

Physical Activity Tracking Among Sri Lankan Adults: Findings From a 7-Year Follow-up of the Ragama Health Study

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Physical activity tracking among Sri Lankan adults: findings from a 7-year follow-up of the Ragama Health Study

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Abstract:	Limited data are available on physical activity tracking among adults in Low- and Middle-Income countries. Using a longitudinal design we assessed trends and correlates of physical activity among Sri Lankan adults. Individuals selected through age-stratified random sampling, were screened initially in 2007 (n=2986) and re-evaluated in 2014 (n=2148). On both occasions, structured interviews and clinical measurements were completed. Approximately 40% of the participants engaged in recommended levels of physical activity both at baseline and follow-up. One-fifth reported increased physical activity at follow-up, a similar proportion reported being persistently inactive or a reduction in physical activity. In the adjusted analysis, being persistently active was associated with male sex, a lower educational level and income, being free of any chronic disease conditions, better self-rated health, and sitting time <8 hours. Our findings support public health interventions to help maintain recommended physical activity levels over time, particularly for subgroups at high-risk of physical inactivity.

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4 **follow-up of the Ragama Health Study**
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12 Limited data are available on physical activity tracking among adults in Low- and Middle-
13 Income countries. Using a longitudinal design we assessed trends and correlates of physical
14 activity among Sri Lankan adults. Individuals selected through age-stratified random
15 sampling, were screened initially in 2007 ($n=2986$) and re-evaluated in 2014 ($n=2148$). On
16 both occasions, structured interviews and clinical measurements were completed.
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19 both at baseline and follow-up. One-fifth reported increased physical activity at follow-up, a
20 similar proportion reported being persistently inactive or a reduction in physical activity. In
21 the adjusted analysis, being persistently active was associated with male sex, a lower
22 educational level and income, being free of any chronic disease conditions, better self-rated
23 health, and sitting time <8 hours. Our findings support public health interventions to help
24 maintain recommended physical activity levels over time, particularly for subgroups at high-
25 risk of physical inactivity.
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45 **What We Already Know**
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- 47 • Over one quarter of world's adult population do not engage in sufficient physical
48 activity to produce health benefits
- 49 • Global trends in insufficient physically activity have not shown any notable decreases
50 over time
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- Previous longitudinal studies of correlates of physical activity reflect mostly Upper Middle-Income countries

What This Article Adds

- Longitudinal trends and correlates of physical activity in an understudied population of a Lower Middle-Income country
- Only 39% of the participants were able to be persistently active over a 7-year period
- Those of male gender, lower income and education, free of chronic disease, better self-rated health and lower sitting times were more successful in maintaining recommended levels of physical activity over time

Introduction

Physical inactivity is independently associated with increasing the risk for non-communicable diseases (NCDs), such as coronary heart disease, type 2 diabetes and cancer and is ranked as the fourth leading cause of death worldwide.^{1,2} Globally, more than a quarter of adults are estimated to be physically inactive with no signs of notable decreases in the levels of insufficient physical activity during the period 2001-2016.^{3,4} It is estimated that if inactivity is decreased by 10%-25%, 533,000 to 1.3 million deaths could be prevented each year.^{2,5} In a worldwide attempt to enhance prevention and management of major NCDs, the World Health Organization member states have agreed to work towards a 10% relative reduction in insufficient physical activity by 2025. Sri Lanka, a Lower Middle-Income country in South Asia⁶, is also a part of this agreement and is working towards achieving these physical activity goals. In 2018, Physical Activity Guidelines for Sri Lankans were formulated under the direction of the National Steering Committee on Non Communicable Diseases.⁷ The guidelines, aligning with WHO's Global Recommendations on Physical Activity for Health⁸,

