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Physical activity and sedentary behaviour of adults with mental illness

Running title: Physical activity and sedentary behaviour of adults with mental illness

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Physical activity and sedentary behaviour of adults with mental illness

Original article

Abstract

Objectives: To assess physical activity (PA) and sedentary behaviour (SB) in non-institutionalised adults with mental illness, using a combination of self-report and objective measures.

Design: Cross-sectional.

Methods: Participants completed PA questionnaires (time spent walking for transport, walking for recreation, gardening, vigorous-, and moderate-intensity activities), and SB questionnaires (time spent sitting for TV, travel, work, computer use; and reclining). Participants also wore an accelerometer for 7-days. Accelerometry estimates of time spent in SB, light activity, and moderate-to-vigorous activity (MVPA), bout durations, and breaks in sedentary time, were calculated.

Results: 142 participants completed the questionnaires. The median time spent in self-reported MVPA and SB was 4.5 hours/week and 10.7 hours/day respectively. Walking for transport, and sitting to watch TV, contributed most to self-report estimates; time spent reclining was an important contributor to SB. 99 participants completed the accelerometry. The median time spent in accelerometer-derived MVPA and SB was 26 minutes/day and 9.2 hours/day respectively; 7% of MVPA time was in bouts of 10 minutes or more, and 34% of SB time was in bouts of over 20 minutes.

Conclusions: A high proportion of participants reported activity levels consistent with physical activity guidelines; however, a small proportion of activity was accumulated in bouts of 10 minutes or more. Participants also had high levels of SB, about one-third of which was accumulated in bouts over 20 minutes. PA and SB interventions for this group could target increasing recreational walking, and reducing television time.

Keywords

Mental illness, mental health, physical activity, sedentary behaviour, accelerometer, questionnaire

Introduction

Adults with mental illnesses have a shorter life expectancy than the general population[1], and increased risk of chronic disease[2]. Physical activity (PA) can protect against these outcomes[3], and reduce depression and anxiety[4]. High levels of sedentary behaviour (SB) are associated with increased risk of morbidity and all-cause mortality[5], and may also be associated with poor mental health[6]. It is therefore important to understand the levels of PA and SB of adults with mental illness.

Most studies of PA and SB in adults with mental illness have used self-report measures only. These studies have commonly assessed the frequency (e.g. times/week) and intensity of activities[7-9], or have only reported categories of total activity[2,10]. Few studies have reported on the self-reported *duration* of PA[11,12], which is important for determining adherence to PA guidelines, and identifying the most common contexts of PA participation. A questionnaire study with 21 community-based adults with mental illness reported that walking comprised the greatest, and leisure-time activity the lowest, proportion of moderate-to-vigorous physical activity (MVPA)[11]. Another questionnaire study with 194 outpatients with schizophrenia, found low engagement in leisure-time sports, and similar self-reported values for weekdays and weekend days: ~12.6 hours/day in sedentary *and* light (e.g. driving, shopping), ~1.3 hours/day in moderate, and ~0.3 hours/day in vigorous activities[12]. This study assessed combined sedentary and light activities[12]; however, distinguishing SB from light activity is important, given the different health-related implications[5]. One study assessed self-reported SB, which found average sitting times of 5.1 hours/day[11]; this study did not assess domain-specific sedentary behaviours, or time spent reclining. Self-report methods are, however, prone to reporting errors such as recall and social desirability bias[13].

Objective methods, such as accelerometry, allow for unbiased measurement, but few studies have used these in adults with mental illness. Accelerometry studies with sample sizes ranging from 46[14] to 165[15] have reported mean times spent in SB ranging from 9.1 to 13.5 hours/day[14-16], and MVPA ranging from 14 to 42 minutes/day[14-17]. Two studies also assessed bout durations of SB and MVPA: one found that adults with depression and/or anxiety accumulated 42% of SB in ≥20 minute bouts, and 43% of

MVPA in ≥10 minute bouts[15]; the other found that only 4% of a sample of adults with mental illnesses who'd accumulated at least 150 minutes/week of MVPA, did so in ≥10 minute bouts[17]. These studies have typically focused on samples of adults with specific psychiatric diagnoses, e.g. schizophrenia[14], depression and/or anxiety[15], and bipolar disorder[16]; one study was with adults with a range of diagnoses[17]. Accelerometry does not provide contextual information about PA and SB, which can be useful for intervention planning; for example, if active transport is found to be high, PA interventions may target recreational activity.

