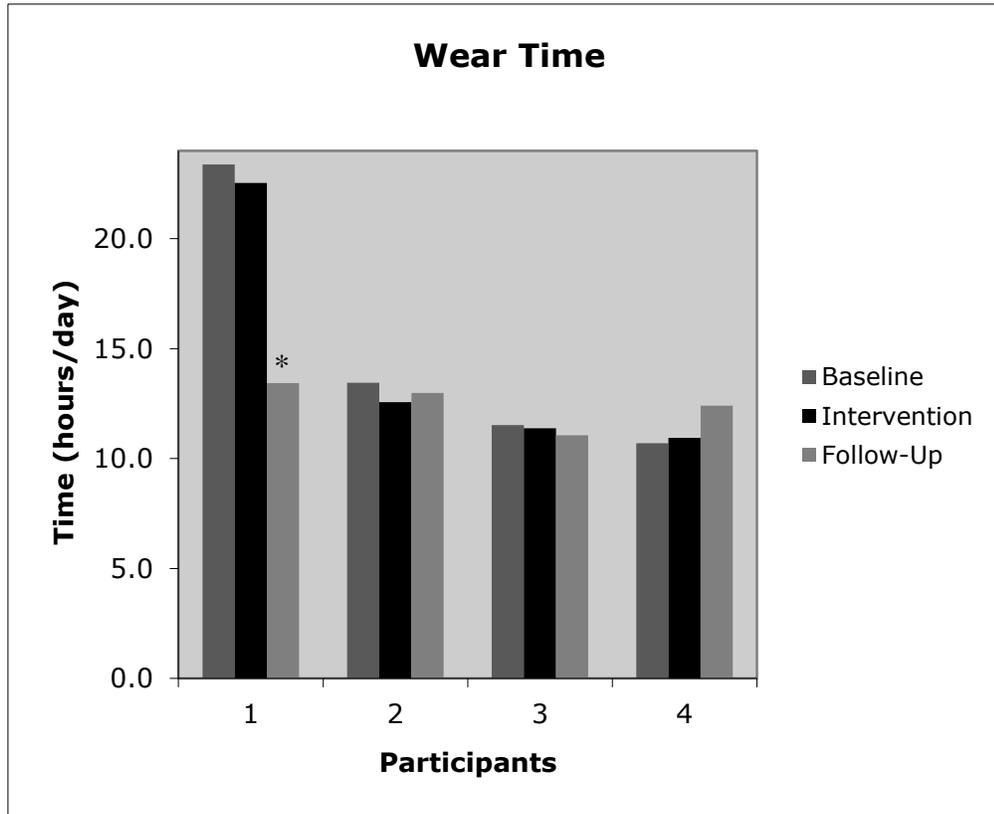
Figure 1. Individual daily wear time averages per phase. *p < .05.