YH Cheng 鄭養鴻
KL Chou 周基利
DJ MacFarlane 麥迪勤
I Chi 齊　鉹

Patterns of physical exercise and contributing factors among Hong Kong older adults

Key Messages

1. Studies suggest that regular physical activity and exercise offer a significant opportunity to enhance years of active independent life for older individuals. However, the majority of local respondents have a relatively sedentary lifestyle and were not getting adequate physical activity and exercise, though many recognised the health benefits of being active.
2. Compared with their relatively active American counterparts, in terms of strength, flexibility and agility, the respondents of this study fared unfavourably, with mean values in the 20-30 percentile score or lower.
3. More than 80% of elderly adults regularly participated in sports activities, the majority of whom engaged in only a low-to-moderate level of physical exercise mainly due to limited choices and time allocation for such activity. Nearly 17% of the respondents engaged in walking as a leisure activity; a substantial proportion included completion of their household activities (shopping, visiting friends) in what they termed 'walking'. As walking confers many health benefits, its promotion in the immediate environments of the elderly is practical and undoubtedly health enhancing.
4. Findings suggested that cognitive-perceptual factors, ie perceived 'pros' and 'cons' of doing exercise, self-efficacy of exercise, stages of change and perceived barriers to exercise were all influential variables contributing to engagement in sports activity. Longitudinal studies are needed to understand the causal and temporal relations between these variables.
5. Health promotion programmes to educate older adults about the benefits of engaging in physical activity with respect to their self-efficacy are crucial. Education can enhance individual's knowledge and/or awareness concerning the health benefits of physical activity and exercise. Those who are deprived and less educated should receive more attention from policymakers and service providers.

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Sau Po Centre on Ageing, The University of Hong Kong
YH Cheng, KL Chou, I Chi
Department of Community Medicine and Unit for Behavioural Sciences, The University of Hong Kong
YH Cheng
Department of Politics and Sociology, Lingnan University
KL Chou
Institute of Human Performance, The University of Hong Kong
DJ MacFarlane
School of Social Work and School of Gerontology, University of Southern California, US
I Chi

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Principal applicant and corresponding author:
Dr YH Cheng
Department of Community Medicine & Unit for Behavioural Science, The University of Hong Kong, 5/F William MW Mong Block, Faculty of Medicine Building, 21 Sassoon Road, Pokfulam, Hong Kong SAR, China
Tel: (852) 2819 9284
Fax: (852) 2855 9528
E-mail: hrmrcyh@hkucc.hku.hk

Introduction

Successful attempts to prevent disease and early death have led to an increasingly aged population in our society. With such an epidemiological transition, maintaining health and fitness into old age has become a public health priority. Studies[1-3] have identified numerous potential health benefits of increased physical activity, while the damaging effects of inactivity are as serious as the hazards of smoking, high blood pressure, and high cholesterol. The health benefits of physical activity and exercise in the elderly have been so well documented that moderate-intensity physical activity and exercise are now regarded as among the most worthwhile health interventions for older adults. Regular exercise and physical activity provide a significant opportunity to extend years of active independent life in older persons.

Despite such well-documented benefits, a large percentage of older adults in the modern world remain relatively inactive.[1] As the local old-age population grows at substantial rate, an in-depth understanding of the elderly's physical activity and exercise patterns is needed, so as to identify factors facilitating or hindering their participation in physical activity. The findings could suggest ways to motivate older persons into increasing their level of physical activity, and thus decrease the extent of sedentary living–associated disability, illness, and need for medical care.

Physical activity is a global term covering a variety of activities, including exercises. Physical activity refers to any bodily movement produced by skeletal muscles resulting in increased energy expenditure, whereas exercise is defined as planned, structured, and repetitive bodily movement for enhancing and maintaining one or more components of physical fitness.[4] As per these definitions, physical activity and exercise are somewhat different, but in this report we use these terms interchangeably.

Study objectives

This study aimed (1) to obtain a detailed profile of the physical activity and exercise patterns among the elderly in Hong Kong, and (2) to attain a better understanding of why elderly people are not more physically active. The information obtained could highlight attitudes and beliefs about the need for and benefits of physical activity and exercise, and serve as an essential precursor for devising policies to promote more physical activity and exercise in the elderly population.

