

Physical performance and activity among older adults visiting primary healthcare centres in Riyadh

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Saad M. Bindawas¹, Vishal Vennu¹ ,
Ayidh M. Alqarni²  and
Tariq A. Abdulrahman¹

Abstract

Objective: To assess physical performance (PP) and physical activity (PA) among older adults visiting primary healthcare centres (PHCCs) in Riyadh.

Methods: In this cross-sectional study, men and women ($n = 74$) aged ≥ 60 years were recruited from five PHCCs across Riyadh, Saudi Arabia, between 19 February and 6 August 2017. The Timed Up & Go test was used to assess PP. Self-reported PA was assessed using the Physical Activity Scale for the Elderly. Means and standard deviations were used to describe PP and PA scores across genders. A two-tailed independent samples t-test was used to estimate mean differences (MD) and 95% confidence intervals (CI) between genders.

Results: Men scored significantly lower than women on PP (MD: 2.11, 95% CI: 0.59 to 3.64) and PA (MD: -46.1 , 95% CI: -80.96 to -11.25). Significant gender differences were observed for leisure time activities (MD: 17.35, 95% CI: 3.29 to 31.40), light household activities (MD: -10.86 , 95% CI: -16.19 to -5.53) and heavy household activities (MD: -6.48 , 95% CI: -11.73 to -1.23).

Conclusions: Men show significantly lower PP and PA than women. There are gender differences in leisure time activities and in light and heavy household activities.

Keywords

Physical activity, healthcare, adult, Saudi Arabia, physical performance, leisure time, older adults

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¹Department of Rehabilitation Sciences, College of Applied Medical Sciences, King Saud University, Riyadh, Saudi Arabia

²Department of Physical Therapy, King Abdullah Hospital, Bisha, Saudi Arabia

Corresponding author:

Vishal Vennu, Department of Rehabilitation Sciences, College of Applied Medical Sciences, 10219 King Saud University, Riyadh 11433, Saudi Arabia.
Email: vvennu@ksu.edu.sa



Introduction

Physical performance and physical activity (PP and PA, respectively) are important in the prevention of several chronic non-communicable diseases,¹ and in promoting healthy aging.^{2,3} PA can reduce the risks of cardiovascular illnesses, diabetes, colon and breast cancer, hip or vertebral fractures, weight problems and depression.⁴ Previous studies indicate that PA improves PP⁵ and has positive outcomes on various health indices.⁶ One study showed that the level of PA explained 37% of performance variance.⁷ Other studies indicate that a higher PA level is associated with better performance.^{8,9}

Several studies have examined the relationship between PP and PA in different populations,^{10,11} and have demonstrated that high PA level is a critical predictor of fall risk and associated with better PP.¹² Furthermore, vigorous PA, gender, body mass index (BMI), depressive symptoms, age and use of some medications are also associated with PP.¹³ Thus, the association between PA and PP has been assessed across diverse populations and conditions.

In Saudi Arabia, the proportion of older adults is rapidly increasing, as life expectancy has risen over the last few decades.¹⁴ It is predicted that older adults will comprise 18.4% of the total population by 2050.¹⁴ PP is an important determinant of health and well-being, and plays a critical role in the prevention of certain health conditions, in maintaining independence and in supporting activities of daily living in older adults.¹⁵ Older adults have poorer PP owing to age-related loss of strength, balance control and cardiorespiratory function.¹⁶ In addition, there is a trend in age-related decline in PP owing to decreased grip strength and walking speed, which are more prominent with age.¹⁷

Although few studies have investigated PP and PA levels among older adults,^{18,19}

recent findings indicate that additional research on the relationship between PP and PA in this population is warranted.⁹ Performance-based measures of mobility and balance may determine the level of PP in this community.²⁰ Functional mobility and balance may be important predictors of adverse health events in older adults.²¹ However, no studies have determined both PP and PA levels among elderly Saudi men and women visiting primary healthcare centres (PHCCs) in Riyadh.