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3 recommend that adults engage in at least 150 minutes of moderate-intensity aerobic physical
4 activity or at least 75 minutes of vigorous-intensity aerobic physical activity per week, or an
5 equivalent combination.
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12 Physical inactivity is a risk factor for all major NCDs that are considered a threat to global
13 health. Yet, it is a modifiable risk factor and population level interventions to improve
14 physical activity are an important step towards tackling the NCD epidemic, especially in
15 Low- and Middle-Income countries such as Sri Lanka where the comparative disease burden
16 is high. At present, most of the physical activity data within the Sri Lankan context is based
17 on cross-sectional studies. Such data is limited in proving evidence of causal associations
18 between physical activity and related factors. Physical activity guideline adherence estimates,
19 based on the 2015 STEP-wise approach to non-communicable disease surveillance (STEPS)
20 survey, indicated that 28.1% and 44.2% of the Sri Lankan adult men and women,
21 respectively, did not meet the guidelines.⁹ The findings suggested that more than a quarter of
22 Sri Lankan adults was not getting sufficient physical activity and are at risk of developing or
23 aggravating chronic disease conditions linked to physical inactivity.
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42 To develop effective public health interventions, understanding physical activity behaviour
43 and its determinants is important as effective programmes can target factors known to cause
44 inactivity.¹⁰ Longitudinal observational studies identifying factors having a strong, potentially
45 causal, association with physical activity are under-represented in the literature with most
46 studies using cross-sectional designs to identify correlates.^{10, 11} Furthermore, intervention
47 strategies that have been shown to help people initiate behaviour change have not shown to
48 be working in the same way when it comes to behaviour maintenance.¹² It should also be
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3 noted that previous studies on the correlates of physical activity in Low- and Middle-Income
4 countries tend to reflect Upper Middle-Income countries¹³⁻¹⁵ where a different socioeconomic
5 gradient may prevail compared to the countries in the Lower Middle-Income group such as
6 Sri Lanka. Hence, to improve physical activity levels of populations in the Lower Middle-
7 Income countries and for formulating relevant policy, research conducted specifically
8 focusing on people living in these countries would be helpful. The objective of this study is
9 to describe longitudinal trends and sociodemographic correlates of physical activity guideline
10 adherence among Sri Lankan adults.
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24 **Methods**

25 *Participants*

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27 The Ragama Health Study commenced in 2007 as an on-going community-based cohort
28 study to investigate lifestyle related chronic diseases among Sri Lankan adults. The Ragama
29 study area is situated approximately 20 km north of the country's capital, Colombo, and
30 consists of an urban to suburban, multi-ethnic population. In 2007, 35-64 year old residents
31 (n=3012) of the Ragama health administrative area were selected by age-stratified random
32 sampling from the electoral register to participate in the baseline survey. Methodological
33 details of selecting and screening of the inception cohort are described elsewhere.¹⁶ Complete
34 baseline records and investigation results were available for 2,986 individuals. The initial
35 cohort was invited for a re-evaluation seven years later and 2,148 individuals participated in
36 the follow-up assessments (response rate 72%).
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Measures

All assessments carried out at baseline (2007) were repeated during the re-assessment (2014) and included clinical, anthropometric and biochemical measures. Participant interviews, anthropometric, and clinical assessments were conducted using standardised protocols by trained research assistants who had completed a degree in medicine. On each assessment day, 5-8 research assistants conducted the interviews and were overseen by senior medical staff. Informed written consent was obtained from all participants. Ethics approval for the study was obtained from the Ethics Review Committee of the Faculty of Medicine, University of Kelaniya, Sri Lanka (P38/09/2006).

Physical activity

At baseline and at follow-up, self-reported physical activity was assessed in a structured interview using a culturally adapted and validated Sinhalese version¹⁷ of the International Physical Activity Questionnaire – Short Form (IPAQ– SF).¹⁸ All participants were able to communicate fluently in the Sinhalese language and were asked to report the frequency and duration of vigorous physical activity (e.g. manual digging, lifting very heavy objects, etc.), moderate-intensity activity (e.g. lifting objects, slow cycling, etc.), and walking over the week immediately preceding the interview. Data gathered from IPAQ – SF was categorised into two groups based on World Health Organization Global Physical Activity Recommendations.⁸ A participant was categorised as ‘sufficiently active’ if they engaged in at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic physical activity per week, or an equivalent combination of both. Those who did not meet these criteria were categorised as ‘not sufficiently active’. To examine the longitudinal

