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Correlates of Physical Activity in People living with Psychotic Illness in Australia

Running title: Correlates of physical activity in psychosis

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Abstract

Objective

In light of the high prevalence of physical comorbidities in people with psychotic illness, there is a need to explore modifiable risk factors that may contribute to this disease burden. The benefits of physical activity to both physical and mental health have been well established. We aimed to examine the prevalence and correlates of physical activity in a national sample of adults living with psychotic illness.

Methods

Physical activity was assessed in 1801 people using the International Physical Activity Questionnaire. Participants were dichotomized into low and moderate-high physical activity groups and associations between physical activity and a range of socio-demographic, clinical and physical comorbidity variables were examined using logistic regression.

Results

More than half the participants were categorised in the moderate-high physical activity group with nearly half of the sample engaged in physical activity every day. There were significant associations between low physical activity and; older age, unemployment, educational non-participation, antipsychotic medication use, social dysfunction, self-reported loneliness, and obesity. However,

there was no significant association between physical activity and; sex, psychosis type, illness duration, physical comorbidity, or negative symptoms.

Conclusion

The findings from this study may inform future interventions designed to increase physical activity in people with psychotic illness.

Key words: psychotic illness, physical activity, risk factors

Box

Significant outcomes

- More than half of the people living with psychotic illness are engaged in moderate to high levels of physical activity according to International Physical Activity Questionnaire.
- People with psychotic illness are more likely to be physically active if they are; younger, leaner, employed, enrolled in formal education, and have better levels of social functioning and sense of connection.

Limitations

- Cross sectional studies cannot define causality – some questions may be better answered with longitudinal and experimental studies.
- There was no objective measure of physical activity, and the self-report questionnaire may be vulnerable to overestimation.
- The prevalence survey was based only on individuals in contact with public mental health and community services, thus it may not be representative of those in the private mental health services.

Introduction

There is now a solid body of evidence demonstrating that the majority of the excessive premature mortality in people with psychotic illness is due to preventable physical illness such as cardiovascular diseases and diabetes mellitus (1-5). Within the matrix of factors that influence physical comorbidity (6-8), physical activity (PA) has been recognised as a critical component in daily activity that can improve health outcomes both in the general (9, 10) and psychiatric populations (11-13). In order to

optimise PA in those with psychotic illness, it is important to have an understanding of the socio-demographic and clinical factors that are associated with PA (14-17).

In a comprehensive systematic review of PA correlates in individuals with schizophrenia (14), the most consistent associations were found between low PA and the presence of negative syndrome and cardio-metabolic comorbidity such as metabolic syndrome and obesity. The review also found associations between PA and assorted factors in a small number of studies including physical self-perception, healthy eating habits, and objectively defined measures of social isolation (14).

Moreover, the review identified significant limitations in the existing studies. Almost all of the included studies used either convenience or clinically biased samples (e.g. people with diagnosis of metabolic syndrome, or people on antipsychotic medications). The majority of studies included were based on small to modest sample sizes with only one population based cohort (18, 19), which was from Spain (n=1704). Furthermore, many of the studies relied on poorly validated measures, leading to a recommendation that future research should employ valid and more widely used PA measures. Thus, there is a need for a study of PA in people with psychotic illness that is based on a large population study, using a validated measure of PA.

We have previously explored the association between PA and cardiometabolic health in those with psychotic illness (6, 7, 20). In the current study, we had the opportunity to undertake a more detailed assessment of the prevalence and correlates of PA in this group. In terms of correlates, we hypothesised that; (a) negative symptoms, body mass index (BMI), comorbid physical illness, and social isolation would have significant association with PA; (b) other factors seen in the general population (15) such as age, sex, and social functioning would also have significant impact in our study sample, and; (c) clinical factors such as duration of illness, type of psychotic illness, and the use of antipsychotic medication, would have significant associations with PA in the current sample.

Aim of the study

The aim of the current study is to examine the prevalence and correlates of physical activity in Australian adults living with psychotic illness.

Material and methods

Methods

The 2010 Second Australian National Survey of Psychosis – the Survey of High Impact Psychosis (SHIP) was conducted within seven catchment sites across five Australian states, covering a population of some 1.5 million people aged 18–64 years, approximately 10% of the Australian population in this age range (21). A two-phase design was followed. In Phase 1, screening for psychosis occurred in public specialised inpatient and community mental health services and in non-government organisations supporting people with mental illness in the census month (March 2010). A psychosis screener was used to identify individuals likely to meet criteria for formal diagnosis (21, 22). A total of 7955 people screened positive for psychosis and met eligibility criteria. In Phase 2, 1825 people who were screened positive were randomly selected, stratified by catchment site and age group (18-34 years and 35-64 years), and interviewed.