Using a combination of self-report and objective measures may provide more comprehensive assessment; however, few studies have done so. One study with 54 adults with schizophrenia, found that participants reported a mean of 11.2 hours/week in PA (including low intensity), and that the most commonly reported activity was walking[18]. This questionnaire also assessed sitting time, however, this was operationalised as a 'sitting index', which does not provide information about the duration or context of sedentary behaviours. Accelerometer data from 16 participants indicated that 8.9 hours/day was spent in SB, 32 minutes/day in moderate, and 4 minutes/day in vigorous activity[18].

Previous research suggests high levels of SB in adults with mental illness, with lower estimates from self-report measures than accelerometry (5.1 vs. ≥8.9 hours/day). Conversely, self-reported MVPA tends to be higher than accelerometry (~1.6 hours/day vs. ≤42 minutes/day). Differences in PA and SB estimates across studies could be due to differences in samples (e.g. diagnoses), or measures used. Most studies have been with participants with a specific diagnosis; assessing PA and SB in diagnostically heterogeneous groups is important, because PA and SB intervention can benefit adults with a broad range of mental illnesses[19]. More research using self-report and objective measures with adults with mental illnesses is therefore needed to provide insight into how (e.g. bout durations, break frequency, measured intensity etc.), and in what context, PA and SB is accumulated for this group.

The aim of this study was to assess the PA and SB of adults across a range of mental illnesses, using self-report and objective methods.

Methods

Ethical approval was obtained from The University of Queensland Behavioural and Social Sciences Ethical Review Committee (2012000908), and the Royal Brisbane & Women's Hospital Human Ethical Review Committee (HREC/12/QRBW/286). Data were collected between October 2012 and December 2013.

This was a cross-sectional study. Individuals were approached in waiting rooms of five psychiatric outpatient clinics, and support groups of four community-based mental health organisations in Brisbane, Australia, and verbally invited to participate. Project posters were placed in waiting rooms, and interested people could contact the researcher directly, or staff members could refer interested clients. Eligible participants were non-institutionalised men and women who self-identified as recovering from mental illness, were ambulatory, able to understand English, and over 18 years of age. People in visible distress or with severe intellectual impairment were not invited to participate.

There were two study components; component 1 involved reporting PA and SB using self-administered questionnaires. Participants could complete the questionnaires immediately or take them home; verbal agreement was taken as consent. Participants received an AUD$5 gratuity upon completion.

The PA questionnaire was adapted from the Active Australia survey to have two walking items[20]. Respondents reported the total frequency and duration in the previous week of: a) walking for transport; b) walking for recreation; c) vigorous yard work; d) vigorous activity, and e) other moderate intensity activities. This version of the questionnaire has been shown to have moderate correlations with accelerometry (ρ=0.43–0.52) for mid-aged women[21]. Consistent with other state and national physical activity surveys, self-report data were truncated to limit potential over reporting[20]. Self-reported activity for *each questionnaire item* was truncated to 14 hours/week[20]. Self-reported moderate-to-vigorous activity in the previous week (Sr-MVPA/week) was calculated as the sum of

time spent in walking (for transport and recreation/exercise), moderate activity, and vigorous activity weighted by two (excluding yard work), and truncated to 28 hours/week[20]. Participants who reported at least 150 minutes of Sr-MVPA/week were classified as meeting PA guidelines[22].

The SB questionnaire was adapted from a questionnaire which asks about sitting time on each of a usual weekday and weekend day, in each of: a) traveling; b) at work; c) watching television; d) computer use; e) leisure time (not including TV)[23]. The questionnaire has been shown to have high validity for sitting at work and computer use (r=0.69–0.74), for mid-aged adults[23]. Because SB is typically defined to include reclining time, an additional item was added to assess reclining time, not including sleep (e.g. lying down due to stress, pain or boredom). Self-reported sedentary time for each questionnaire item was truncated to 12 hours/day, with the exception of s*itting for travel*, which was truncated to 8 hours/day. Individual questionnaire items were summed for weekdays and weekend days, and self-reported sedentary behaviour in a usual day (Sr-SB/day) was calculated as (*usual weekday**5+*usual weekend**2)/7, and truncated to 20 hours/day.