The associations between gender roles, PP and PA vary across countries.²² Therefore, a thorough understanding of both PP and PA levels that takes into account gender differences is essential for the effective promotion of active living in elderly Saudi men and women visiting PHCCs in Riyadh.^{22,23} Thus, the current study aimed to address this gap by assessing both PP and PA in this population. We hypothesized that PP and PA would vary by gender, and may be lower in men than in women.

Methods

Study design and setting

This cross-sectional study was conducted among participants visiting PHCCs in Riyadh, Saudi Arabia. These PHCCs are distributed across the five sectors (central, north, south, east and west) of Riyadh, the capital of Saudi Arabia. One PHCC was chosen randomly from each sector. The Ministry of Health (MOH) provides and regulates the PHCC network throughout the country, which provides vital first-level care services in Saudi Arabia.²⁴ The primary objective of PHCCs is to enhance public health outcomes by providing a combination of preventive and therapeutic services.²⁴

Participant recruitment

Participants were recruited from five PHCCs across Riyadh, Saudi Arabia, between 19 February and 6 August 2017. The sample size was based on feasibility. We excluded some participants on the basis of the following exclusion criteria: the presence of severe pain, cardiovascular disease, cognitive disorder, stroke during the past 2 years, problems with hearing or vision and presence of Alzheimer's disease. The presence of severe pain was determined by asking the participant to mark a distance between 75 and 100 mm on a 10-cm line of a visual analogue scale.²⁵

Data collection

Once participants had accepted the invitation to participate, received a brief explanation of the study and provided written consent, a trained healthcare provider collected demographic data (age, gender, education, occupation and BMI) from five PHCCs in each sector of Riyadh. Each participant's PP and PA were determined using the Timed Up & Go (TUG) test and the Physical Activity Scale for the Elderly (PASE), respectively.

The PASE questionnaires were used to assess leisure-, household- and work-related activities over the preceding 7 days. Leisure time-related activities were rated on the following two ordinal scales: (1) frequency (1 = never to 4 = often) and (2) duration (<1 to >4 hours), whereas household and work-related activities were rated as 'yes' or 'no'. One point was allotted for every 'yes' answer for a particular activity; 'no' responses earned 0 points. Mean frequency and duration were used to calculate a subscale of hours per day. Scores on 12 subscales were weighted by the strenuousness of the activity and then summed to give an overall PASE score. This score ranged from 0 to 793; higher

scores (>150) indicate greater PA.²⁶ The reliability and validity of the PASE have been determined for participants with an average age of >60 years.²⁷

In the TUG test, the participant is asked to stand up from an armchair, walk at a normal, comfortable, self-selected speed for about 3 m, turn around 180 degrees, walk back and sit back down on the chair. A stopwatch is used to record TUG time in s. The timing commences with the command 'Go'. Participants were allowed to use assistive devices (e.g. canes or walkers), and one practice trial was conducted. The reliability and validity of this test for older adults have been reported previously.²⁸

Statistical analysis

Descriptive statistics, such as means and standard deviations (SDs) for continuous variables and number (percentage) for categorical variables, were calculated for both men and women. Means and SDs were also calculated for PP and PA scores, including all PA domains, for men and women. The mean difference (MD) and 95% confidence interval (CI) for men and women were compared using a two-tailed independent samples t-test. Statistical analysis software (SAS) Version 9.2 for Windows® (SAS Institute Inc., Cary, NC, USA) was used for all analyses. Statistical significance was determined at $P < 0.05$.

Ethical approval

The ethics committee and institutional review board of the College of Applied Medical Sciences, King Saud University (approval number: 030-37/38), and the MOH represented in King Fahad Medical City (approval number: 17-004E) in Riyadh, Saudi Arabia, approved the study on 12 February 2017. Written informed consent was obtained from all participants before their enrolment in the study.

Results

Participant characteristics

Of 106 participants, 74 Saudi men ($n = 41$) and women ($n = 33$) aged ≥ 60 years were recruited. Thirty-two participants were excluded. Figure 1 shows the flow of the study sample. The distribution of the demographic characteristics by gender is shown in Table 1. The mean age was 64.8 years. Men were 3 years older than women, on average, and most had obtained at least a high school degree (68%). Most participants were either freelance workers or retired (88%).

