Research Article

Self-Reported Nutrition and Physical Activity Program Utilisation among Australians with Psychosis: A Cross-Sectional Analysis of Data

Doreen Mucheru[1*], Mary-Claire Hanlon[1,2], Linda E. Campbell[2,3], Mark McEvoy[1,4], Lesley MacDonald-Wicks[1,5]

[1]Faculty Health and Medicine, The University of Newcastle, Australia

[2]Brain and Mental Health Program, Hunter Medical Research Institute, Australia

[3]Faculty of Science, The University of Newcastle, Australia

[4]Centre for Clinical Epidemiology & Biostatistics, Hunter Medical Research Institute, Australia

[5]Priority Research Centre for Physical Activity and Nutrition, The University of Newcastle, Australia

[*]**Corresponding author:** Doreen Mucheru, Faculty of Health and Medicine, The University of Newcastle, Callaghan NSW 2308, Australia. Tel: +61-249854928; Email: Doreen.Mucheru@uon.edu.au

Abstract

Objective: To describe the self-reported attendance of community nutrition and physical activity programs in the government and non-government sector among 1825 people from the Survey of High Impact Psychosis (SHIP), and identify demographics associated with overall self-reported program attendance. Additionally, to assess whether improved nutrition and physical activity outcomes were associated with program attendance.

Methods: In this cross-sectional analysis of data from SHIP, descriptive statistics were generated and tests-of-association applied between program attendance, and demographics, nutrition and physical activity outcomes.

Results: Just 11.6% attended a nutrition or physical activity program. Overall attendance was associated with highest education qualifications attained (p=0.004) and diagnosed disorder (p=0.022). Non-government sector attendees were more likely to consume reduced fat milk (p=0.010), and less likely to run out of food (p=0.007).

Conclusions: There is extremely low utilisation of community nutrition and physical activity programs in Australians with psychosis which is associated with certain demographics that may act as barriers. Program attendance did not show consistent association with improved nutrition or physical activity outcomes.

Implications for public health: Nutrition and physical activity program utilisation should be encouraged in people with psychosis by addressing problems related to access. These programs should be evaluated locally to ensure usefulness.

Introduction

People living with psychosis report extremely poor nutrition and physical activity outcomes [1]. Dietary choices made by those in this group often comprise of high-fat-low-fibre foods and fewer fruits and vegetables [1,2]. They are also less likely to meet physical activity targets than the general population, and primarily engage in physical activity through light walking [3]. Poor nutrition and low physical activity are likely to coexist in people with psychosis, and show the greatest propensity of co-occurrence compared to other lifestyle risk factors [4,5].

High rates of physical illness seen in this group, are largely linked to nutrition and physical activity patterns that do not adhere to recommended guidelines [6]. Overweight, obesity, dyslipidaemia, hypertension, type 2 diabetes, metabolic syndrome and Cardiovascular Disease (CVD) are some of the resulting conditions [6]. Over one-quarter (26.8%) of participants from the Survey of High Impact Psychosis (SHIP) aged 18-64 years

reported having a cardiovascular condition and half (53.5%) had metabolic syndrome [1]. In the Australian general population, 22% of those ≥18 years reported having some form of CVD in the 2014-15 National Health Survey, and 31% of those from the AusDiab study met criteria for metabolic syndrome [7,8]. Physical health differences between people with psychosis and the Australian general population are likely to be greater than those reflected here; this is because physical health findings from the Australian general population also include those of persons ≥65 years, and they show increased susceptibility to CVD and metabolic syndrome [7,8]. Health promotion programs therefore need to target nutrition and physical activity in a way specific to those living with psychosis, so that they are empowered to have more control over their health [6,9]. Provision and utilisation of health promotion services in the community setting is crucial to ensure this [10].

Health programs available for Australians with psychosis are provided via the government and non-government sectors; targeted behaviours include nutrition and physical activity [10]. These programs are generally described as community-based or community programs to indicate that they are for those who are not inpatients [11,12].

Raudino et al. [10] described general service utilisation patterns among Australians with psychosis, however, specific emphasis on community nutrition and physical activity programs was outside the scope of this study. Overall, study findings highlighted increased use of outpatient or community services in the past decade; those accessing programs of any kind were 1.5 times more likely to live alone and 40% more likely to report unemployment [10].

Community nutrition and physical activity programs have the potential to achieve outcomes comparable to those cited in research studies assessing efficacy of nutrition and physical activity programs in people with psychosis [13]. Results from randomised controlled studies in this field highlight significant decreases in weight (4 kg) and body-mass-index (3 points) [13]. Research and evaluation of community programs would then provide a basis for exploration of factors associated with program use in people with psychosis, as they face various challenges relating to their health, employment, income, housing and social interactions [1,10,14].