Methods

Study design

This was a cross-sectional survey to collect relevant information from community-dwelling elderly persons in Hong Kong.

Respondents and data collection

Respondents were recruited by random sampling of elderly adults (aged ≥60 years) through 22 elderly social centres (54% of all such centres) located across

the 18 districts, and a multistage random sampling through 46% of residential complexes across these 18 districts in Hong Kong. A structured questionnaire was used to collect the data in face-to-face interviews between October 2001 and September 2002. A total of 1065 eligible subjects were successfully interviewed, amounting to a response rate of 64%. To further assess and compare the subjective and objective health of the respondents, a sub-sample of 180 from the original 1065 was randomly selected for the assessment of heart rate and bodily movement. However, the pedometer provided analysable data concerning steps walked from only 164 participants; the Tritrac accelerometry (3-D bodily movement) provided 136 sets of data; while the heart rate monitors (Polar HRM) only resulted in 79 analysable datasets. The missing data were mainly due to technical malfunctions or non-compliant users, as many respondents did not like wearing the elastic chest belt over the full day and often removed it.

Study instruments

The specific instruments used in the study were: (1) anthropometric measures and functional tests of strength, balance, and flexibility; (2) Activity of Daily Living (ADL), Instrumental Activity of Daily Living (IADL), and Advanced Instrumental Activity of Daily Living (Advanced IADL); (3) Centre for Epidemiological Studies of Depression; (4) Mini-Mental State Examinations; (5) Perceived Self-efficacy Scale; (6) Perceived Pros and Cons of Exercise Scale; (7) Exercise Barriers Scale; (8) Baecke Questionnaire of Habitual Physical Activity and Modified Baecke Questionnaire for Older Adults; and (9) Measures of heart rate and bodily movement. These measures were collected from the sub-sample. Other than filling out the original questionnaire, these respondents had their physical activity patterns assessed over 2 full days (>12 waking hours) by heart rate monitoring (Polar PE4000 telemetry system) and assessment of three-dimensional bodily movement (Tritrac R-3D).

Data analysis

Univariate statistics, bivariate correlation, and multiple regression analyses were applied to assess the relative contribution of factors such as perceived 'pros' and 'cons' of doing exercise, perceived barriers, physical and mental health, socio-demographic variables, and cognitive factors toward explaining the participation patterns of physical exercise with a focus on sports activity. By means of the analysis of variance (ANOVA), the relationships between habitual physical activity, and blood pressure, strength, flexibility and agility among the sub-sample were analysed.

Table 1. Socio-demographics and general health characteristics of respondents (n=1065)

Characteristic	% (unless otherwise stated)
Gender (M:F)	26:74
Age (years)	
60-64	10
65-69	21
70-74	28
75-79	20
80-84	15
85-89	5
≥90	1
Mean, median, SD	74, 73, 7
Marital status	
Married	51
Widowed	44
Divorced/separated	3
Single	2
Educational level	
No formal education	21
Elementary/primary	62
Secondary or higher	17
Mean, SD (years)	3.4, 4
Living condition	
Living alone	16
With spouse only	28
With children	12
With spouse and children	22
With relatives/acquaintances	22
Housing type	
Public housing	53
Self-own flat	40
Rented flat	4
Rented room	2
Other	1
Working condition	
Retired	89
Home maker	9
Working with full- or part-time job	2
Top five chronic illnesses reported	
Arthritis	58
Eye disease	52
Hypertension	44
Osteoporosis	33
Diabetes	15
Mean No. of chronic illnesses (SD, range)	2.3 (1.4, 0-13)
Top five somatic complaints reported	
Memory loss/difficult to concentrate	72
Stiff and swollen joints	60
Sleeping problems	46
General fatigue	43
Extreme fatigue	38
Mean No. of somatic complaints (SD, range)	4.4 (2.8, 0-12)
Self-rated health	
Poor/very poor	15
Good/excellence	62
Functional capacity score (ADL, IADL)	
23-35 (no impairment)	75
36-45	20
≥46 (mild-to-moderate grade of impairment)	5
Depressive symptomatology	
No symptoms	77
Mild/moderate	13
Severe	10

Results

Socio-demographics, general health and biological characteristics of respondents

The socio-demographics and general health characteristics of respondents are shown in Table 1. There was a preponderance of residents from Kwun Tong, Tsuen Wan, Kwai Ching, Kowloon City, and Sham Shui Po compared to other districts. The average household income per annum of the respondents was $56 000 and the median was $26 400, with around 40% falling into the range of equal to or less than $25 000, and for nearly 34% were more than $50 000.