PP and PA results by gender

Table 2 shows the mean PP and PA status by gender. Men scored higher than women in the TUG test (13.3 s vs. 11.2 s; $P = 0.003$). Both men and women had low PASE scores (91.1 and 137.3, respectively).

Both PP and PA were significantly lower in men than in women (PP: MD: 2.11, 95% CI: 0.59 to 3.64, $P = 0.003$; PA: MD: -46.1, 95% CI: -80.96 to -11.25, $P = 0.003$). Significant gender differences were observed for leisure time activities (MD: 17.35, 95% CI: 3.29 to 31.40, $P = 0.016$), light household activities (MD: -10.86, 95% CI: -16.19 to -5.53, $P = 0.016$) and heavy household activities (MD: -6.48, 95% CI: -11.73 to -1.23, $P = 0.001$).

Discussion

This study aimed to assess both PP and PA levels among elderly Saudi men and women visiting PHCCs in Riyadh. The results showed that both PP and PA (specifically, leisure time, and light and heavy household activities) were relatively low and differed between men and women. Men had lower PP and PA than women.

A recommended practical cutoff value for the TUG to indicate normal versus

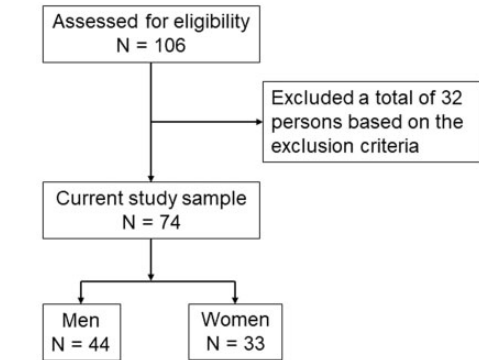


Figure 1. Flow of the study sample.

below typical performance is 12 s.²⁹ A high PASE score (>150) indicates excellent PA.²⁶ In this study, both men and women had low PP and PA. Men scored significantly higher than women on the TUG test, and both men and women had low PASE scores.

There is a lack of research on PP levels among older adults in Saudi Arabia. Our study is the first to demonstrate that elderly men visiting PHCCs in Riyadh have low PP. We also showed that PP varied by gender; women had better PP than men, which has been shown previously.³⁰ One study showed that the TUG performance was 6.0 to 11.2 s for community-dwelling Swiss women aged 65 to 85 years.²⁷

However, PP levels in the present study were lower than those observed in previous studies.^{31,32} For instance, one study assessed normative TUG values by gender in Malaysia,³¹ and found TUG scores of 11.0 s for men and 11.6 s for women. A study on TUG norms for Americans aged 20 to 59 years attending primary care clinics revealed a TUG score of 9.9 s for 50 to 59-year-olds. Another study found mean TUG scores for men and women aged 60 to 89 years of 9 s and 9.3 s, respectively.³³ A possible reason for this is an age-related change in the Saudi population, resulting in a decline in PP owing to loss of strength,

Table 1. Descriptive statistics, stratified by gender, n = 74.

| Characteristics | Men n = 41 (55%) | Women n = 33 (45%) | MD (95% CI) |
|------------------------------------|---------------------|-----------------------|-------------------------|
| Age in years, mean (SD) | 66.3 (7.4) | 63.4 (6.5) | 2.84 (−0.45 to 6.14) |
| BMI, kg/m ² , mean (SD) | 27.5 (4.2) | 31.8 (5.5) | −4.32 (−6.57 to −2.07)* |
| Education level, n (%)** | | | |
| Illiterate or primary school | 13 (32) | 19 (58) | |
| High school or above | 28 (68) | 14 (42) | |
| Occupational status, n (%) | | | |
| None | 7 (17) | 2 (6) | |
| Freelance or retired | 34 (83) | 31 (94) | |

BMI, body mass index; MD, mean difference; CI, confidence interval; SD, standard deviation.

P* = 0.003, *P* = 0.026.