Component 2 involved wearing an ActiGraph GT3X+ accelerometer on the right hip, 24 hours/day for seven consecutive days. During the monitoring period, participants recorded time to bed, time out of bed, and non-wear times, in a diary. The researcher (JC) met participants to demonstrate how to use the monitor, and measure height and weight. Accelerometer data from two pilot participants were included in the analysis. Participants provided written informed consent before data collection, and received an AUD$40 gratuity upon completion.

Accelerometer vertical axis data were converted to counts per minute (cpm). Participants' self-reported time out of bed, and time to bed, were used to define their *waking* hours; only waking data were analysed. Accelerometer non-wear time was identified from diaries, and from consecutive zero counts ≥60 minutes. Data were considered valid if the accelerometer was worn for at least 90% of waking hours on at least four days of the week, including at least one weekend day.

Accelerometer-derived sedentary behaviour (Ac-SB), light, and moderate-to-vigorous activity (Ac-MVPA), were defined as ≤100 cpm, 101–2,019 cpm, and >2,019 cpm, respectively. *Daily averages* of Ac-SB and Ac-MVPA (Ac-SB/day and Ac-MVPA/day) were calculated. For ease of comparison with Sr-MVPA/week, Ac-MVPA/day was converted to a weekly measure, by multiplying by seven (Ac-MVPA/week).

Bouts of Ac-MVPA and Ac-SB were defined as successive accelerometer data above, and below, their respective thresholds (>2,019 cpm, and ≤100 cpm). Bouts of Ac-MVPA 10 minutes or longer were identified, consistent with some PA recommendations[24], and bouts of Ac-SB longer than 20 minutes were identified as *prolonged* bouts, given that breaks in sedentary time every 20 minutes can confer health benefits[25]. The data between successive Ac-SB bouts (≥1-minute) were defined as sedentary breaks; the mean number, duration, and intensity of sedentary breaks, were calculated[26].

Demographic questionnaires were used in both study components. Participants indicated psychiatric diagnosis from a list of: depression, anxiety (e.g., post-traumatic stress disorder, panic attack, obsessive compulsive disorder, generalised anxiety disorder), psychoses (e.g., schizophrenia, schizoaffective disorder), substance use (e.g., drug, alcohol), eating disorder, bipolar disorder, or other (please specify). Level of distress was assessed using the Kessler-6 scale; scores range from 6 to 30, with scores over 15 indicating high distress[27].

Participants' demographic characteristics were compared across study components using chi-squared and t-tests. Wilcoxon signed-rank tests were used to compare the reported frequencies, and truncated durations of questionnaire items. Due to the potential for researcher administration to influence self-report results, questionnaire data for participants who requested assistance were compared with those that self-administered, using Mann-Whitney tests. Accelerometer-derived outcomes were weighted by the number of valid days of accelerometry for each participant, to generate group summary statistics. Spearman's rank order correlations and Wilcoxon tests were used to compare Sr-MVPA/week with Ac-MVPA/week; because SB data were normally distributed, t-tests were used to compare Sr-SB/day

with Ac-SB/day. Accelerometer data reduction was performed using Matlab 2011b, and SPSS v.22 was used to generate descriptive statistics and perform statistical tests.

Results

Of the 425 individuals invited or referred to the study, 142 (33%) completed the questionnaires, 55% of whom were recruited from hospital sites; no information is available on those who declined. Most questionnaire participants (79%; n=112) consented to the accelerometer component; attrition for the accelerometry was 12%. Of those who completed the accelerometry, 47% were recruited from hospital sites. Participants who completed the accelerometry were similar on age (mean=40 vs. 40 years), sex (female=47% vs. 35%), BMI (mean=30 vs. 26), and distress (mean=15 vs. 16) to those who declined *or* withdrew, and less likely to have a psychotic or substance use disorder (56% vs 100%; p=0.003) than those who withdrew. Just under half of the sample reported multiple psychiatric diagnoses; the most common co-occurring diagnosis was depression, followed by anxiety. Demographic characteristics are summarised in Table 1.