Table 2. Anthropometric characteristics of respondents (n=1065)*

Age-group (years)	Age (years)	Height (m)	Mass (kg)	BMI (kg/m^2)	Waist/hip ratio
Females, n=787	73.6 ± 7.1	150.6 ± 6.1	55.6 ± 11.2	24.5 ± 4.7	0.90 ± 0.06
60-64		153.5 ± 5.4	58.3 ± 8.3	24.7 ± 3.2	0.87 ± 0.07
65-69		152.3 ± 5.7	56.9 ± 10.7	24.5 ± 4.4	0.89 ± 0.07
70-74		150.4 ± 6.1	56.3 ± 11.8	24.9 ± 5.2	0.90 ± 0.08
75-79		149.9 ± 6.1	55.9 ± 12.6	24.9 ± 5.5	0.92 ± 0.08
80-84		149.3 ± 6.0	53.0 ± 9.6	23.7 ± 3.7	0.91 ± 0.08
85-89		147.0 ± 6.1	51.3 ± 10.6	23.9 ± 5.4	0.94 ± 0.09
≥90		146.0 ± 4.9	48.7 ± 12.3	22.7 ± 5.0	0.93 ± 0.09
Males, n=278	73.6 ± 6.7	162.7 ± 6.4	63.1 ± 11.1	23.8 ± 3.8	0.91 ± 0.06
60-64		166.1 ± 5.6	66.3 ± 7.2	24.0 ± 2.4	0.91 ± 0.06
65-69		162.8 ± 5.4	66.8 ± 9.8	25.2 ± 3.3	0.92 ± 0.06
70-74		162.7 ± 6.8	62.6 ± 10.2	23.6 ± 3.2	0.91 ± 0.06
75-79		162.0 ± 5.5	60.3 ± 10.0	23.0 ± 3.8	0.91 ± 0.07
80-84		162.2 ± 7.5	61.4 ± 15.2	23.3 ± 5.4	0.91 ± 0.07
85-89		161.1 ± 9.0	66.1 ± 12.8	25.4 ± 3.9	0.93 ± 0.08
≥90		160.0 ± 3.4	57.4 ± 6.3	22.5 ± 3.2	0.95 ± 0.05

* Data are shown in mean ± SD

A basic biological description including height, mass, body mass index, and waist and hip ratio of the 1065 elderly respondents is shown in Table 2 for key anthropometric variables. A high percentage (63% of females, 53% of males, and 60% overall) of the elderly respondents exceeded the American Heart Association systolic threshold for hypertension (140 mm Hg). Only 19% of the elderly exceeded the diastolic threshold (90 mm Hg) for hypertension (17% of females and 22% of males).

In addition, all respondents were asked to perform two tests of functional strength: 30-second Chair Stand Test, and a 30-second Arm Curl Test; two tests of flexibility: Chair Sit & Reach, and the Back-Scratch; and a test of agility: the 8-foot Up & Go Test.[5] Normative values were created from the strength, flexibility, and balance tests, and compared with published American data, with the Hong Kong values also represented as a percentile of the US values (Table 3).