Table 2. Mean physical performance and activity scores by gender, n = 74.

| Variable | Men Mean (SD) | Women Mean (SD) | MD (95% CI) |
|--|------------------|--------------------|----------------------------|
| TUG, s | 13.3 (3.9) | 11.2 (3.9) | 2.11 (0.59 to 3.64)* |
| PASE | 91.1 (63.8) | 137.3 (86.4) | −46.1 (−80.96 to −11.25)* |
| Leisure time activity | 39.9 (31.1) | 22.5 (28.9) | 17.35 (3.29 to 31.40)** |
| Walking outside home | 27.4 (22.6) | 18.7 (25.8) | 8.66 (−2.58 to 19.9) |
| Light sports | 1.6 (6.8) | 0.89 (2.6) | 0.75 (−1.76 to 3.28) |
| Moderate sports | 4.6 (13.3) | 0.92 (3.3) | 3.73 (−1.00 to 8.47) |
| Strenuous sports | 1.4 (4.0) | 0.37 (1.4) | 1.04 (−0.41 to 2.51) |
| Muscle strength | 4.7 (10.8) | 1.6 (3.9) | 3.15 (−0.79 to 7.09) |
| Household activity | 59.9 (49.4) | 75.2 (47.2) | −15.23 (−37.83 to 7.35) |
| Light housework | 7.3 (11.5) | 18.1 (11.3) | −10.86 (−16.19 to −5.53)** |
| Heavy housework | 4.9 (10.0) | 11.3 (12.6) | −6.48 (−11.73 to −1.23)† |
| Home repairs | 6.5 (12.5) | 1.8 (7.3) | 4.77 (−0.15 to 9.68) |
| Lawn work/yard care | 12.2 (17.2) | 13.0 (17.6) | −0.79 (−8.92 to 7.32) |
| Outdoor gardening | 5.8 (9.2) | 4.2 (8.30) | 1.61 (−2.50 to 5.72) |
| Caring for another person | 23.0 (16.8) | 26.5 (15.2) | −3.47 (−10.98 to 4.05) |
| Work-related activity (paid/voluntary) | 17.1 (30.5) | 7.5 (30.1) | 9.58 (−4.57 to 23.74) |

PASE, Physical Activity Scale for the Elderly; TUG, Timed Up & Go test; MD, mean difference; CI, confidence interval; SD, standard deviation.

P* = 0.003, *P* = 0.016, †*P* = 0.001.

balance control and cardiorespiratory function.¹⁶ Another possible reason is a substantial reduction in knee flexion among elderly Saudis.³⁴ Elderly Saudi people are required to fully flex their knees several times per day for daily activities, such as praying (five times daily), ablutions and

sitting to eat on the floor. A substantial reduction in full knee flexion may result in slower performance of these activities.

Consistent with the present study results, previous studies have observed low levels of PA in Saudi samples, including leisure time activities, as well as prolonged

improvement in PA over the past 9 years.^{18,19} These studies suggest that the sedentary nature of Saudi lifestyles limits the attainment of appropriate PA levels. It is somewhat surprising that in this study, age and mean BMI were higher than the reference values. This may be because greater age and higher BMI limits the range of motion in the hip and knee joints, leading to sedentary lifestyles.^{35,36} This population may therefore have a greater risk of low activity levels. Low PA levels among Saudis, especially those attending PHCCs, therefore represents a substantial public health concern. Our findings should be viewed as a reasonable call to action.

One interesting finding was that adult men and women visiting PHCCs had low PA. Thus, government departments (e.g. the MOH), private companies and communities should cooperate in designing progressive resistance training programs and public policies to promote active living and to minimize sedentary habits in Saudi Arabia. There is evidence that progressive resistance training can improve PP among older adults.³⁷ Additionally, a systematic literature search by Amireault et al.³⁸ identified 21 studies focusing on preferences for PA up to 31 March 2017, and showed that older adults prefer to walk and engage in PA continuously for about 30 minutes in the morning. Thus, the Saudi MOH, policymakers and researchers could feasibly encourage the population to choose physically active lifestyles,³⁸ not only for the sake of health but also for leisure, security and economic well-being. Specific surveillance procedures could be widely implemented to obtain standardized PA levels.