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3 tracking of physical activity guideline adherence among our sample, based on these criteria, a
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5 participant was classified into one of four groups:
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- 7 1. 'Persistently active' group: those who reported 'sufficient activity' both at baseline
8 and follow-up.
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- 10 2. 'Increased activity' group: those reporting sufficient activity at follow-up but not at
11 baseline.
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- 13 3. 'Reduced activity' group: those reporting sufficient activity at baseline but not at
14 follow-up.
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- 16 4. 'Persistently inactive' group: those failing to report sufficient activity both at baseline
17 and follow-up.
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26 27 28 Sitting time 29

30 The IPAQ –SF also assessed the sitting time of respondents. Even though there is evidence
31 linking high levels of sedentary time with detrimental health effects, currently no
32 recommendations exist for adult sitting time thresholds.¹⁹ Sitting time was categorised into
33 two groups: those reporting ≥ 8 hours/day and < 8 hours/day. A recent meta-analysis,
34 including data from over one million participants, showed that a threshold of over 6-8 hours
35 sitting time/day increased the risk for several major chronic diseases²⁰, justifying the cut-
36 offs selected in the present study.
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49 Lifestyle and sociodemographic factors 50

51 For anthropometric measures, two recordings of both standing height and body weight of the
52 participants were obtained using a portable stadiometer (seca 213[®], Seca Deutschland,
53 Germany) and an electronic digital weighing scale (TANITA Inner Scan 50[®], Tanita
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3 Corporation America Inc, USA), respectively. Height was measured to the nearest 0.5 cm and
4 weight with an accuracy of ± 100 g. Body Mass Index (BMI) was calculated using the
5 measured height and weight ($\text{weight}/\text{height}^2$) and participants categorised as (i) Underweight
6 ($< 18.5 \text{ kg}/\text{m}^2$); (ii) Normal BMI ($18.5\text{-}24.9 \text{ kg}/\text{m}^2$); (iii) Overweight ($25\text{-}29.9 \text{ kg}/\text{m}^2$); and (iv)
7 Obese ($\geq 30 \text{ kg}/\text{m}^2$).²¹ Waist circumference, measured at the midpoint between the lower
8 border of the rib cage and the iliac crest using a tape measure, was categorised as high if ≥ 90
9 cm for males or ≥ 80 cm for females, and normal if < 90 cm for males or < 80 cm for females
10 as recommended for South Asians.²²

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15 All participants were asked about their smoking habits and were categorised as a current
16 smoker or not based on their responses. Alcohol consumption was categorised as (i) Lifetime
17 abstainer; (ii) Former drinker (people consumed alcoholic beverages but have not done so in
18 the past 12 months); (iii) Current drinker consuming 14 units of alcohol or less per week; and
19 (iv) Current drinker consuming more than 14 units of alcohol per week. Self-rated health was
20 categorised into five groups by asking respondents how they felt about their general health:
21 (i) Very good; (ii) Good; (iii) Satisfactory; (iv) Unsatisfactory; and (v) Poor. 'Unsatisfactory'
22 and 'Poor' were collapsed into one group for data analysis purposes. A history of
23 cardiovascular disease or diabetes was assessed by asking respondents whether a doctor has
24 ever made a diagnosis of hypertension, hypercholesterolemia, myocardial infarction, other
25 coronary heart disease, stroke or diabetes. If the participants responded 'Yes' to any of the
26 conditions listed above or had any medical records that confirmed the diagnosis they were
27 categorised as (i) Yes, or (ii) No.