Self-reported PA statistics are summarised in Figure 1. One participant was unable to provide responses, therefore 141 questionnaires were analysed. Truncation was applied to 5.7%, 5.0%, 1.4%, 1.4%, and 2.1% of responses for the items *walking for transport*, *walking for recreation*, *yard work*, *vigorous activity*, and *moderate activity*, respectively; Sr-MVPA/week was truncated for 11.3% of participants. For each of these items, truncated values ranged from: 14-70, 16-60, 40-100, 18-200, 18-100, and 28-70 hours/week, respectively. The median Sr-MVPA/week was 4.5 hours/week (IQR=1.8-12). Respondents reported a higher frequency (sessions/week) for *walking for transport* than other PA items ($p<0.001$). Longer durations were also reported for *walking for transport* than other PA items ($p<.001$), with a median of 2 hours/week (IQR=0.7-5). At least 150 minutes/week of Sr-MVPA/week was reported by 99 (70%) participants, 74 (52% of total) of whom reported doing so in 5 or more sessions. Few participants (7%) reported no activity.

Self-reported SB summary statistics are presented in Figure 1. One-fifth of participants (n=29) requested assistance (e.g. recall prompts) to complete the SB questionnaire, four of whom were unable to provide responses. The 25 participants who provided SB data, and requested assistance, reported similar sedentary times (for each domain, and total) to those who did not request assistance (p>.12); data from all participants who provided responses were therefore included in the analyses (n=138). Truncation was applied to 2.2%, 2.2%, 1.4%, 0%, 0%, and 0.7%, of responses for the items: *sitting to watch TV*, *sitting for travel*, *lying down (not sleep)*, *sitting at a computer*, *sitting for work*, and *sitting for other reasons*, respectively; Sr-SB/day was truncated for 6.5% of participants. For each of these items, truncated values ranged from: 12-15, 8-19, 15-22, NA, NA, 14-14, and 21-35 hours/day, respectively. The median Sr-SB/day was 10.3 hours/day (IQR=6.3-14.5). The most frequently reported behaviours were: sitting for *travel* (96%), sitting *to watch TV* (88%), and sitting for *other reasons* (87%). Longer durations were reported for sitting to watch TV, than for other domains (p<0.001), with a median of 2.8 hours/day (IQR=1.3-4.6). Time spent reclining contributed more to Sr-SB/day than sitting at work, Z=6.686, p<0.001, or computer use, Z=2.354, p=0.019.

One participant's accelerometer data were lost due to an accelerometer fault, and one participant only wore the monitor to sleep. Of the 99 participants who wore the monitor during waking hours, 75 (76%) met the minimum wear-time criteria; these participants were older than those without valid data (mean=42 vs. 34 years; p=.002), but similar on sex (female=47% vs. 50%), BMI (mean=30 vs. 31), and distress (mean=15 vs. 16). The median number of valid days for these participants was 6 (IQR=6-7), and the median proportion of waking hours that participants wore the monitor was 98% (IQR=97-99%; range=93-100%). Participants spent a median of 26 minutes/day (IQR=12-52) in MVPA (3%, IQR=1-7% of wear-time), 7% (IQR=0-21%) of which was accumulated in ≥10 minute bouts. Light activity accounted for just under a third of wear-time (Med=30%, IQR=25-38%). Participants spent a median of 9.2 hours/day (IQR=7.9-10.6) sedentary (65%, IQR=58-72% of wear-time), over a third of which (Med=34%, IQR=25-42%) was accumulated in >20 minute bouts. Participants recruited from community-based sites had higher SB, U=925, p=.017, r=.28, and lower MVPA, U=503, p=.036, r=.24, than those recruited from hospital sites. The median number of sedentary breaks/day was 87

(IQR=77-102), the median break length was 3.3 (IQR=2.7-3.9) minutes, and the median break intensity was 533 (IQR=438-619) cpm, which is light intensity.

Of the 75 participants who met the minimum wear-time criteria, 73 completed the PA questionnaire, and 71 completed the SB questionnaire; self-report and accelerometry estimates of PA and SB were compared for participants that provided valid data for both measures. Graphical comparisons of Sr-MVPA/week and Ac-MVPA/week, and Sr-SB/day and Ac-SB/day, are presented in Figure 2. Sr-MVPA/week was higher than Ac-MVPA/week, $Z=3.604$, $p<0.001$, and moderately correlated, $r_s(71)=0.44$, $p<0.001$. Sr-SB/day was higher than Ac-SB/day, $t(70)=2.70$, $p=0.009$, $d=0.42$, without significant correlation, $r(69)=.21$, $p=0.08$.