Study strengths and limitations

The primary strength of this study was that an objective and standardized measure of PP was obtained using the TUG test. The advantage of the TUG is that it is easy to

perform and takes little time compared with other measures, such as the Physical Performance Test (PPT),³⁹ which takes an approximate average of 10 minutes to complete. In contrast, the average completion time of the TUG test is 15 s.⁴⁰ A study by Schoene et al.⁴¹ concluded that the TUG is better for less healthy and low-functioning older people than for healthy, high-functioning older people. Moreover, research has shown that the TUG test has excellent interrater reliability (intraclass correlation coefficient = 0.99).⁴² The test score also correlates well with gait speed ($r = -0.55$), scores on the Berg Balance Scale ($r = -0.72$) and Barthel Index scores ($r = -0.51$).⁴² Many studies have shown excellent test-retest reliability in specific populations, such as community-dwelling older adults.²⁸

Another study strength was the assessment of PA (leisure, and light and heavy household activities) using the PASE, which is a short (5 minutes) and easily scored test. Another advantage of the PASE is that it has been translated into numerous languages and validated,⁴³ including in a Saudi population.⁴⁴ Thus, we selected the PASE to assess PA instead of an internationally standard measure such as the International Physical Activity Questionnaire (IPAQ), which has limitations related to its self-report format (people tend to overestimate their positions on the items). Furthermore, when used in the same individuals, differences have been observed between the long and short forms of the IPAQ.⁴⁵

A few study limitations should be noted. First, the descriptive, cross-sectional design prevents us from establishing causality. Second, PA was assessed using a self-report questionnaire, which may be subject to recall and social desirability biases. Third, the results are based on responses from older adults visiting PHCCs in Riyadh, which may limit the

generalizability of our findings across Saudi Arabia. Fourth, as we only used a Saudi sample, it is unknown whether the findings could be generalized to other countries. Fifth, in the analysis, we did not adjust for clustering by PHCC. Finally, the evidence presented here must be interpreted with caution, as other variables that may affect PP, such as depressive symptoms and medications, were not measured.

Conclusion

Men have lower PP than women visiting PHCCs in Riyadh. Both men and women visiting PHCCs in Riyadh had low PA, including leisure time, and light and heavy household activities. There was a clear gender difference in the variables: men had lower PP and PA levels than women. Thus, interventions are needed to improve PP and PA in this community.

Data availability

To protect patient privacy, the data used to support the findings of this study are restricted by the research ethics committee of the College of Applied Medical Sciences, King Saud University, and the MOH represented in King Fahad Medical City, Riyadh, Saudi Arabia. Data are available from the author (Ayidh M. Alqarni) for researchers who meet the criteria for access to confidential data.

Declaration of conflicting interest


The authors declare that there is no conflict of interest.

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ORCID iDs

Vishal Vennu  <https://orcid.org/0000-0001-7616-3955>

Ayidh M. Alqarni  <https://orcid.org/0000-0002-4594-2689>

References

1. Lee IM, Shiroma EJ, Lobelo F, et al. Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *Lancet* 2012; 380: 219–229.
2. Lineweaver TT, Kugler J, Rabellino A, et al. Beliefs about age-related changes in physical functioning across the adult life span and their relationship with physical activity levels of older adults. *Neuropsychol Dev Cogn B Aging Neuropsychol Cogn* 2018; 25: 613–631.
3. Feng Z, Cramm JM and Nieboer AP. A healthy diet and physical activity are important to promote healthy ageing among older Chinese people. *J Int Med Res* 2019; 47: 6061–6081.
4. Lear SA, Hu W, Rangarajan S, et al. The effect of physical activity on mortality and cardiovascular disease in 130 000 people from 17 high-income, middle-income, and low-income countries: the PURE study. *Lancet* 2017; 390: 2643–2654.
5. Kidd T, Mold F, Jones C, et al. What are the most effective interventions to improve physical performance in pre-frail and frail adults? A systematic review of randomised control trials. *BMC Geriatr* 2019; 19: 184.
6. Stubbs B, Koyanagi A, Hallgren M, et al. Physical activity and anxiety: a perspective from the World Health Survey. *J Affect Disord* 2017; 208: 545–552.
7. Silva AG, Queiros A, Cerqueira M, et al. Pain intensity is associated with both performance-based disability and self-reported disability in a sample of older adults attending primary health care centers. *Disabil Health J* 2014; 7: 457–465.
8. Szabo AN, Bangert AS, Reuter-Lorenz PA, et al. Physical activity is related to timing performance in older adults. *Neuropsychol Dev Cogn B Aging Neuropsychol Cogn* 2013; 20: 356–369.
9. Spartano NL, Lyass A, Larson MG, et al. Objective physical activity and physical

