

▲ Predictors of Physical Activity Behavior in Older Community-dwelling Adults

Colette Browning, PhD

Jane Sims, PhD

Hal Kendig, PhD

Karen Teshuva, PhD

Objectives: Physical activity is important health behavior for functional independence and quality of life in older people. This study examined factors that influence older people's engagement in physical activity. **Methods:** Data were analyzed from the first wave of the Melbourne Longitudinal Studies on Health Ageing program survey of 1000 persons aged 65 yrs and older living in noninstitutional settings in Melbourne, Australia. **Results:** Most people reported doing some physical activity in the previous 2 wks. Agreement that there was much older people can do to keep healthy influenced reported physical activity behaviour. Most respondents believed they did enough activity. Age, educational status, and income were also correlates of physical activity behavior. The predictors of energetic physical activity behavior (defined as engaging in both energetic and light activities in the past fortnight) were age, education, personal security score, and positive health beliefs, independent of health status. **Discussion:** These predictors have implications for planning and tailoring delivery of health promotion interventions. *J Allied Health* 2009; 38:8–17.

THE BENEFITS of physical activity for older people are well recognized. They include a lower incidence of hypertension, heart disease, osteoporosis, degenerative arthritis, colon cancer, and diabetes mellitus; improved mood and memory function; and a better and maintained social net-

work.¹ It has been argued that up to half of the decline in physical functioning associated with aging can be ameliorated through improved lifestyles, including regular participation in physical activity.² Exercise and physical activity can improve the quality of life of older people.^{3,4} Based on the current Australian National Physical Activity Guidelines, which recommend 30 minutes of moderate physical activity on most days of the week, more than half of older Australians are insufficiently active to gain health benefits; of these, one third can be classified as sedentary.^{3,5–7} These figures are similar to those reported for other western societies^{8,9} and highlight the need for targeted promotion of physical activity within this sector of the population.

Increasing participation by older people in physical activity is an international public health goal.^{10–12} Older people rate physical activity as an important aspect of remaining healthy¹³ and are more likely to engage in positive health behaviors than younger groups.^{14,15} However, participation in adequate levels of physical activity decreases across the life span.¹⁶

The study reported in this paper contributes to our understanding of physical activity promotion by focusing on physical activity in older community-dwelling adults using a “health action” approach that recognizes older people as active decision makers in a social context. This model focuses on goals as set by older people and the factors that they perceive as influencing their lives overall and priority health actions.¹⁷ The active decision-making approach in turn requires systematic attention to variation among groups in terms of gender, marital status, socioeconomic status, cultural background, and life experiences. The health action approach was developed in the Melbourne Longitudinal Studies on Health Ageing (MELSHA) program, a longitudinal survey of community-dwelling older people in Melbourne, Australia.¹³ The approach recognizes that the amount and types of current physical activity need to be understood in the context of the social and health resources that support or inhibit engagement in physical activity, beliefs about physical activity, and beliefs about the meaning of health (Figure 1).

Dr. Browning is Professor and **Dr. Sims** is Senior Research Fellow, Monash Institute of Health Services Research, Monash University, Notting Hill, Victoria, Australia; **Dr. Kendig** is Professor, Faculty of Health Sciences, University of Sydney, Sydney, New South Wales, Australia; and **Dr. Teshuva** is Project Officer, Lincoln Center for Research on Ageing, La Trobe University, Melbourne, Victoria, Australia.

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Address correspondence and reprint requests to: Jane Sims, PhD, Senior Research Fellow, Faculty of Medicine, Nursing and Health Sciences, Monash University, Bldg 1, 270 Ferntree Gully Road, Notting Hill, Victoria 3168, Australia. Tel 61-03-9501-2436; fax 61-03-8575-2233; e-mail jane.sims@med.monash.edu.au.