The current study is based on 1801 participants who provided information on PA. The research protocol for the study was approved by all relevant institutional ethics committees at each catchment site and all participants gave written informed consent.

Assessments

The interview consisted of 32 modules including demographic characteristics, social participation and functioning, physical health and activity, psychopathology, substance use, medication and service utilisation. In addition, each participant had a physical health assessment. The interview was administered by trained interviewers who were mental health professionals.

Diagnostic classification

Diagnostic assessment was based on a semi-structured clinical research interview, the Diagnostic Interview for Psychosis - Diagnostic Module (DIP -DM) (23). The instrument was developed specifically for the first Australian National Low Prevalence (Psychotic) Disorders Study 1997-1998 (22). It uses prompts adapted from the Schedules for Clinical Assessment in Neuropsychiatry (SCAN)

(24) to elicit signs and symptoms, then applies the Operational Criteria Checklist for Psychosis (OPCRIT) (25) algorithm embedded into a software package to generate diagnoses according to several classification systems including the Tenth Revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) (26).

Physical activity

PA was measured using the International Physical Activity Questionnaire short form (IPAQ) (27). Whilst there are some concerns that the IPAQ may overestimate PA levels compared to more objective measurements (28, 29), it remains one of the most widely used research tools in population studies, and its validity has been replicated in people with schizophrenia against an accelerometer measurement (30). The IPAQ is a four item, self-report questionnaire that measures frequency and duration of moderate PA (≥ 4 metabolic equivalent of task (MET)), vigorous PA (≥ 8 MET), walking, and sitting over the preceding seven days (31). PA assessed consisted of activities undertaken for at least ten minutes as part of everyday life including occupational as well as recreational activities.

Previous publications from the SHIP study have utilised PA classification criteria from the National Survey of Mental Health and Wellbeing (32) in order to allow comparability with national survey data (6, 21). However, for the purpose of this study, the IPAQ scoring protocol was used to categorise PA into three levels (low, moderate, or high) (31), then further dichotomized into two groups – low (low IPAQ PA level only) versus moderate-high (moderate and high IPAQ PA levels combined), thus essentially dividing the participants into those who are considered physical active and those who are not.

Correlates

We examined 22 different variables from the SHIP data, in accordance with standard epidemiological practice, some of the variables were changed into categories (supplementary table). The variables were then grouped into three distinct domains (socio-demographic, clinical, physical comorbidity) for analysis.

Socio-demographic domain

Age was divided into five groups (aged 18-24, 25-34, 35-44, 45-54, and 55-64). Country of birth was based on the question "What country were you born in?" Marital status was divided into 1) single, never married; 2) married or de facto, and 3) separated, divorced or widowed. Living arrangement was divided into either living alone or living with others. Current educational participation was determined according to whether the participant had studied in any formal capacity in the four weeks prior to the interview or not. Employment status was determined according to whether or not the participant was in any employment in the four weeks prior to the interview.

Clinical domain

Illness duration was divided into quartiles (duration of 0-6 years, 7 to 12 years, 13 to 20 years, and 21 to 50 years). The type of psychotic illness was determined according to DIP-DM (23) with diagnoses derived using the ICD-10 (26). It was then divided into either non-affective (schizophrenia, delusional disorder and other non-organic psychosis) or affective psychosis (schizoaffective disorder, bipolar disorder and depression with psychosis). Course of illness was assessed and rated by the interviewers capturing the number of episodes of mental illness that a person experiences and the degree of recovery after each episode (23). This was classified into single, episodic, or chronic. Negative symptoms including restricted affect, poverty of speech, and diminished sense of purpose were rated by interviewers using all the information available to them from the interview. Each symptom was rated using a three point scale: none; moderate; or severe. We dichotomised the variable into 'absent' (none) or 'present' (moderate and severe combined). Use of antipsychotic medication for at least the previous four weeks was based on self-report and/or chart review. Current smoking status was determined by self-reported smoking in the four weeks prior to interview. Alcohol use over the previous 12 months was assessed using the Alcohol Use Disorders Identification Test (AUDIT). Using a cut off score of eight or more, we dichotomised the AUDIT score into "low risk" (less than or equal to seven) and "at risk" (scores higher than or equal to eight) (33). Overall social functioning in the previous 12 months was assessed by interviewers, based on responses to questions throughout the interview. A three point scale was used: no dysfunction, obvious dysfunction, or severe dysfunction. Self-reported loneliness in the previous 12 months was rated from none to severe according to agreement with the following statements: "I have plenty of friends, and have not been lonely" (none), "Although I have friends, I have been lonely occasionally"

(mild), “I have some friends but have been lonely for company” (moderate), and “I have felt socially isolated and lonely” (severe).