Furthermore, outcomes associated with utilising community nutrition and physical activity programs ought to be identified specifically for those with psychosis, as this will clarify the kind of outcomes that can be anticipated [15]. These findings would be useful for both service users and providers, allowing for service advocacy where there is associated participant benefit, and also providing incentive for service evaluation where participant benefits are not detected [16].

Our study aimed to describe the self-reported attendance of community nutrition and physical activity programs in the government and non-government sector among 1825 people from the Survey of High Impact Psychosis (SHIP), and identify demographics associated with overall self-reported program attendance. Additionally, we aimed to assess whether improved nutrition and physical activity outcomes were associated with program attendance.

Methods

This study is a cross-sectional analysis of data from the Survey of High Impact Psychosis conducted by Morgan, et al. [1] in 2010.

Survey of High Impact Psychosis (SHIP)

SHIP was implemented across seven mental health service sites within five Australian states. The sites covered about 62,000 km² and 1,464,923 people aged 18-64 years. Survey inclusion criteria were, participant age between 18 and 64 years, residing in a catchment site, and contact with designated mental health services. SHIP excluded all who resided in a nursing home or prison, or those unable to sufficiently communicate in English to answer the questions. Although SHIP was a survey, an interview format was applied with participants.

The survey employed a two-phase design. Phase 1 involved a census of those in contact with designated mental health services in the government and non-government sectors. During this phase, a psychosis screener was used to identify psychosis-positive adults. Subsequent random selection of participants from the phase 1 census led to phase 2 of the study. In phase 2, participants were stratified by age to ensure adequate coverage of all age-groups who took part in diagnostic interviews, fasting blood checks, physical examinations and cognitive functioning assessments. Investigations were conducted by trained mental health professionals. Procedures applied in this survey ensured that all participants met screening criteria for psychosis. The final sample from SHIP comprised a total of 1825 participants who were interviewed. The complete summary of methods from SHIP has been published by Morgan, et al. [1].

Ethics

Ethics approval was provided for all sites by relevant local authorities; for the lead site and most others, ethics approval was granted by the Human Research Ethics Committee in 2009 (Reference Number: RA/4/1/2478). The Declaration of Helsinki was adhered to during research and written and informed consent was provided by all taking part in the study.

Data

Access to data is restricted to those who have permission from the SHIP study group. For initial inquiries regarding access please contact Dr. Mary-Claire Hanlon (Mary-Claire.Hanlon@uon.edu.au).

Study Measures

Demographics

Demographic variables examined in this analysis include, sex (male/female), age in years, Aboriginal or Torres Strait Islander descent (yes/no), current marital status (single or never married/ married or de facto/separated or divorced/widowed/NK: Not Known), highest education qualification (left school with no qualifications/secondary school qualification or leaving certificate/tertiary certificate/bachelor's degree/postgraduate qualifications/other/NK), income per fortnight (AU$300 or less/AU$300-AU$499/AU$500-AU$799/AU$800-AU$1000/AU$1000 or more/NK) and participation in paid employment in the last 12 months (employed in any job in last 12 months/home duties or caring or retired or volunteer or unpaid or student/no formal activity [includes unemployed]/NK).

Diagnosis

Diagnoses were made using the Diagnostic Module of the Diagnostic Interview for Psychosis (DIP-DM), a semi-structured clinical interview [1]. The clinical interview has good inter-rater reliability shown by a 0.80-1.00 pairwise agreement ratio for most items, and excellent diagnostic validity (9/10 agreement with Schedules for Clinical Assessment in Neuropsychiatry [SCAN]) [17]. DIP-DM was used by trained mental health professionals to obtain participant scores based on the different symptoms of illness [1]. These scores were imputed to a computer algorithm using the Operational Criteria for Psychosis (OPCRIT) to produce an ICD-10 diagnosis [18]. This procedure decreased the likelihood of subjective bias during the diagnostic process [18].