Cognitive-perceptual dimension and physical exercise

There were three domains to be explored in the relationship between cognitive-perceptual dimension and physical exercise among the respondents. The first entailed self-efficacy of exercise. In this domain, respondents were asked to rate their expectation of doing exercise in the coming year on an 11-point rating scale ranging from 0 (not at all sure) to 10 (very sure). Results indicated that nearly 70% of them reported a rating of 7 and above. Meanwhile, 80% of the respondents rated 7 and above concerning not exercising regularly is harmful to one's health on an 11-point rating scale ranging from 0 (not at all harmful) to 10 (very harmful). In this domain, respondents were further required to rate their confidence for increasingly difficult levels of exercise including walking, jogging, lifting objects, walking up stairs, and doing sit-ups. As the level of difficulty increased, the majority of respondents' efficacy scores decreased. The second entailed 'pros' and 'cons' of doing exercise and perceived barriers to exercise. About 66% of the respondents saw many 'pros' in doing physical exercise, whereas 88% of the survey respondents perceived little barriers to exercise. The top five perceived 'pros' were: maintaining physical health (80%); improving mobility (80%); building strong muscles (74%); relaxing mentally (73%); and feeling happy (69%). The top five perceived 'cons' were: muscle strains (4%); reactivating old wound (2%); possibly hurting muscles (2%); possibly hurting the back (1%); and feeling of exhaustion (1%). The top five perceived barriers were: inflexible and stiff limbs (54%); difficulties in memorising exercise styles (29%); not enough facilities in elderly social centre (20%); long waiting time to use facilities in elderly social centre (18%); and not enough public space to do exercise (16%). The third domain entailed stages of changes for exercise. Over one-third (35%) of the respondents reported a rating of 10 on an 11-point visual analogue scale, ranging from 0 (currently not engaged in exercise and have no such plan) to 10 (currently engaged in regular exercise and have been doing so for the past 6 months) as the best description of their physical exercise pattern. About 9% rated 0 that they did not do any exercise and had no plan to do so.

Patterns and levels of physical exercise and activity

The respondents' patterns and levels of physical exercise were examined in terms of work activity, household activity, leisure activity, caregiving activity, and sports activity. Because only 2% of the respondents held either a full-time or a part-time job, work activity was removed as it did not provide a sufficient number of responses for analysis on the levels of physical exercise and activity.

In assessing household activities, the study found that over half (56.3%) of the respondents performed light household chores on a regular basis such as washing dishes; 39.7% performed heavy household chores such as floor and window cleaning regularly. Almost half (49.3%) of the respondents chose walking as a mode of transportation for accomplishing daily activities such as going out to see friends or 'yum cha'. For shorter trips such as shopping,

Table 3. Summary and comparison of strength, flexibility and balance tests on the survey respondents to US statistics

Sex	Age-group (years)	30-second Chair Stand Test			30-second Arm Curl Test		
		HK mean	US mean	HK as US percentile	HK mean	US mean	HK as US percentile
Female	60-64	12.3	15	25	13.6	16	30
	65-69	11.3	14	25	13.1	15	30
	70-74	10.1	13	25	11.8	14	25
	75-79	9.4	12	20	11.5	14	25
	80-74	9.3	11	25	11.2	13	30
	85-89	8.3	10	25	10.5	12	30
	≥90	7.9	8	50	9.8	11	35
Male	60-64	14.0	16	25	14.2	19	15
	65-69	12.9	15	30	13.3	18	10
	70-74	11.6	14	25	12.7	17	15
	75-79	11.3	14	25	12.1	16	15
	80-74	11.1	12	35	11.5	16	15
	85-89	8.1	11	25	11.0	14	15
	≥90	5.8	10	15	8.5	12	15

walking was also the major preferred mode (87.3%). However, in terms of the number of flights of stairs walked per day (each flight approximately having 10 steps), only 17.2% of the respondents reported walking more than six flights of stairs a day. About 50% never used stairs.

The level of participating in leisure activity among the respondents was high. Over 97% of the respondents involved in a regular leisure activity and the average time they spent on the activity was 17.4 hours per week. The most popular choices of activities were watching TV (41%), followed by walking (17%), listening to radio (9%), and visiting elderly social centre (9%).

Concerning caregiving as a form of physical activity and exercise, the results found that slightly over one third of the respondents were caregivers for their spouse, grandchildren, and/or other relatives. For those who engaged in caregiving, the average time required was about 8 hours per week.

Regarding sports activity as a form of physical exercise, the study found that about 83% of the respondents regularly participated in sports activity. The amount of time they spent in the activity was an average of 4 hours per week. The preferred choices of sports activity among the respondents were light gymnastics (51%; defined by the respondents as the stretching of arms and legs, and relevant balancing bodily movements without a fixed routine) and Tai Chi (10%). About 60% of the respondents did not have an alternate sports activity. Furthermore, about 80% of the respondents reported that they would not spend any time on a second sports activity. Further analysis revealed that despite the high participation rate in sports activity, only 21% of the respondents gained a moderate-to-high level of physical exercise through participating in sports activity.