Physical comorbidity domain

BMI was calculated using the participant’s height and weight, and was categorised according to the World Health Organisation criteria (34) into underweight (less than 18.5), normal (between 18.5 and 24.9), overweight (between 25.0 and 29.9), and obese (more than 30.0). We combined the underweight and normal categories together for our analysis. Abdominal obesity was defined using the International Diabetes Federation recommended cut points for waist circumference for European and non-Europeans as a waist circumference of at least 94 cm in men or 80 cm in women (35). Lifetime presence of physical illnesses including diabetes mellitus, cardiovascular disease, arthritis, anaemia, respiratory problems or chronic back, neck or other pain was based on self-report.

Data analysis

Descriptive statistics were used to summarize the key characteristics of PA. For the correlate analysis, we examined the association between PA “low”/“moderate-high” groups and candidate correlates using logistic regression. Odds ratios with 95% confidence intervals (CI) were used to estimate the likelihood of participants being in the “moderate-high” group with adjustment for age and sex (Model 1). In Model 2, we also adjusted for all the other dependent variables within the domain. Analyses were conducted with Statistical Analysis System (version 9.4; SAS Institute, Cary, NC, USA) using weightings in order to adjust for age and site-related oversampling.

Results

Physical activity characteristics

Data analysed in the current paper are from SHIP participants who completed the IPAQ as part of the survey (n=1801, 98.7%). Almost half (n = 856, 47.5%) the participants were classified in the low PA level with 685 participants (38.0%) in the moderate PA level and only 260 participants (14.4%) in the high PA level. When dichotomised, 47.5% were in the low PA group, and 52.5% were in the moderate-high PA group.

When we examined the level of engagement in any type of PA, nearly half of the sample (48.1%) had engaged in some kind of PA every day in the past seven days. At the same time, a substantial minority (12.3%) of the sample had not engaged in any form of PA whatsoever. With respect to the frequency and duration of different types of PA, nearly half (48.2%) of the sample reported walking as PA in at least five out of the past seven days. However, a majority of the sample reported *not* engaging in any PA of moderate or vigorous intensity type (69.0%, 79.6% respectively). In terms of duration of PA per session for different types of PA, we found that the median (and inter-quartile range) time participants were engaged in walking per session was 30 (15–60) minutes while the median (inter-quartile range) duration spent sitting on a weekday was 360 (240–480) minutes.

Correlates of physical activity

Table 1 presents the candidate correlates of PA in the socio-demographic domain. Age, employment status, and current educational participation showed significant association with PA. There was a linear trend between PA and age, with the oldest age group (age 55–64) being the group least likely to be physically active compared to the youngest age group (aged 18–24). Being employed in the past four weeks was significantly associated with greater PA. Likewise, being enrolled to study in the past 4 weeks was significantly associated with greater PA. None of the other variables in this domain (sex, country of birth, marital status, and living arrangements) were associated with PA.

(INSERT TABLES 1, 2 and 3 ABOUT HERE)

Table 2 shows the candidate correlates of PA in the clinical domain. Antipsychotic medication use in general was associated with lower PA, although the association was not significant for participants who were on clozapine compared to those who were not. Compared to those with no dysfunction, having severe social dysfunction was associated with lower PA. Likewise, compared to those reporting not feeling lonely, endorsing a severe level of loneliness was associated with lower PA. None of the other variables in the clinical domain (illness duration, psychosis type, course of illness, restricted affect, poverty of speech, diminished sense of purpose, smoking status, and alcohol use status) were associated with PA.

Table 3 presents the correlates of PA in the physical comorbidity domain. Both BMI and abdominal obesity showed significant association with PA. Compared to those in the normal/underweight BMI group, participants in the obese group were significantly less likely to be physically active. However, the association was not significant in the overweight group. Presence of abdominal obesity also showed a similar relationship with lower PA. In contrast, reported history of comorbid physical illness was not associated with PA.