Nutrition

Retrospective measures of dietary intake from Short Diet Questions (SDQs) used in the 1995 National Nutrition Survey (NNS) were used to assess overall nutrition in this group. Questions assessing dietary intake covered 7 main aspects-meal events per day, breakfast consumption, milk consumption, vegetable intake, fruit intake, addition of salt to food and food security. All questions assessed responses for the 4-week period preceding the interview, except for food security which covered the 12-month period prior to the event. Where appropriate, response categories for the questions were merged for the purpose of analysis in the present study. Meal events measured the number of eating occasions in a day, and was collapsed from a continuous variable into a categorical variable with 4 response options (0-2 meal events/3-4 meal events /≥5 meal events/NK). Breakfast consumption assessed the number of days in a week participants normally engaged in this meal. Number of days breakfast was consumed was also collapsed from 9 response options to 3 (<4 per week/≥ 4 per week/NK). Type of milk normally consumed was the third element measured, and responses were collapsed into 5 categories from the initial 7 (does not drink milk/full cream milk/low or reduced fat or skim milk/soy or evaporated or sweetened condensed or other type of milk/NK). Intake of fruits and vegetables was assessed using 2 separate questionnaire items that asked about the usual number of serves consumed in a day. Standard serve sizes were described to participants by interviewers. Responses previously included 5 response categories which were merged into 4 for both the questions (0-1 serves/2-3 serves/4-6 serves/NK). Frequency of adding salt to cooked food was measured for the predefined period preceding the interview based on 5 options (never/rarely/sometimes/usually/NK). Finally, participants were asked whether there had been any instances during the previous 12 months when they had run out of food and could not afford to buy more (no/yes/NK).

Validity of the SDQs against 24-hour recall data indicate that questions on number of meal events and usual fruit and vegetable intake show validity that is fair, whereas validity on the assessment of breakfast consumption is poor [19]. Questions on type of milk and running out of food display good validity [19]. Validity agreement statistics were unfortunately not provided for these assessments [19].

Physical Activity

The International Physical Activity Questionnaire (IPAQ) was used to give a retrospective self-reported measure of time spent engaging in walking, moderate and vigorous activity in the 7 days prior to the interview. Moderate activities were described as requiring moderate physical effort, resulting in breathing that is somewhat harder than usual. Vigorous activities were described as requiring hard physical effort, resulting in harder than usual breathing. Moderate and vigorous activity were also described through a wide range of familiar activities that would fall into each of these two categories. Time spent engaging in any of these activities had to be at least 10 minutes in duration, and the Not Known (NK) response option was also provided. Reliability of the IPAQ in people with schizophrenia shows a correlation coefficient of 0.68 based on test-retest while criterion validity of the tool shows a correlation coefficient of 0.37 when assessed against a motion detector; both these measures are similar to that of the general population [20].

Community Rehabilitation/ Day Therapy Program Participation

SHIP participants were asked whether they had been involved in any form of community rehabilitation or day program therapy when not under hospital admission, during the 12-month period preceding interview (yes/no/NK). All participants who did not attend community rehabilitation or day therapy were marked as not applicable (NA) for prospective sections.

Participants who responded positively to attending day therapy or community rehabilitation were then asked to define this attendance based on four locations (public hospital/private hospital/ government funded community-based centre/non-government funded community-based centre). Content of programs attended in these sectors was ascertained; all programs with a focus on nutrition and physical activity were identified. Attendance at a nutrition and physical activity program was categorised for the government sector and hospitals (no/yes/NK/NA), and non-government sector (no/yes/NK/NA). Participants were then asked to specify the total duration of the program they attended in weeks, whether they completed the program (no/still on/yes/NK/NA) and if they found it of benefit (no/some/a lot/NK/NA).

Statistical Analysis

Analyses were conducted using the Statistical Package for the Social Sciences version 24 (SPSS). Descriptive statistics were run for all study variables-sex, age, Aboriginal or Torres Strait Islander descent, marital status, highest qualification, income per fortnight, participation in paid employment, diagnosis, meal events per day, breakfast consumption, milk consumption, vegetable intake, fruit intake, addition of salt to food, running out of food, walking, moderate activity, vigorous activity, attendance of community rehabilitation or day program therapy, location of community rehabilitation or day program therapy, participation in nutrition and physical activity program, program duration, completion and perceived benefit. Categorical variables were described using frequencies, and continuous variables were described using means and standard deviations. Demographic descriptive statistics were split by overall attendance of nutrition and physical activity programs. Association between demographics and attendance at a nutrition and physical activity program was assessed using chi-squared tests or independent sample t-tests depending on the suitability. In addition, chi-squared tests and Mann-Whitney U tests were conducted to highlight any associations between participation in nutrition and physical activity programs (in the government sector and hospitals, and non-government sector) and nutrition and physical activity outcomes. The specific test of association used for each group of variables was selected based on adherence to test assumptions. A p value of <0.05 was used to detect significance in all analyses.