Data management and statistical analysis

All data were entered in Epi Info 7 using data entry control options for quality assurance (Centres for Disease Control and Prevention, Atlanta, GA, USA). Statistical analyses were performed using IBM SPSS version 24 (IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp). Percentages and their 95% Confidence Intervals (CI) were calculated for the four groups of participants: (a) 'Persistently active'; (b) 'Increased activity'; (c) 'Reduced activity'; and (d) 'Persistently inactive'. Chi-squared tests were used to test the unadjusted differences between the prevalence rates in each category and selected sociodemographic and health-related variables. For all statistical tests, a p value of <0.05 was considered as significant.

Logistic regression analysis was used to assess the associations between being 'Persistently active' and sociodemographic and health-related variables. The regression model included the following explanatory variables: sex (reference group [ref] = male); age (ref = 55-64 years); education (ref= passed grade 12 exit examination or higher level of education); income (ref \geq US\$ 250); BMI ref = normal BMI); waist circumference (ref = normal); current smoking (ref = no); alcohol consumption (ref = lifetime abstainers); self-rated health (ref = very good); known history of cardiovascular disease or diabetes (ref = no); sitting time at baseline (ref = < 8 hours). Odds ratios and their 95 % CI were calculated and are reported.

Results

Baseline and follow-up data were available for 2,148 respondents (72% follow-up response rate). In this sample, 57.6% were female, 56% were within the ages of 35-54 years and had successfully completed Grade 10 national level school examination, or had obtained a higher

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3 level of educational qualification. As shown in Table 1, 39.4% of the participants were
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5 classified as 'Persistently active' at both baseline and follow-up. One in five participants
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7 (20%) was classified to the 'Increased activity' group. A similar proportion of participants
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9 were classified as 'Reduced activity' (21.1%) or 'Persistently inactive' (19.5%). In the
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11 unadjusted analysis, with the exception of age and waist circumference, significant
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13 differences were observed for all other sociodemographic and health-related factors across all
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15 categories of physical activity guideline adherence ($p < 0.05$).
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22 Table 2 gives the adjusted analysis showing the overall associations with selected
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24 sociodemographic and health related variables for the 'Persistently active' category.
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26 Compared to males, females in this sample were less likely to be persistently active (Odds
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28 Radio [OR] = 0.58, 95% CI: 0.43 – 0.79). Age was not associated with being 'Persistently
29
30 active'. Compared to those who had achieved a higher level of education, those who had no
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32 formal education or attended school only upto primary level (OR = 1.57, 95% CI: 1.04 –
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34 2.36) and those who were educated only up to grade 10 (OR = 1.36, 95% CI: 1.03 – 1.81)
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36 were more likely to be 'Persistently active'. The odds of being 'Persistently active' were
37
38 similar between those who had passed Grade 10 qualifying examination and those who had
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40 received higher educational qualifications (OR = 1.24, 95% CI: 0.95 – 1.62). Participants in
41
42 the highest income category (US\$ \geq 250) were least likely to be 'Persistently active'
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44 compared to those in the lower income categories, the ORs ranged from 1.85 (95% CI: 1.27 –
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46 2.69) for the lowest income category of less than US\$ 50, 1.41 (95% CI: 1.02 – 1.95) for
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48 those earning between US\$ 50 - 99, and 1.41 (95% CI: 1.05 – 1.89) for the US\$ 100 - 249
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50 income category.
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3 Table 2 further illustrates that avoidance of unhealthy behaviours, like smoking or regular
4 alcohol consumption, were not related to being 'Persistently active'. However, those who
5 self-rated their health as 'unsatisfactory' or 'poor' were less likely to be 'Persistently active'
6 (OR = 0.57, 95% CI: 0.36 – 0.89) compared to those who rated their health to be 'very good'.
7
8 Over one third of the participants in this sample had a known history of CVD or diabetes. The
9 adjusted analysis found that participants suffering from these chronic conditions were less
10 likely to be 'Persistently active' (OR = 0.64, 95% CI: 0.52 – 0.79) compared to those who did
11 not have a history of CVD or diabetes. Those reporting eight hours or more of sitting
12 time/day were less likely to be 'Persistently active' (OR = 0.46, 95% CI: 0.32 – 0.66)
13 compared to those who reported sitting times of <8 hours/day.
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28 Discussion