Bivariate and multivariate analyses

It was because only 2% of the respondents held a part-time or full-time job; the household activity was a rather habitual and unchangeable form of activity; the types of leisure activities most respondents engaged in were passive and without an exercise component (eg watching TV); and finally, only a small proportion of the respondents engaged in the role of a caregiver; the analysis of the present study was focused on sports activity only. Results of the correlation analysis found that age (r= –0.161, P<0.01), gender (r=0.093, P<0.01), educational attainment (r=0.127, P<0.01), self-rated health (r=0.146, P<0.01), number of chronic illnesses (r=0.073, P<0.05), functional capacity (r= –0.202, P<0.01), levels of depression (r= –0.112, P<0.01), cognitive ability (r=0.190, P<0.01), cognitive-perceptual category including perceived 'pros' and 'cons' of exercise (r=0.440, P<0.01), perceived barriers to exercise (r= –0.213, P<0.01), self-efficacy of exercise (r=0.271, P<0.01), and stages of change (r=0.586, P<0.01) were all significantly associated with sports activity with various degrees of strength. In the multiple regression analysis, as female respondents were over-sampled, a weighting was done to rectify the limitation of sample distribution. Concerning the relation between sports activity and the independent variables, the results showed that number of chronic illnesses suffered, cognitive ability, perceived 'pros' and 'cons' of doing exercise, self-efficacy of exercise, and stages of change for exercise were positively related to sports activity, while gender, levels of depression, perceived barriers to exercise were negatively related to sports activity. The overall model accounted for 43% of the total variance in the levels of sports activity.

Sub-sample data analysis

The pedometer results showed that the respondents averaged about 426 steps/hour over the average day's recording of 12.3 hours (from the Tritrac analysis), and if we assumed this normal active day was 12.3 hours long, this equated to approximately 5240 steps/day, which was very similar to the recommended 6000 steps per day for the elderly by Tudor-Locke and Myers.[6] There was no statistical significance relating to age and gender concerning the number of steps taking per day among the sub-sample respondents. Concerning heart rate, there were no statistically significant gender differences across the low,

8-foot Up & Go Test			Chair Sit & Reach Test			Back-Scratch Test		
HK mean	US mean	HK as US percentile	HK mean	US mean	HK as US percentile	HK mean	US mean	HK as US percentile
7.9	5.2	<5	2.1	2.1	50	-3.7	-0.7	20
8.5	5.6	<5	2.6	2.0	55	-4.1	-1.2	20
10.3	6.0	<5	0.9	1.4	45	-5.6	-1.7	15
10.6	6.3	<5	-0.7	1.2	45	-9.5	-2.1	<5
12.9	7.2	<5	-1.7	0.5	30	-9.9	-2.6	<5
13.6	7.9	<5	-4.3	-0.1	15	-10.7	-3.9	5
15.4	9.4	<5	-4.8	-1.7	25	-14.2	-4.5	<5
7.5	4.7	<5	-2.8	0.6	25	-7.9	-3.4	20
7.9	5.1	<5	-2.2	0.0	35	-7.5	-4.1	25
9.9	5.3	<5	-2.6	0.0	30	-9.5	-4.5	15
9.7	5.9	<5	-5.4	-1.1	15	-7.5	-5.6	35
10.4	6.4	<5	-7.8	-2.0	10	-8.4	-5.7	30
12.4	7.2	<5	-5.8	-2.4	20	-16.6	-6.2	<5
20.6	8.1	<5	-12.1	-3.6	<5	-11.8	-7.2	15

moderate, or vigorous levels of activity (these three levels of thresholds were classified according to the guidelines laid down by the American College of Sports Medicine[7]). When the data were examined using ANOVA and post-hoc Scheffe analyses across the three age-groups (60s, 70s, 80s), no significant differences were found, although the ≥80 age-group's values above the low-intensity threshold were surprisingly almost significantly higher than both the 60-69 and 70-79 age-groups. For Tritrac data, there were no statistically significant gender differences across the low, moderate, or vigorous levels of activity, but a high degree of similarity in the times spent in the moderate and vigorous heart rate thresholds. When the data were examined using ANOVA and post-hoc Scheffe analyses across the three age-groups (60s, 70s, 80s), a very similar pattern in the heart rate data was observed, but the ≥80 age-group's values were significantly higher than both the 60-69 and 70-79 age-groups across all three intensity levels (low, moderate, and high intensity).