Discussion

Based on a nationally representative sample of over 1800 individuals, we found that 52.5% of the participants reported engaging in at least moderate *level* of PA. Of note, 48.1% of the participants reported engaging in some kind of PA every day of the previous week. Whilst few participants reported engaging in either moderate or vigorous *intensity* PA, nearly half (48.2%) reported walking for at least ten minutes, at least five days of the week. This preference for walking over more strenuous types of PA is consistent with previous findings in smaller studies (36, 37). In the general population, the effect of sedentary behaviours such as sitting is gaining research attention as a key risk factor for poor physical health (38). There are few studies that have explored this issue in people with psychotic illness (39). In our study, participants spent on average six hours a day, almost half their waking hours, sitting. This finding is consistent with a recent outpatient-based study in people with schizophrenia (40).

Correlates of physical activity in people with psychotic illness

Consistent with our hypotheses, we found that social isolation, poor social functioning, older age, higher BMI, and antipsychotic medication use were significantly associated with PA in people with psychotic illness.

Loneliness is prevalent across people with psychotic illness (41), and has been associated with lower PA in the general population (42). In previous studies related to PA in people with schizophrenia, social isolation has been assessed using reported social contact in the past month (37), or in relation to the level of social support that participants received (36). Our survey assessed social isolation

using self-reported loneliness, and found it to be also associated with lower PA. Interestingly, living arrangement (living alone versus living with others) was not associated with PA, further suggesting the relevance of *subjective* social connectedness in terms of social isolation. In addition, interviewer-rated overall social functioning showed a linear trend with PA, with more severe social dysfunction significantly associated with lower PA. Furthermore, we found that participants who were employed and participants who were enrolled in formal education were nearly 1.5 times *more* likely to be physically active than those who were unemployed or not enrolled in formal education. Speculatively, employment and educational participation may offer opportunities for people with psychotic illness to connect socially and enhance social functioning (43). These activities may also reduce sedentary behaviours in people with psychotic illness.

Age was another correlate that showed a linear relationship, with the older age groups showing lower PA compared to the youngest group. This is largely consistent with the evidence from the general population (15). This finding suggests a need to tailor different types of PA interventions to different age groups. In terms of BMI, participants in the obese group showed a statistically significant association with lower PA compared to those in the underweight/normal group. Being overweight, as opposed to obese, did not show any statistically significant association with PA. Nevertheless, BMI remains an important correlate as nearly half (46.4%) the sample were obese. Likewise, the presence of abdominal obesity was associated with lower PA. Finally, we found an association between lower PA and being on any antipsychotic medication, but not with current clozapine use. This may represent a greater level of functionality in those who were not on any antipsychotic medications rather than the effect of the psychotropic medications *per se*.

In contrast to our prior hypotheses, we did not find any significant association between PA and comorbid physical illness, negative symptoms, sex, duration of illness, or psychosis type. In particular, we found that none of the three different clinical measures of negative syndrome, nor the presence of comorbid physical illness, were associated with lower PA. Even though further studies are needed to explore these relationships, the null findings in our study may be encouraging as they indicate that these factors, many of which are unmodifiable and have traditionally been associated with poor engagement with PA, may not impede interventions to increase PA.

Despite finding that more than half of the people with psychotic illness are engaged in a reasonable amount of PA, this 'dose' may not be sufficient in light of the burden of comorbidity and shortened life expectancy in this group (1, 4). We found that nearly half of the people with psychotic illness reported engaging in walking at least five days a week. As such, attempting to modify the intensity of walking slightly to the moderate PA intensity may be a more achievable, and effective, intervention strategy than to target those who engage in little PA. Our findings also suggest that optimizing employment and educational participation in people with psychotic illness (44) may have positive down-stream consequences for PA.