Results

The mean age of participants was 38.4 (11.2) years and 59.6% were males. Only 4.9% of those who took part in the study identified as Aboriginal/ Torres Strait Islander descent. Most (61.2%) were single or never married. About one third (33.7%) left school without any qualifications while 40.5% reported having a tertiary qualification. Many (59.2%) had a fortnightly income between $500 and $799 while 53.2% did not participate in employment or any another formal activity in the 12 months preceding the interview. About half (47.0%) of the sample had a diagnosis of schizophrenia while 16.1% and 17.5% were affected by schizoaffective disorder and bipolar mania respectively.

Overall attendance of community rehabilitation or day therapy was 36.5%. Just 3.3% of the sample attended a community rehabilitation or day therapy program in a public hospital while only 0.3% took part in a similar type of program in the private hospital. Further, 11.2% participated in a community rehabilitation or day therapy program in a government funded community-based center whilst 25.4% attended the same type of program in a non-government funded community-based center. Participation in nutrition and physical activity programs in the government sector and hospitals was 5.3% while participation in the same kind of program within the non-government sector was 8.7%. Attendance of nutrition and physical activity programs was associated with the highest education qualifications attained (χ^2=17.394, df= 5, p=0.004) and participant diagnosis (χ^2=14.824, df=6, p=0.022). Those attending community nutrition and physical activity programs were less likely to have left school without qualifications (25.5% vs 40.9%) and more likely to have secondary school qualifications (21.7% vs 15.3%) or tertiary qualifications (44.3% vs 35.0%) than those not attending programs. They were also more likely to have schizophrenia (52.4% vs 46.4%) or delusional disorders and other non-organic psychosis (8.0% vs 4.5%) and less likely to have severe depression disorder (6.6% vs 11.8%) than those not attending programs (Table 1).

		Total Sample N = 1825 (N %) or M (SD)	Attended Nutrition and Physical Activity Program in any Sector n = 212 (n %) or M (SD)	Did not Attend Nutrition and Physical Activity Program any Sector n = 509 (n %) or M (SD)	Test
Sex	Male	1087 (59.6%)	129 (60.8%)	298 (58.5%)	X^2= 0.329, df= 1, p = 0.566
	Female	738 (40.4%)	83 (39.2%)	211 (41.5%)	
Age		38.4 (11.2)	40.0 (11.2)	38.6 (11.1)	t=-1.590, df=719, p=0.693
Aboriginal/ Torres Strait Islander descent	No	1735 (95.1%)	202 (95.3%)	479 (94.1%)	X^2= 0.396, df= 1, p = 0.529
	Yes	90 (4.9%)	10 (4.7%)	30 (5.9%)	
Marital status	Single/ Never Married	1117 (61.2%)	137 (64.6%)	341 (67.0%)	X^2= 2.527, df= 3, p = 0.470
	Married/ De facto	312 (17.1%)	22 (10.4%)	57 (11.2%)	
	Separated/ Divorced	376 (20.6%)	46 (21.7%)	103 (20.2%)	
	Widowed	20 (1.1%)	7 (3.3%)	8 (1.6%)	
Highest education qualification attained	Left school with no qualifications	615 (33.7%)	54 (25.5%)	208 (40.9%)	X^2=17.394, df= 5, **p = 0.004
	Secondary school qualifications	304 (16.7%)	46 (21.7%)	78 (15.3%)	
	Tertiary Qualifications	739 (40.5%)	94 (44.3%)	178 (35.0%)	
	Bachelor degree	92 (5.0 %)	10 (4.7%)	22 (4.3%)	
	Postgraduate qualifications	28 (1.5%)	3 (1.4%)	9 (1.8%)	
	Other	32 (1.8%)	3 (1.4%)	11 (2.2%)	
	Not known	15 (0.8%)	2 (0.9%)	2 (0.4%)	

Current net fortnightly income	Less than $300 per fortnight	58 (3.2%)	8 (3.8%)	10 (2.0%)	
	Between $300 - $499 per fortnight	209 (11.5%)	16 (7.5%)	47 (9.2%)	
	Between $500 - $799 per fortnight	1080 (59.2%)	139 (65.6%)	321 (63.1%)	X^2= 2.618, df= 4, p = 0.624
	Between $800 - $1000 per fortnight	232 (12.7%)	29 (13.7%)	71 (13.9%)	
	More than $1000 per fortnight	139 (7.6%)	9 (4.2%)	18 (3.5%)	
	Not known	107 (5.9%)	11 (5.2%)	42 (8.3%)	
Participation in paid employment	Employed in any job in last 12 months	596 (32.7%)	46 (21.7%)	134 (26.3%)	
	Home duties/ caring/ retired/ volunteer/ unpaid/ student	258 (14.1%)	30 (14.2%)	73 (14.3%)	X^2= 1.860, df= 2, p = 0.395
	No formal activity (includes unemployed)	971 (53.2%)	136 (64.2%)	302 (59.3%)	
DIP ICD-10 diagnosis	Schizophrenia	857 (47.0%)	111 (52.4%)	236 (46.4%)	
	Schizoaffective	293 (16.1%)	33 (15.6%)	74 (14.5%)	
	Bipolar, mania	319 (17.5%)	31 (14.6%)	76 (14.9%)	
	Depressive psychosis	81 (4.4%)	5 (2.4%)	26 (5.1%)	X^2=14.824, df= 6, *p = 0.022
	Delusional disorders and other non-organic psychosis	92 (5.0%)	17 (8.0%)	23 (4.5%)	
	Severe depression disorder	158 (8.7%)	14 (6.6%)	60 (11.8%)	
	Screen-positive for psychosis but did not meet full criteria for ICD-10 psychosis	25 (1.4%)	1 (0.5%)	14 (2.8%)	