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30 This study is the first to report on the longitudinal trends of physical activity guideline
31 adherence among Sri Lankan adults. The key findings were that being persistently active over
32 time was independently associated with being male, having lower education/income, better
33 self-rated health, and being free of chronic disease conditions such as cardiovascular disease
34 or diabetes. While large-scale international population prevalence studies have been
35 published recently³, they tend to report only cross-sectional observational data rather than for
36 groups that change their physical activity over time. Our study is important because this adds
37 to the under-reported literature on the factors associated with maintaining physical activity
38 over several years as well as for a poorly studied population in a Lower Middle-Income
39 country.
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3 This study confirmed that males are more active than females and that males are over-
4 represented in the 'Persistently active' group. This reflects robust findings in the literature¹⁰
5 and, in the current case, may be due to occupational and leisure patterns as well as cultural
6 expectations and opportunities. However, the observed associations showing that lower
7 education and income are associated with higher levels of physical activity are contrary to
8 some other studies. For example, in a review of occupational variables and physical activity
9 by Kirk and Rhodes²³, white-collar/professionals showed the highest leisure time physical
10 activity compared to blue-collar workers. However, other reviews suggest that such trends are
11 less conclusive.¹⁰ Moreover, the review by Kirk and Rhodes was predominantly of studies
12 from high-income Western countries. The findings related to education and income observed
13 in this study can be partly explained by the type of occupations those with low educational
14 levels may be engaged in, whereas those with higher educational levels are more likely to
15 find better paid jobs that are less labour intensive and physically less demanding (usually in
16 an office environment that is largely sedentary); those with low educational qualifications
17 tend to be employed in occupations requiring manual labour that generally pays lower wages.
18 When the analysis was extended, an association was also observed between income and
19 sitting time with those in higher income categories significantly more likely to be sitting for
20 ≥ 8 hours/day ($p < 0.001$).
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47 In this study, there was an association between measures of adiposity and physical activity
48 among adults (Table 1). This is not a surprising finding, although previously such consistent
49 links have been shown mostly in cross-sectional studies.²⁴ Moreover, the direction of
50 association, if any, was not known, as it is plausible to have 'reverse causality' operating
51 whereby adiposity may be a 'cause' of inactivity, an outcome, or both. A related finding is
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3 that those with chronic conditions, such as diabetes, were less likely to remain physically
4 active. These results suggest that, despite the benefits of physical activity, chronic conditions
5 and higher BMI could act as barriers to physical activity. This requires further study into the
6 beliefs and motivation of people with such conditions and how they see the role of physical
7 activity.²⁵
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17 While it is common to see reports of higher self-rated health by those who are physically
18 active²⁶, other at-risk health behaviours, such as smoking and regular alcohol consumption,
19 were unrelated to physical activity maintenance. However, those with longer sitting times
20 were less likely to be in the 'Persistently active' group. While there is some debate about the
21 association between time spent in moderate-to-vigorous physical activity and sedentary time,
22 it is plausible to have a cluster of 'poor' health behaviours, including high sedentary time and
23 low physical activity.²⁷
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35 In future follow-up of this population the use of accelerometers to improve the validity of
36 moderate and vigorous intensity physical activity estimates will be helpful. These devices are
37 not commonly used for studies in South Asia and including such measures will help to create
38 more reliable data for the region. More research should be undertaken in the region to
39 understand demographic and sociocultural variables that could help population-wide
40 improvements in physical activity levels as systematic differences exist between countries
41 and cultures in the region.²⁸
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Strengths and limitations

There have been no previous community cohort follow-up studies, with relatively large samples sizes tracking physical activity, reported from Lower Middle-Income countries. This is the first such prospective follow-up study reporting changes in physical activity over time. Other strengths of this study include the high response rate at follow up and separate assessment of walking and sedentary behaviour using a validated tool. The main limitation of the study is the use of the IPAQ – SF, which is a self-reported physical activity tool. Physical activity data collected using wearable devices, for example accelerometers, may be the ideal but due to high costs we could not use them in this study. We have not adjusted for any over reporting that would have resulted particularly by the use of the IPAQ³ as it is known to over report in capturing physical activity data. It should also be noted that an individual's ability to perform physical activity at the fullest potential may be affected by a recent major health event like a myocardial infarction and not capturing this information could be considered as a limitation in this study.