Strengths and Limitations

A major strength of the current study was that we were able to examine PA of a large, nationally-representative sample of people with psychotic illness with a validated instrument. However, several limitations are notable and the interpretation of our findings requires caution. The survey design did not include a control population thus we cannot make inferences about how individual with psychotic illness differ from the general population in Australia. Moreover, as the study was conducted in Australia, the findings may not be globally generalizable. The cross-sectional nature of the data prevented us from making any inferences about the causation between PA and the examined variables. In addition, even though the SHIP sample is representative of people receiving support from public mental health services and non-government organisations, it may not be representative of those in the private mental health services or those who have dropped out of treatment altogether. Finally, another limitation is the use of IPAQ to measure PA levels. Even though it is both practical and feasible in population studies, the IPAQ is a subjective assessment tool that may be vulnerable to recall bias, potentially resulting in overestimation of PA and compromised validity (30). Furthermore, it should be noted that while dichotomizing the PA variable reduces the burden of multiple comparisons (and resultant Type I error), it may also have underestimated and overestimated the benefit of PA in the participants in the original high and moderate PA groups respectively. Even though keeping the original three PA groups would have allowed the analysis to be more detailed, we felt that the results would be more precise and have more practical relevance if we divided the participants into those who are considered to be physically active and those who are not.

In conclusion, our study reports correlates that may inform future interventions designed to increase PA in people with psychotic illness. Addressing social connectedness and increasing work force/educational participation as well as programmes to increase the intensity of walking may encourage sustainable increases in PA, which in turn is likely to improve the physical health of people living with psychotic illness.

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Table 1: Association between physical activity level and socio-demographic factors

Variable	Category	N (%) ¹	Model 1 ² Odds Ratio ⁴ (95% CI ⁵)	Model 2 ³ Odds Ratio (95% CI)
Age (years)	18-24	199 (11.1)	Reference	Reference
	25-34	560 (31.1)	0.79 (0.56, 1.12)	0.81 (0.57, 1.17)
	35-44	490 (27.2)	0.59 (0.41, 0.83)	0.59 (0.41, 0.87)
	45-54	384 (21.3)	0.48 (0.33, 0.69)	0.46 (0.31, 0.69)
	55-64	168 (9.3)	0.41 (0.26, 0.63)	0.40 (0.25, 0.65)
Sex	Female	729 (40.5)	Reference	Reference
	Male	1072 (59.5)	1.06 (0.86, 1.30)	1.09 (0.88, 1.35)
Country of birth	Australia	1479 (82.1)	Reference	Reference
	Not Australia	322 (17.9)	1.17 (0.90, 1.51)	1.10 (0.84, 1.43)
Marital status	Single, never married	1100 (61.1)	Reference	Reference
	Married or de facto	311 (17.3)	0.95 (0.72, 1.26)	0.90 (0.67, 1.21)
	Separated, divorced, widowed	390 (21.7)	1.22 (0.92, 1.60)	1.18 (0.89, 1.57)
Living arrangement	Lives alone	557 (31.6)	Reference	Reference
	Lives with others	1204 (68.4)	0.97 (0.78, 1.21)	1.01 (0.81, 1.27)
Current education participation	Not enrolled to study in the past 4 weeks	1603 (89.3)	Reference	Reference
	Enrolled to study in the	193 (10.8)	1.58 (1.13, 2.21)	1.50 (1.07, 2.11)

Employment status	past 4 weeks			
	No employment in the	1401 (77.8)	Reference	Reference
	past 4 weeks			
	Any employment in the	400 (22.2)	1.47 (1.15, 1.88)	1.46 (1.14, 1.87)
	past 4 weeks			

¹Totals may vary due to missing variables.

²Model 1 = adjusted for age and sex; ³Model 2 = adjusted for age and sex as well as all the other variables within the table; ⁴used to estimate the likelihood of participants being in the “moderate-high” group; ⁵CI = confidence interval.

*Significant results shown in **bold**.

Table 2: Association between physical activity level and clinical factors

Variable	Category	N (%) ¹	Model 1 ²	Model 2 ³
			Odds Ratio ⁴ (95%CI ⁵)	Odds Ratio (95% CI)
Illness duration	0 to 6 years	437 (24.5)	Reference	Reference
	7 to 12 years	453 (25.4)	1.08 (0.80, 1.46)	1.20 (0.86, 1.68)
	13 to 20 years	434 (24.4)	1.07 (0.78, 1.47)	1.17 (0.82, 1.68)
	21 to 50 years	458 (25.7)	1.03 (0.73, 1.47)	1.22 (0.83, 1.82)
Psychosis type	Non - Affective	936 (57.7)	Reference	Reference
	psychosis			
	Affective psychosis	685 (42.3)	1.02 (0.82, 1.27)	0.95 (0.74, 1.21)
Course of illness	Single	144 (8.0)	Reference	Reference