Participation in any community rehabilitation or day therapy program (last 12 months)	No	1133 (62.1%)	1 (0.5%)	58 (11.4%)	
	Yes	666 (36.5%)	211 (99.5%)	447 (87.8%)	NA
	Not known	26 (1.4%)	-	4 (0.8%)	
Location of community rehabilitation or day therapy program (last 12 months)	**Public hospital**				
	No	605 (33.2%)	189 (89.2%)	408 (80.2%)	
	Yes	60 (3.3%)	21 (9.9%)	39 (7.7%)	
	Not known	27 (1.5%)	1 (0.5%)	4 (0.8%)	NA
	Not applicable	1133 (62.1%)	1 (0.5%)	58 (11.4%)	
	Private hospital				
	No	659 (36.1%)	210 (99.1%)	441 (86.6%)	
	Yes	6 (0.3%)	-	6 (1.2%)	
	Not known	27 (1.5%)	1 (0.5%)	4 (0.8%)	NA
	Not applicable	1133 (62.1%)	1 (0.5%)	58 (11.4%)	
	Government funded community-based centre				
	No	460 (25.2%)	152 (71.7%)	301 (59.1%)	
	Yes	205 (11.2%)	58 (27.4%)	146 (28.7%)	
	Not known	27 (1.5%)	1 (0.5%)	4 (0.8%)	NA
	Not applicable	1133 (62.1%)	1 (0.5%)	58 (11.4%)	
	Non-government funded community-based centre				
	No	203 (11.1%)	67 (31.6%)	135 (26.5%)	
	Yes	464 (25.4%)	143 (67.5%)	314 (61.7%)	
	Not known	25 (1.4%)	1 (0.5%)	2 (0.4%)	NA
	Not applicable	1133 (62.1%)	1 (0.5%)	58 (11.4%)	

Participation in Nutrition and Physical Activity Program	**Government sector and hospitals**	No	170 (9.3%)	-	-	NA
		Yes	97 (5.3%)	-	-	
		Not known	23 (1.3%)	-	-	
		Not applicable	1535 (84.1%)	-	-	
	Non-government sector	No	379 (20.8%)	-	-	NA
		Yes	159 (8.7%)	-	-	
		Not known	29 (1.6%)	-	-	
		Not applicable	1258 (68.9%)	-	-	

M (SD): Mean (Standard Deviation); ICD: International Statistical Classification of Diseases and Related Health Problems; X^2: Chi Square test; t: Independent Sample T test; *p<0.05; **p<0.01; ***p<0.001; NA: Not Applicable.

Table 1: Demographic Characteristics of Participants from the Survey of High Impact Psychosis by Attendance at a Nutrition and Physical Activity Program.

Almost half (45.3%) the participants reported engaging in 3-4 meal events in a day while 51.5% reported consuming breakfast on 4 or more days in a week. A greater proportion (55.8%) of the sample consumed full cream milk. Almost three quarters (71.1%) and 48.1% of participants reported consuming 0-1 serves of fruits and vegetables a day respectively. Over one third (35.6%) of those who took part in the study never added salt to cooked food. Over one-quarter (28.4%) reported running out of food and not being able to buy more. The average time participants spent walking was 214.8 (334.7) minutes per week. The mean time spent in moderate and vigorous activity was 76 (241.0) and 55.6 (193.8) minutes per week respectively.