- performance in middle-aged and older adults. *Exp Gerontol* 2019; 119: 203–211.
10. Jantunen H, Wasenius N, Salonen MK, et al. Objectively measured physical activity and physical performance in old age. *Age Ageing* 2016; 46: 232–237.
 11. Cooper R, Kuh D, Cooper C, et al. Objective measures of physical capability and subsequent health: a systematic review. *Age Ageing* 2011; 40: 14–23.
 12. Moreira NB, Rodacki ALF, Pereira G, et al. Does functional capacity, fall risk awareness and physical activity level predict falls in older adults in different age groups? *Arch Gerontol Geriatr* 2018; 77: 57–63.
 13. Wilcox S, Dowda M, Griffin SF, et al. Results of the first year of active for life: translation of 2 evidence-based physical activity programs for older adults into community settings. *Am J Public Health* 2006; 96: 1201–1209.
 14. Karlin NJ, Weil J and Felmban W. Aging in Saudi Arabia: an exploratory study of contemporary older persons' views about daily life, health, and the experience of aging. *Gerontol Geriatr Med* 2016; 2: 2333721415623911.
 15. Geirsdottir OG, Arnarson A, Briem K, et al. Physical function predicts improvement in quality of life in elderly Icelanders after 12 weeks of resistance exercise. *J Nutr Health Aging* 2012; 16: 62–66.
 16. Riley PO, DellaCroce U and Kerrigan DC. Effect of age on lower extremity joint moment contributions to gait speed. *Gait Posture* 2001; 14: 264–270.
 17. Makizako H, Shimada H, Doi T, et al. Age-dependent changes in physical performance and body composition in community-dwelling Japanese older adults. *J Cachexia Sarcopenia Muscle* 2017; 8: 607–614.
 18. El Bcheraoui C, Tuffaha M, Daoud F, et al. On your mark, get set, go: levels of physical activity in the Kingdom of Saudi Arabia, 2013. *J Phys Act Health* 2016; 13: 231–238.
 19. Amin TT, Al Khoudair AS, Al Harbi MA, et al. Leisure time physical activity in Saudi Arabia: prevalence, pattern and determining factors. *Asian Pac J Cancer Prev* 2012; 13: 351–360.
 20. Yim-Chiplis PK and Talbot LA. Defining and measuring balance in adults. *Biol Res Nurs* 2000; 1: 321–331.
 21. Cesari M, Kritchevsky SB, Newman AB, et al. Added value of physical performance measures in predicting adverse health-related events: results from the Health, Aging And Body Composition Study. *J Am Geriatr Soc* 2009; 57: 251–259.
 22. Ahmed T, Vafaei A, Auais M, et al. Gender roles and physical function in older adults: cross-sectional analysis of the International Mobility in Aging Study (IMIAS). *PLoS One* 2016; 11: e0156828.
 23. Li W, Procter-Gray E, Churchill L, et al. Gender and age differences in levels, types and locations of physical activity among older adults living in car-dependent neighborhoods. *J Frailty Aging* 2017; 6: 129–135.
 24. Alhamdan AA, Alshammari SA, Al-Amoud MM, et al. Evaluation of health care services provided for older adults in primary health care centers and its internal environment: a step towards age-friendly health centers. *Saudi Med J* 2015; 36: 1091.
 25. Jensen MP, Chen C and Brugger AM. Interpretation of visual analog scale ratings and change scores: a reanalysis of two clinical trials of postoperative pain. *J Pain* 2003; 4: 407–414.
 26. Stehling C, Liebl H, Krug R, et al. Patellar cartilage: T2 values and morphologic abnormalities at 3.0-T MR imaging in relation to physical activity in asymptomatic subjects from the osteoarthritis initiative. *Radiology* 2010; 254: 509–520.
 27. Washburn RA, McAuley E, Katula J, et al. The physical activity scale for the elderly (PASE): evidence for validity. *J Clin Epidemiol* 1999; 52: 643–651.
 28. Shumway-Cook A, Brauer S and Woollacott M. Predicting the probability for falls in community-dwelling older adults using the Timed Up & Go Test. *Phys Ther* 2000; 80: 896–903.
 29. Bischoff HA, Stahelin HB, Monsch AU, et al. Identifying a cut-off point for normal mobility: a comparison of the timed 'up and go' test in community-dwelling and institutionalised elderly women. *Age Ageing* 2003; 32: 315–320.