Conclusions

The present study adds to the literature on the factors associated with participation in physical activity in two important ways. First, a Lower Middle-Income country is studied, and these are generally under-represented. Second, to better understand what might be associated with participation, we analysed data for those who have been successful in maintaining recommended levels of physical activity over a 7-year period. Results show that being persistently active seems to be associated with male sex, a lower educational level and income, being free of chronic disease conditions like CVD and diabetes, better self-rated health, and lower levels of sedentary behaviour.

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Table 1. Prevalence of different categories of physical activity guideline adherence^{a,b,c,d} between 2007 and 2014 – overall and by sociodemographic and health-related factors at baseline

	Total	Persistently active ^a	Increased activity ^b	Reduced activity ^c	Persistently inactive ^d
	<i>n</i> (%)	% (95% CI)			
<i>Total</i>	2148	39.4 (37.4-41.5)	20.0 (18.3-21.7)	21.1 (19.4-22.9)	19.5 (17.8-21.2)
Gender					
Male	910 (42.4)	44.9 (41.7-48.2)	17.0 (14.7-19.6)	20.1 (17.6-22.8)	17.9 (15.5-20.5)
Female	1238 (57.6)	35.4 (32.8-38.1)	22.1 (19.9-24.5)	21.9 (19.7-24.3)	20.6 (18.4-22.9)
		<i>p</i> < 0.001			
Age (years)					
35-44	366 (17.0)	43.2 (38.2-48.3)	22.7 (18.6-27.2)	17.8 (14.1-21.9)	16.4 (12.9-20.5)
45-54	832 (38.8)	40.9 (37.6-44.2)	19.7 (17.1-22.5)	20.7 (18.0-23.5)	18.8 (16.2-21.5)
55-64	950 (44.2)	36.7 (33.7-39.8)	19.2 (16.7-21.8)	22.8 (20.3-25.6)	21.3 (18.7-24.0)
		<i>p</i> = 0.06			
Education					
Primary to no formal education	161 (7.5)	45.3 (37.8-53.1)	16.1 (11.1-22.4)	27.3 (20.9-34.6)	11.2 (7.0-16.8)
Grade 6-9	793 (36.9)	42.6 (39.2-46.1)	19.0 (16.4-21.9)	21.3 (18.6-24.3)	17.0 (14.5-19.8)
Passed grade 10 qualifying exam	761 (35.4)	39.2 (35.7-42.7)	21.0 (18.2-24.0)	19.6 (16.9-22.5)	20.2 (17.5-23.2)
Passed grade 12 exit exam or higher level	433 (20.2)	31.9 (27.6-36.4)	21.2 (17.6-25.3)	21.2 (17.6-25.3)	25.6 (21.7-29.9)
		<i>p</i> < 0.001			
Monthly family income (in US\$)					
<50	313 (14.6)	45.4 (39.9-50.9)	12.5 (9.1-16.5)	23.6 (19.2-28.6)	18.5 (14.5-23.1)
50-99	646 (30.1)	39.9 (36.2-43.8)	20.9 (17.9-24.2)	22.0 (18.9-25.3)	17.7 (14.4-20.2)
100-249	863 (40.2)	40.4 (37.2-43.7)	20.2 (17.6-22.9)	19.6 (17.0-22.3)	19.8 (17.3-22.6)
=>250	326 (15.1)	30.1 (25.3-35.2)	24.8 (20.4-29.8)	21.2 (17.0-25.9)	23.9 (19.5-28.8)
		<i>p</i> < 0.001			