There was no association between attendance of nutrition and physical activity programs, either in the government sector and hospitals or in the non-government sector with meal frequency, breakfast consumption, fruit and vegetable consumption, and addition of salt to food. However, attendance of programs in the non-government sector and milk consumption displayed a statistically significant association (χ^2=11.366, df=3, p=0.010), with 39.2% of those who attended a program in this sector consuming low, reduced fat or skim milk in contrast to 25.0% among those who do not did attend. This was not replicated in those attending the government sector and hospitals. Additionally, attendance of programs in the non-government sector was significantly associated with food security (χ^2=7.232, df=1, p=0.007); more participants (31.6%) not attending programs in this sector reported running out of food and not being able to buy more, compared to attendees (20.1%). This relationship was not replicated in those attending programs in the government sector and hospitals.

Assessments between measures of physical activity including walking, moderate and vigorous activity, and attendance of programs did not show a statistically significant association with either the government sector and hospitals, or non-government sector. Nevertheless, participation in vigorous activity and attendance of programs in the non-government sector neared statistical significance (U=28017, Z=-1.89, p=0.058); those who reported attending programs in the non-government sector had a higher mean rank of minutes spent in vigorous physical activity per week (282.79) than those who did not attend (263.92) (Table 2).

		Total Sample N = 1825 (N %) or M (SD)	Nutrition and Physical Activity Program Attendance in the Government Sector and Hospitals		Nutrition and Physical Activity Program Attendance in the Non-Government Sector		Tests of Association with Nutrition and Physical Activity Program Participation in the Government Sector and Hospitals	Tests of Association with Nutrition and Physical Activity Program Participation in the Non-Government Sector
			No n=170	Yes n=97	No n=379	Yes N=159		
Meal events per day (last 4 weeks)	0-2 meal events	548 (30.0%)	48 (28.2%)	20 (20.6%)	112 (29.6%)	36 (22.6%)	X^2 = 2.120, df= 2, p = 0.347	X^2 = 2.781, df = 2, p = 0.249
	3-4 meal events	826 (45.3%)	80 (47.1%)	52 (53.6%)	157 (41.4%)	71 (44.7%)		
	≥ 5 meal events	437 (23.9%)	39 (22.9%)	25 (25.8%)	107 (28.2%)	51 (32.1%)		
	Not known	14 (0.8%)	3 (1.8%)	-	3 (0.8%)	1 (0.6%)		
Eats breakfast (days per week in last 4 weeks)	0-3 days per week	877 (48.1%)	72 (42.4%)	40 (41.2%)	180 (47.5%)	66 (41.5%)	X^2= 0.088, df= 1, p = 0.766	X^2= 1.683, df = 1, p = 0.195
	≥ 4 days per week	939 (51.5%)	95 (55.9%)	57 (58.8%)	198 (52.2%)	93 (58.5%)		
	Not known	9 (0.5%)	3 (1.8%)	-	1 (0.3%)	-		
Milk consumed (serves per day in last 4 weeks)	Does not drink milk	98 (5.4%)	6 (3.5%)	4 (4.1%)	21 (5.5%)	7 (4.4%)	X^2= 0.629, df= 3, p = 0.890	X^2= 11.366, df = 3, *p = 0.010
	Full cream milk	1018 (55.8%)	82 (48.2%)	43 (44.3%)	228 (60.2%)	76 (47.8%)		
	Low or reduced fat or skim milk	575 (31.5%)	70 (41.2%)	45 (46.4%)	93 (24.5%)	62 (39.0%)		
	Soy or evaporated or sweetened condensed or other type of milk	114 (6.2%)	9 (5.3%)	5 (5.2%)	30 (7.9%)	13 (8.2%)		
	Not known	20 (1.1%)	3 (1.8%)	-	7 (1.8%)	1 (0.6%)		