30. Rodrigues-Barbosa A, De Miranda LM, Vieira-Guimaraes A, et al. Age and gender differences regarding physical performance in the elderly from Barbados and Cuba. *Rev Salud Publica (Bogota)* 2011; 13: 54–66.
31. Ibrahim A, Singh DKA and Shahar S. ‘Timed Up and Go’ test: age, gender and cognitive impairment stratified normative values of older adults. *PLoS One* 2017; 12: e0185641.
32. Kear BM, Guck TP and McGaha AL. Timed Up and Go (TUG) test: normative reference values for ages 20 to 59 years and relationships with physical and mental health risk factors. *J Prim Care Community Health* 2017; 8: 9–13.
33. Steffen TM, Hacker TA and Mollinger L. Age-and gender-related test performance in community-dwelling elderly people: Six-Minute Walk Test, Berg Balance Scale, Timed Up & Go Test, and gait speeds. *Phys Ther* 2002; 82: 128–137.
34. Mulholland SJ and Wyss UP. Activities of daily living in non-Western cultures: range of motion requirements for hip and knee joint implants. *Int J Rehabil Res* 2001; 24: 191–198.
35. Morini S, Bassi A, Cerulli C, et al. Hip and knee joints flexibility in young and elderly people: effect of physical activity in the elderly. *J Biology of Sport* 2004; 21: 25–38.
36. Gilleard W. Functional task limitations in obese adults. *J Curr Obes Rep* 2012; 1: 174–180.
37. Mangione KK, Miller AH and Naughton IV. Cochrane review: improving physical function and performance with progressive resistance strength training in older adults. *Phys Ther* 2010; 90: 1711–1715.
38. Amireault S, Baier JM and Spencer JR. Physical activity preferences among older adults: a systematic review. *J Aging Phys Act* 2018: 1–12.
39. Reuben DB and Siu AL. An objective measure of physical function of elderly outpatients. The Physical Performance Test. *J Am Geriatr Soc* 1990; 38: 1105–1112.
40. Podsiadlo D and Richardson S. The timed “Up & Go”: a test of basic functional mobility for frail elderly persons. *J Am Geriatr Soc* 1991; 39: 142–148.
41. Schoene D, Wu SM, Mikolaizak AS, et al. Discriminative ability and predictive validity of the timed up and go test in identifying older people who fall: systematic review and meta-analysis. *J Am Geriatr Soc* 2013; 61: 202–208.
42. Ng SS and Hui-Chan CW. The timed up & go test: its reliability and association with lower-limb impairments and locomotor capacities in people with chronic stroke. *Arch Phys Med Rehabil* 2005; 86: 1641–1647.
43. Washburn RA, Smith KW, Jette AM, et al. The Physical Activity Scale for the Elderly (PASE): development and evaluation. *J Clin Epidemiol* 1993; 46: 153–162.
44. Alqarni AM, Vennu V, Alshammari SA, et al. Cross-cultural adaptation and validation of the Arabic version of the Physical Activity Scale for the Elderly among community-dwelling older adults in Saudi Arabia. *Clin Interv Aging* 2018; 13: 419–427.
45. Pirani BM and Smith TS. *Body and time: bodily rhythms and social synchronism in the digital media society*. Newcastle upon Tyne: Cambridge Scholars Publishing, 2014.