Discussion

Most participants (70%) self-reported at least 150 minutes/week of MVPA. Other studies have found a lower proportion meeting PA recommendations, however, researchers have operationalised "recommendations" differently, e.g. one study reported that 39% of their sample engaged in at least 20 episodes of PA per month[8]. The Active Australia survey has not been validated in adults with mental illness, and Sr-MVPA/week was truncated for more than 10% of participants, indicating that over-reporting may be high. We truncated self-report data consistent with the guidelines for the questionnaire, however, we are not aware of studies on the appropriateness of the specific truncation values for adults with mental illness. The most common type of activity was walking for transport, which is in agreement with other research[8,11,18]. PA interventions for adults with mental illness could target increasing *recreational* walking. Future research could investigate walking cadence, given previous research indicating its impact on health[28].

Questionnaire data indicated that participants were highly sedentary. Our study is the first to report SB in six domains, including time spent reclining. Sitting to watch TV contributed most to SB, and sitting for travel was most frequently reported. Reclining time, not including sleep, was an important contributor to SB, more so than sitting for work or computer use, which may be due to low rates of

employment. The SB questionnaire has not been validated in adults with mental illness, and truncation was applied to more than 6% of responses, potentially indicating over-reporting. High levels of SB in adults with mental illness could be due to medication side-effects (e.g. lethargy, weight gain), symptoms of mental illness (e.g. avolition, anhedonia, psychomotor retardation), and socio-behavioural issues (e.g. social isolation, low self-esteem or self-confidence). Reducing or breaking-up reclining and TV time could be a target of SB interventions for this group.

Our study extends previous accelerometry research by assessing bout characteristics: one third of SB was accumulated in prolonged bouts, and participants tended to break up SB with short bouts of light activity, which may have health implications, given that previous research has shown that interrupting SB every 20 minutes is beneficial[25]. Only a small proportion of accelerometer-derived MVPA time was accumulated in at least 10 minute bouts, indicating that participants may report short-duration bursts of incidental activity. In our study, self-reported MVPA was greater than accelerometer-derived MVPA; however, our questionnaire asked about the week preceding the accelerometry period, and may reflect actual differences in behaviour. The poor correlation between self-report and accelerometry measurements of SB may indicate difficulties using SB questionnaires in this group[29].

A strength of this study is the diagnostically heterogeneous sample recruited from both community and hospital settings, which increases generalizability; however, a convenience sample was used instead of a random sample, therefore our sample may not be representative. This heterogeneity likely contributed to the differences in self-reported and accelerometer-derived PA and SB between this and previous studies. Differences in self-report data across studies could also be due to different recall periods; we asked about PA in the previous week, while others have asked about a usual day[12], and a typical week[18]. Comparability across studies would be enhanced by use of standardised PA and SB questionnaires designed for use, and validated, with adults with mental illness.

Conclusions

Adults with mental illness spend about two-thirds of their waking time sedentary, a third of which is accumulated in prolonged bouts. Watching TV contributes most to SB, and time spent reclining is an important contributor to SB. The most common activity was walking; few participants engaged in other moderate or vigorous activities. In view of the demonstrable mental health benefits of PA, people involved in the care of adults with mental illness should encourage replacing some sedentary activities with moderate-vigorously active pursuits.

Practical implications

- A high proportion of adults with mental illness report levels of moderate-to-vigorous activity consistent with recommendations, primarily due to walking for transport.
- Exercise interventions for this group could target increasing recreational walking.
- Adults with mental illness report high levels of sedentary behaviour, primarily from TV time.
- Sedentary behaviour interventions for this group could target breaking up prolonged television viewing.

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Declaration of Conflicting Interests

The Authors declare that there is no conflict of interest.

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Figure 1 - Lower and upper whiskers represent the outermost datum within 1.5 x interquartile range (IQR) from the 1st and 3rd quartile, respectively; numbers next to the median line, and box edges, represent the median value, and 25th-75th percentiles; diamonds represent the mean, and circles represent outliers. **Upper panel:** Durations of self-reported physical activity in the previous week (n=141). Light grey boxplots represent self-reported durations for each of the five questionnaire items; the dark grey boxplot represents *total* self-reported moderate-to-vigorous activity in the previous week (Sr-MVPA/week), calculated as the sum of walking (for transport or recreation), vigorous activity, and moderate activities. **Lower panel:** Durations of self-reported sedentary behaviour in a usual day (n=138). Light grey boxplots represent self-reported durations for each of the six questionnaire items; the dark grey boxplot represents *total* self-reported sedentary behaviour for a usual day (Sr-SB/day), calculated as the sum of all six questionnaire items.