Vegetables consumed (serves per day in last 4 weeks)	0-1 serves	887 (48.6%)	78 (45.9%)	46 (47.4%)	189 (49.9%)	74 (46.5%)	
	2-3 serves	715 (39.2%)	68 (40.0%)	40 (41.2%)	142 (37.5%)	65 (40.9%)	$X^2= 0.088$, $df= 2$, $p = 0.957$ $X^2= 0.601$, $df = 2$, $p = 0.741$
	4-6 serves	206 (11.3%)	21 (12.4%)	11 (11.3%)	44 (11.6%)	19 (11.9%)	
	Not known	17 (0.9%)	3 (1.8%)	-	4 (1.1%)	1 (0.6%)	
Fruit consumed (serves per day in last 4 weeks)	0-1 serves	1297 (71.1%)	99 (58.2%)	63 (64.9%)	265 (69.9%)	102 (64.2%)	
	2-3 serves	452 (24.8%)	62 (36.5%)	31 (32.0%)	97 (25.6%)	49 (30.8%)	$X^2= 0.831$, $df= 2$, $p = 0.660$ $X^2= 1.952$, $df = 2$, $p = 0.377$
	4-6 serves	59 (3.2%)	6 (3.5%)	3 (3.1%)	13 (3.4%)	7 (4.4%)	
	Not known	17 (0.9%)	3 (1.8%)	-	4 (1.1%)	1 (0.6%)	
Salt added to food (last 4 weeks)	Never	650 (35.6%)	62 (36.5%)	28 (28.9%)	152 (40.1%)	57 (35.8%)	
	Rarely	252 (13.8%)	33 (19.4%)	19 (19.6%)	47 (12.4%)	26 (16.4%)	
	Sometimes	348 (19.1%)	27 (15.9%)	23 (23.7%)	71 (18.7%)	38 (23.9%)	$X^2= 3.090$, $df= 3$, $p = 0.378$ $X^2= 4.013$, $df = 3$, $p = 0.260$
	Usually	560 (30.7%)	45 (26.9%)	27 (27.8%)	104 (27.4%)	37 (23.3%)	
	Not known	15 (0.8%)	3 (1.8%)	-	5 (1.3%)	1 (0.6%)	
Ran out of food (last 12 months)	No	1296 (71.0%)	114 (67.1%)	75 (77.3%)	258 (68.1%)	127 (79.9%)	
	Yes	519 (28.4%)	53 (31.2%)	22 (22.7%)	119 (31.4%)	32 (20.1%)	$X^2= 2.474$, $df = 1$, $p = 0.116$ $X^2= 7.232$, $df= 1$, **$p= 0.007$
	Not known	10 (0.5%)	3 (1.8%)	-	2 (0.5%)	-	

							Mean rank for No=135.55 & Yes=131.28 U= 7981, Z= -0.436 p= 0.663	Mean rank for No=264.42 & Yes=281.62 U= 28204, Z= -1.174 p= 0.240
	Walking	214.8 (334.7)	211.3 (342.5)	167.3 (174.9)	227.1 (376.3)	220.5 (279.9)		
Physical activity (min/ week)	Moderate activity	76 (241.0)	74.2 (191.4)	51.5 (107.5)	51.3 (180.5)	42.5 (123.2)	Mean rank for No=133.97 & Yes=134.05 U= 8240, Z= -0.010 p= 0.992	Mean rank for No=266.08 & Yes=277.64 U= 28835.50, Z= -1.003 p= 0.316
	Vigorous activity	55.6 (193.8)	34.0 (110.5)	43.5 (96.8)	35.4 (127.8)	43.4 (106.5)	Mean rank for No=130.25 & Yes=140.57 U=7607.50, Z= -1.508 p= 0.131	Mean rank for No=263.92 & Yes=282.79 U= 28017, Z= -1.893 p= 0.058

M (SD): Mean (Standard Deviation); X²: Chi Square test; U: Mann-Whitney U test; df: Degrees of Freedom; *p<0.05; **p<0.01; ***p<0.001

Table 2: Nutrition and Physical activity Characteristics by Nutrition and Physical Activity Program Attendance in the Government Sector and Hospitals, and Non-Government Sector.

The sub-sample attending nutrition and physical activity programs in the government sector and hospitals reported an average program duration of 19.4 (19.6) weeks. Most had either completed the program (49.5%) or were still undertaking the program (40.2%) at the time of interview. Many reported experiencing "a lot" of benefit (52.6%) or "some" (39.2%) benefit.

The sub-sample accessing nutrition and physical activity programs in the non-government sector reported an average program duration of 31.6 (21.1) weeks. Many from this group were either still undertaking (63.5%) the program or had completed the program (18.9%) at the time of interview. The benefit of attending the program was described as "a lot" by 61.6% of this sub-sample while 30.8% reported experiencing "Some" benefit (Table 3).

		Government Sector and Hospitals n = 97 (n %) M (SD)	Non-government Sector n = 159 (n %) M (SD)
Duration of program in weeks		19.4 (19.6)	31.6 (21.1)
Completed program	No	10 (10.3%)	20 (12.6%)
	Still on	39 (40.2%)	101 (63.5%)
	Yes	48 (49.5%)	30 (18.9%)
	Not known	-	8 (5.0%)
Benefit	No	8 (8.2%)	6 (3.8%)
	Some	38 (39.2%)	49 (30.8%)
	A lot	51 (52.6%)	98 (61.6%)
	Not known	-	6 (3.8%)

Table 3: Characteristics of Nutrition and Physical Activity Program Attendance in the Government Sector and Hospitals, and Non-Government Sector.