Discussion

In this territory-wide study, female gender was over-sampled, as more of that gender responded. Moreover, the overall educational level of the respondents was substantially higher than in the general Hong Kong aged population. Furthermore the majority were retired, and not many identified themselves as caregivers, so they derived little physical activity and exercise through work and caregiving. Although a large percentage of the respondents did have regular leisure activity, their preferred choices were rather passive and sedentary. Their household activities were fairly repetitive with a low level of energy expenditure. Therefore, sports activity was assessed as the dependent variable, to examine what factors played a part in facilitating different levels of participation. According to the bivariate analysis, the older the individuals, the less likely they were to participate in sports. Although the literature suggests that males are more involved in sports, in the present study female respondents tended to be more active in that respect, many of whom often attended such activities organised at elderly social centres. Respondents with higher educational levels also had higher levels of participation in sports, whereas those with physical impediments were less likely to participate. Rehabilitation from illnesses was also a factor involving persons in more sports activity, with the aim of achieving better health through exercising their sick bodies. Additionally, there were cognitive-perceptual factors, including perceived 'pros' and 'cons' of exercise, self-efficacy of exercise, stages of change and perceived barriers to exercise, all of which were influential determinants contributing to engagement in sports activity. Thus, attitudes and beliefs may also play a part in affecting the level of participation in physical activity and exercise among elderly respondents. The multiple regression analysis further highlighted the importance of these variables in explaining a significant proportion of variance in terms of the degree of sports activity participation. Apparently, the association between the cognitive-perceptual dimension and sports activity participation provided a window to signify the applicability of the Transtheoretical Model[8] in modifying behavioural change and promoting physical activity and exercise. However, to demonstrate a causal relationship between changing behaviour and beliefs and the attainment of higher levels of participation in physical activity and exercise, would require a more elaborate research design.

Although walking is not considered a sports activity in the traditional sense, nearly 17% of the respondents engaged in this type of leisure activity. Many respondents also engaged in walking among their daily activities. Walking carries many health benefits. A substantial proportion of respondents adopted it deliberately in the course of completing their household activities. Thus, promotion of walking among the elderly in their immediate environment is practical and in turn, health enhancing.

Studies of this kind have their limitations. Physical activity participation is self-reported at the point of the

interview. Affective, social, economic, and cognitive factors can influence self-reporting of data. The cross-sectional study design did not allow for the determination of cause and effect. In addition, since the female gender and more highly educated subjects were over-sampled, interpreting the findings requires extra caution. The present study incorporated objective functional measures in assessing the effects of physical activity and exercise in the elderly respondents. Machine malfunction, the timing for recording information and respondent non-compliance due to the discomfort of wearing the devices invariably affected the collection of results and the quality of data. Moreover, as the distribution/availability of regulated/habitual physical activity in the present study was uneven, a larger sample size and examination of activities other than sports, could be of help.

Conclusion

In summary, the present study revealed that the majority of local elderly adults were living relatively inactive lifestyles. The specific relationship between cognitive-perceptual factors and levels of engagement in sports activity provides useful information for the development of programmes to facilitate participation by elderly persons in physical activity and exercise. Nonetheless, we have to recognise that changes of behaviour could not ensue in a vacuum. In motivating elderly persons to participate in a physically active lifestyle, their support networks must be strengthened. Moreover, at the neighbourhood level, easily accessible facilities should be provided and inequalities between neighbourhoods reduced. More incentives and encouragement for older adults to be physically active and enjoy the health benefits resulting from participation in physical activity and exercise are necessary. From the societal perspective, dispelling ageism is important to empower elderly persons to have greater control of their lives and become actively involved in the locality where they are residing.

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