	Total	Persistently active ^a	Increased activity ^b	Reduced activity ^c	Persistently inactive ^d
	<i>n</i> (%)	% (95% CI)			
Body Mass Index (kg/m²)					
Underweight (<18.5)	150 (7.0)	40.7 (33.0-48.7)	22.7 (16.5-29.9)	20.7 (14.8-27.7)	16.0 (10.8-22.5)
Normal (18.5–24.9)	1127 (52.5)	42.4 (39.5-45.3)	18.5 (16.4-20.9)	20.2 (18.0-22.7)	18.8 (16.6-21.2)
Overweight (25–29.9)	687 (32.0)	35.1 (31.6-38.7)	20.2 (17.4-23.4)	24.0 (20.9-27.3)	20.7 (17.8-23.8)
Obese (≥30)	184 (8.6)	36.4 (29.7-43.6)	25.5 (19.6-32.2)	16.3 (11.5-22.2)	21.7 (16.2-28.1)
		<i>p</i> = 0.032			
Waist Circumference (cm)					
Normal (males < 90; females < 80)	1021 (47.5)	39.5 (36.5-42.5)	20.9 (18.5-23.4)	21.2 (18.7-23.7)	18.5 (16.2-21.0)
High (males ≥ 90; females ≥ 80)	1127 (52.5)	39.4 (36.6-42.3)	19.2 (16.9-21.5)	21.1 (18.8-23.6)	20.3 (18.0-22.7)
		<i>p</i> > 0.05			
Current smoking					
No	1834 (85.4)	38.1 (35.9-40.3)	20.8 (19.0-22.7)	21.2 (19.4-23.1)	20.0 (18.2-21.8)
Yes	314 (14.6)	47.5 (42.0-53.0)	15.3 (11.6-19.6)	20.7 (16.5-25.4)	16.6 (12.8-21.0)
		<i>p</i> = 0.009			
Alcohol consumption					
Lifetime abstainers	1353 (66.5)	37.6 (35.1-40.2)	21.1 (19.0-23.3)	20.8 (18.7-23.0)	20.5 (18.5-22.8)
Former drinkers	180 (6.9)	40.6 (33.6-47.9)	17.2 (12.2-23.3)	26.1 (20.1-32.9)	16.1 (11.3-22.0)
Current drinker ≤ 14 units of alcohol per week	554 (24.9)	42.4 (38.3-46.7)	19.3 (16.1-22.9)	19.5 (16.3-23.0)	18.8 (15.6-22.3)
Current drinkers > 14 units of alcohol per week	61 (1.7)	49.2 (36.1-62.3)	9.8 (3.7-20.2)	29.5 (18.5-42.6)	11.5 (4.7-22.2)
		<i>p</i> > 0.04			
Self-rated health					
Very Good	109 (5.1)	49.5 (40.2-58.9)	20.2 (13.4-28.5)	15.6 (9.7-23.3)	14.7 (8.9-22.3)
Good	931 (43.3)	40.8 (37.7-44.0)	18.8 (16.4-21.4)	21.1 (18.5-23.8)	19.3 (16.9-22.0)

	Total	Persistently active ^a	Increased activity ^b	Reduced activity ^c	Persistently inactive ^d
	<i>n (%)</i>	<i>% (95% CI)</i>			
Satisfactory	680 (31.7)	41.3 (37.7-45.1)	19.7 (16.8-22.8)	20.4 (17.5-23.6)	18.5 (15.7-21.6)
Unsatisfactory or poor	428 (19.9)	30.8 (26.6-35.3)	22.9 (19.1-27.1)	23.8 (20.0-28.0)	22.4 (18.7-26.6)
		<i>p = 0.012</i>			
<i>Known history of cardiovascular disease or diabetes</i>					
No	1430(66.6)	44.1 (41.5-46.6)	19.7 (17.7-21.8)	20.2 (18.2-22.4)	16.0 (14.2-18.0)
Yes	718 (33.4)	30.2 (26.9-33.7)	20.5 (17.6-23.5)	23.0 (20.0-26.2)	26.3 (23.2-29.6)
		<i>p < 0.001</i>			
<i>Sitting time</i>					
< 8 hours	1965 (91.5)	40.9 (38.7-43.1)	19.2 (17.5-21.0)	21.6 (19.9-23.5)	18.3 (16.7-20.1)
≥ 8 hours	183 (8.5)	24.0 (18.3-30.6)	28.4 (22.2-35.3)	15.9 (11.1-21.7)	31.7 (25.3-38.7)
		<i>p < 0.001</i>			