Figure 2 – Lower and upper whiskers represent the outermost datum within 1.5 x interquartile range (IQR) from the 1st and 3rd quartile, respectively; numbers next to the median line, and box edges, represent the median value, and 25th-75th percentiles. Diamonds represent the mean, and circles represent outliers. **Left panel***:* Comparison of estimates of moderate-to-vigorous activity for the 73 participants who provided valid data for both the accelerometer and questionnaire: **a)** Self-reported moderate-to-vigorous activity for the week preceding accelerometry (Sr-MVPA/week); mean=8.5 hours/week (SD=8.8); **b)** Accelerometer-derived moderate-to-vigorous activity per week (Ac-MVPA/week); mean=4.3 hours/week (SD=4.0). **Right panel:** Comparison of estimates of sedentary behaviour for the 71 participants who provided valid data for both the accelerometer and questionnaire: **c)** Self-reported sedentary behaviour in a usual day (Sr-SB/day); mean=10.6 hours/day (SD=4.7); **d)** Accelerometer-derived sedentary behaviour per day (Ac-SB/day); mean=9.1 hours/day (SD=1.9).

Table 1.

Participant characteristics

	Questionnaire (n=142)	**Accelerometer** (n=101)
Age in years; mean (SD)	40.1 (11.5)	40.3 (11.4)
	range=18-71	range=18-71
	n (%)	**n (%)**
Female	61 (43%)	47 (47%)
Self-reported diagnosis		
Number of diagnoses reported		
1	75 (53%)	54 (53%)
2	42 (30%)	29 (29%)
3-5	25 (17%)	18 (18%)
Single diagnosis reported		
Psychoses	46 (33%)	29 (29%)
Depression	12 (10%)	9 (9%)
Bipolar	10 (7%)	10 (10%)
Anxiety	5 (4%)	4 (4%)
Substance use	1 (1%)	1 (1%)
Eating disorder	0 (0%)	0 (0%)

Other (personality disorder)	1 (1%)	1 (1%)
Multiple diagnoses reported [a]		
Depression	55 (39%)	42 (38%)
Anxiety	38 (30%)	32 (32%)
Psychoses	31 (22%)	17 (17%)
Substance use	17 (12%)	13 (13%)
Other [b]	9 (6%)	7 (7%)
Bipolar	7 (5%)	7 (7%)
Eating disorder	7 (5%)	4 (4%)
Distress [c]		
High distress	64 (45%)	44 (44%)
Education		
Did not complete high school	53 (37%)	34 (34%)
High school	27 (19%)	22 (22%)
College certificate/diploma	40 (28%)	31 (31%)
Tertiary degree (University)	22 (16%)	14 (14%)
Employment		
Full-time/part-time	17 (12%)	12 (12%)
Volunteer	13 (9%)	9 (9%)

Student	14 (10%)	9 (9%)
Homemaker/retired	10 (7%)	8 (8%)
Unable to work	59 (42%)	41 (41%)
Unemployed / looking for work	29 (20%)	22 (22%)
Physical health		
Poor/fair	94 (67%)	72 (72%)
Good	36 (25%)	23 (23%)
Very good	12 (9%)	6 (6%)
Smoker status		
Daily/occasionally	85 (60%)	57 (57%)
Never/ex-smoker	57 (40%)	44 (44%)
BMI (kg/m^2) [d]		
<18.5	-	2 (2%)
18.5 – 24.9	-	19 (19%)
25 – 29.9	-	31 (31%)
>30	-	49 (50%)

[a] Individual diagnoses reported by those who reported multiple diagnoses, hence, the proportions sum to greater than 100%.

[b] *Other* reported diagnoses were personality disorder for all but two participants from both the questionnaire and accelerometer sample: one reported attention deficit hyperactivity disorder (ADHD), the other reported Asperger's syndrome.

[c] Distress was assessed using the Kessler-6 scale; scores range from 6 to 30, with scores over 15 indicating high distress[24].

[d] BMI: Body Mass Index calculated as weight (kg) / height $(m)^2$. Height and weight were measured for participants of accelerometer study only.