Discussion

We aimed to describe self-reported attendance of nutrition and physical activity programs in the government and non-government sector among Australians with psychosis, and discovered that majority of the sample did not attend programs in either sector. Overall program attendance differed based on participant diagnosis, and was greater for those who attained a minimum of high school qualifications or higher. Assessments between program attendance, and nutrition and physical activity outcomes highlighted that only non-government program attendees showed increased consumption of reduced fat or skim milk in preference to other varieties. They were also less likely to run out of food and not have the financial capacity to purchase more. Meal frequency, breakfast consumption, fruit and vegetable intake, adding salt to food and physical activity participation were not related to program attendance.

Reasons for differing program attendance across participant diagnostic groups are unclear because practice guidelines for physical health service referral are consistent for the various psychotic disorders [21]. Appropriate application of these guidelines may promote increased service use across different diagnostic groups [21]. Conversely, the positive relationship between program attendance and attainment of education qualifications could indicate that skills obtained through education may equip persons to overcome personal hindrances related to health service access [22]. Service access support may thus be necessary for those with low education attainment, to ensure that problems related to access are addressed.

Other factors not covered in this study that may influence program attendance include illness, cognitive limitations, financial problems, transport hindrances and participant preferences [23-25]. Designing services that alleviate these difficulties may help improve utilisation of existing services [25,26]. Admittedly, illness related factors are more difficult to address, however, other concerns like transport and financial limitations can be minimised through providing organised program transport and designing low cost activities [10,25,26]. With proper investment and planning, cognitive needs and client preferences can be incorporated into available programs by engaging clients in program design [10,25,26].

The structure of the Australian health system may also affect attendance of existing programs [23,24]. Mental and physical health are treated via different avenues in the government sector, private sector, and community managed organisations [23,24]. A community-based model of care for those with mental illness is currently lacking, and this spread of services may result in service access gaps [23,27]. Fortunately, integrated community-based mental health services and teams are being piloted [23]. Meanwhile, the role of nutrition and physical activity programs needs advocating among Australians with psychosis [23]. General Practitioners (GPs) and case managers are well positioned for this [23,24]. GPs make referrals to other health services while case managers support those with more severe forms of illness to access appropriate treatments [28,29]. These groups act as a gateway to the larger health system for many with psychosis, hence should be informed by service providers on available programs so that they can relay this to clients [23,24].

Current program durations seemed to suggest that community nutrition and physical activity services were designed for persons who could commit on a longer-term basis. This may encourage commitment and engagement in a group not likely to be involved in other formal activities or employment, or may act as a deterrent to those who are unable or unwilling to commit for long durations [1]. Provision of multiple program options for people with psychosis may promote accommodation of needs and preferences which may encourage utilisation of services [26,30].

Rates of perceived program benefit seen in this study could indicate that particular needs are being met [31]. Further, those who attended programs showed increased consumption of reduced fat milk, and decreased likelihood of running out of food without the financial capacity to purchase more. However, improvements in other nutrition and physical activity characteristics were not displayed and the two positive nutrition outcomes were primarily evident in the group attending the non-government sector. The cause for differing outcomes in the government and non-government sector is unfortunately not apparent from available literature [32]. This is because distinctive service delivery characteristics pertaining to these sectors are lacking [32]. Additionally, the SDQs used in nutrition assessment may not be sensitive enough to assess behavioural outcomes related to attending health promotion programs available in the government and non-government sectors [19]. Local evaluation and monitoring of both non-government and government programs is therefore necessary, with the employment of appropriate tools so that amendments can be made when needed [15].

Strengths and Limitations

This study presents an analysis of a cross-sectional data which prevents inference of cause and effect relationships from findings [33]. This is however the largest representative cross-sectional study of Australians with psychosis, thus offers a good representation of the population [1]. Although much of the data presented is self-report, bias was minimised in the original study through applying validated tools where possible, and training interviewers [1]. Nutrition and physical activity programs were not

explored exhaustively because of the wide range of topics assessed in SHIP, thus should be explored further in prospective longitudinal studies with a narrower focus. Finally, SHIP was conducted in 2010 hence recent changes to the parameters assessed may not be reflected in this study.

Conclusion

This study highlights extremely low utilization of community nutrition and physical activity programs among people with psychosis in Australia, with participant diagnosis and higher education attainment displaying association with program attendance [22]. Factors like low levels of education may negatively affect program access; alleviating the challenges that inhibit program access could promote attendance in people with psychosis [25,26]. Additionally, those at the front-line of treatment provision like GPs and case-managers should advocate for the role of these services to this group [23,24]. Current findings also indicate presence of some health-promoting activities in non-government program attendees which may or may not be a consequence of factors related to service delivery. Non-government and government programs should be evaluated locally so that adjustments are made where necessary [15].

Acknowledgements

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