^a To be classified as ‘persistently active’ a respondent had to report at least 150 min per week of moderate-intensity physical activity or 75 min of vigorous-intensity physical activity per week, or an equivalent combination of both, at baseline and follow-up.

^b To be classified in the ‘increased activity’ group a respondent had to report at least 150 min per week of moderate-intensity physical activity or 75 min of vigorous-intensity physical activity per week, or an equivalent combination of both at follow-up but a lesser amount of activity at baseline.

^c To be classified in the ‘reduced activity’ group a respondent had to report at least 150 min per week of moderate-intensity physical activity or 75 min of vigorous-intensity physical activity per week, or an equivalent combination of both at baseline but a lesser amount of activity at follow-up.

^d To be classified ‘persistently inactive’ a respondent had to report less than 150 min per week of moderate-intensity physical activity or 75 min of vigorous-intensity physical activity per week, or an equivalent combination of both, at baseline and follow-up.

Table 2. Adjusted odds ratios^a (OR) and their 95% confidence intervals (95% CI) for being classified as ‘Persistently active’^b between 2007 and 2014 by sociodemographic and health-related factors.

Explanatory variable	OR (95% CI)
Gender (ref: Male)	
Female	0.58 (0.43 – 0.79)
Age group (ref: 55-64 years)	
35-44	1.27 (0.98 – 1.66)
45-54	1.21 (0.99 – 1.48)
Education (ref: Passed grade 12 exit exam or higher level)	
Only upto primary or no formal education	1.57 (1.04 – 2.35)
Grade 6-10	1.36 (1.02 – 1.80)
Passed grade 10 qualifying exam	1.24 (0.95 – 1.62)
Income (ref: US\$ ≥ 250)	
<50	1.85 (1.27 – 2.69)
50 - 99	1.41 (1.02 – 1.95)
100 - 249	1.41 (1.05 – 1.89)
Body Mass Index (ref: Normal 18.5 to 24.9 kg/m²)	
Underweight (< 18.5 kg/m ²)	0.73 (0.50 – 1.06)
Overweight (25–29.9)	0.82 (0.66 – 1.03)
Obese (≥30)	1.00 (0.69 – 1.46)
Waist Circumference (ref: normal males < 90; females < 80 cm)	
High (males ≥ 90; females ≥ 80)	0.94 (0.74 – 1.20)
Current smoking (ref: No)	
Yes	1.01 (0.75 – 1.37)
Alcohol consumption (ref: Lifetime abstainers)	
Former drinkers	0.82 (0.57 – 1.19)
Current drinkers ≤ 14 units of alcohol per week	0.86 (0.64 – 1.16)
Current drinkers > 14 units of alcohol per week	0.99 (0.55 – 1.77)
Self-rated health (ref: Very good)	
Good	0.76 (0.50 – 1.14)
Satisfactory	0.80 (0.52 – 1.21)
Unsatisfactory or poor	0.57 (0.36 – 0.89)
Known history of cardiovascular disease or diabetes (ref: No)	
Yes	0.64 (0.52 – 0.79)

Sitting time at baseline (ref: < 8 hours) ≥ 8 hours**0.46 (0.32 – 0.66)**

^a adjusted for all variables in the table.

^b to be classified as persistently active a respondent had to report at least 150 min per week of moderate-intensity physical activity or 75 min of vigorous-intensity physical activity per week, or an equivalent combination both, at both 2007 and 2014.

For Peer Review