	Episodic	1108 (61.5)	1.07 (0.73, 1.56)	1.37 (0.83, 2.25)
	Chronic	549 (30.5)	0.72 (0.48, 1.07)	1.01 (0.59, 1.72)
Restricted affect	Absent	1014 (56.3)	<i>Reference</i>	<i>Reference</i>
	Present	787 (43.7)	0.94 (0.77, 1.15)	1.13 (0.88, 1.45)
Poverty of speech	Absent	1461 (81.1)	<i>Reference</i>	<i>Reference</i>
	Present	340 (18.9)	0.86 (0.67, 1.12)	0.95 (0.69, 1.30)
Diminished sense of purpose	Absent	863 (47.9)	<i>Reference</i>	<i>Reference</i>
	Present	938 (52.1)	0.65 (0.53, 0.80)	0.82 (0.64, 1.07)
Clozapine use	No	1505 (83.6)	<i>Reference</i>	<i>Reference</i>
	Yes	296 (16.4)	0.81 (0.62, 1.06)	0.76 (0.56, 1.04)
Any antipsychotic use	No	330 (18.3)	<i>Reference</i>	<i>Reference</i>
	Yes	1471 (81.7)	0.68 (0.52, 0.88)	0.72 (0.52, 0.99)
Smoking status^a	Non-smoker	598 (33.5)	<i>Reference</i>	<i>Reference</i>
	Smoker	1190 (66.6)	0.78 (0.63, 0.97)	0.79 (0.62, 1.01)
Alcohol use status^b	Low risk	1225 (68.0)	<i>Reference</i>	<i>Reference</i>
	At risk	576 (32.0)	1.00 (0.81, 1.25)	0.96 (0.75, 1.24)
Overall social functioning	No dysfunction	660 (36.7)	<i>Reference</i>	<i>Reference</i>
	Obvious dysfunction	777 (43.2)	0.58 (0.46, 0.72)	0.72 (0.55, 0.94)
	Severe dysfunction	363 (20.2)	0.51 (0.39, 0.68)	0.68 (0.47, 0.98)
Self-reported loneliness	None	351 (20.0)	<i>Reference</i>	<i>Reference</i>

Mild	568 (32.3)	0.88 (0.66, 1.18)	0.87 (0.64, 1.19)
Moderate	436 (24.8)	0.73 (0.54, 0.99)	0.83 (0.59, 1.15)
Severe	403 (22.9)	0.55 (0.40, 0.75)	0.67 (0.47, 0.97)

¹Totals may vary due to missing variables.

²Model 1 = adjusted for age and sex; ³Model 2 = adjusted for age and sex as well as all the other variables within the table; ⁴used to estimate the likelihood of participants being in the “moderate-high” group; ⁵CI = confidence interval.

*Significant results shown in **bold**.

^aSmoking status indicates current smoking status as per participants’ self-report.

^bAlcohol use status was assessed using the Alcohol Use Disorders Identification Test.

Table 3: Association between physical activity level and physical comorbidity factors

Variable	Category	N (%) ¹	Model 1 ²	Model 2 ³
			Odds Ratio ⁴ (95% CI ⁵)	Odds Ratio (95% CI)
Body mass index (BMI)	Normal or underweight (BMI < 25.0)	433 (24.7)	<i>Reference</i>	<i>Reference</i>
	Overweight (BMI 25.0-29.9)	506 (28.9)	0.88 (0.66, 1.16)	0.97 (0.71, 1.33)
	Obese (BMI > 29.9)	814 (46.4)	0.57 (0.44, 0.74)	0.66 (0.48, 0.90)
Abdominal obesity	Absent	311 (17.8)	<i>Reference</i>	<i>Reference</i>

	Present	1432 (82.2)	0.57 (0.43, 0.76)	0.68 (0.48, 0.97)
History of comorbid physical illness^a	No	684 (38.8)	<i>Reference</i>	<i>Reference</i>
	Yes	1080 (61.2)	0.90 (0.72, 1.11)	0.93 (0.75, 1.16)

¹Totals may vary due to missing variables.

²Model 1 = adjusted for age and sex; ³Model 2 = adjusted for age and sex as well as all the other variables within the table; ⁴used to estimate the likelihood of participants being in the “moderate-high” group; ⁵CI = confidence interval.

*Significant results shown in **bold**.

^aDiabetes mellitus, cardiovascular disease, arthritis, anaemia, respiratory problems or chronic back, neck or other pain.

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