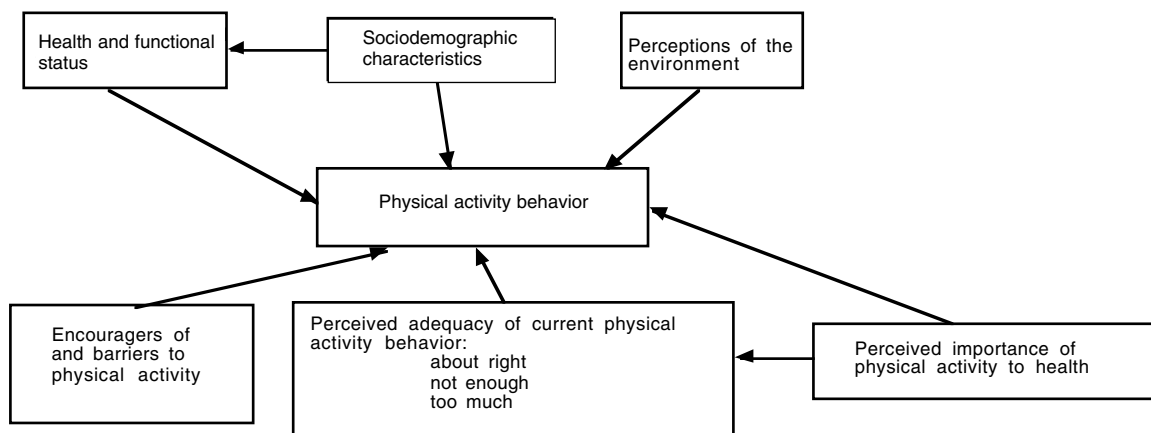


FIGURE 1. Determinants of physical activity: a health action model.

Physical Activity: Types and Amount

The optimal type(s) and level of physical activity to either maintain or enhance function in older people have not yet been determined. Interventions to improve physical functioning in older adults should be based on a thorough understanding of the relative benefits of different types and levels of physical activity.^{18–20} Most recommendations for older people reflect those for adults in general,⁸ although the Australian federal government recently commissioned the production of specific recommendations for older people.²¹

Studies of physical activity in older adults have explored various types of physical activity ranging from everyday activities around the home to vigorous organized activities such as aerobics and progressive resistance training.^{22,23} While for younger adults beneficial effects from physical activity may be achieved if individuals exercise at 60% of maximum heart rate for at least 20 minutes, at least 3 times a week, researchers have posited that it is possible that much lower levels of activity will be beneficial for older groups in terms of maintaining physical capacities.^{24–26} In the present study, we took a comprehensive approach to what constitutes physical activity behavior, including incidental activities in everyday life as well as structured exercise and sport.

Health Beliefs and Physical Activity

The influence of psychological characteristics in predicting health behaviors has dominated health psychology research literature. Several predictive models have been developed that incorporate the role of beliefs, perceptions, attitudes, self-efficacy, values, and motives in the adoption and maintenance of health behaviors such as physical activity.²⁷ Although these models have been well tested in younger adults, far less is known about the influence of attitudes and perceptions on older adults' physical activity.

We previously reported that 28% of our sample said that they felt healthy if they were physically fit or active, and 50% said that their ideal healthy person would be fit or active.¹³ In the present study, we further examined beliefs about physical activity, the meaning of health, what it means to be a healthy person, and their associations with self-reported physical activity behavior.

The Influence of Social Factors on Physical Activity

There is increasing evidence that health behaviors are not merely a product of intraindividual psychological characteristics but that individual choices are influenced by various contexts such as socioeconomic status, family relationships, and cultural factors.^{28,29} In previous analyses of the MELSHA data, engagement in energetic physical activity in the past 2 wks was positively associated with higher income, education, and occupation.³⁰

While an older person's attitudes may be set in childhood, they are influenced by adult roles as partner, parent, and grandparent.³¹ Although previous research with the MELSHA baseline data indicated that encouragement from other people was more important for social than physical activity,¹³ it has been demonstrated that marriage increases the likelihood of having someone to encourage physical activity, especially if the couple have children.^{32,33}

Physical activity behavior is also framed by a person's environment. There is growing evidence of an association between activity patterns, particularly walking, and the environments in which the person lives, works, and plays.^{34,35}

In summary, a number of factors are associated with physical activity behavior in older adults. These include health, health attitudes and beliefs about physical activity, and extrinsic factors such as socioeconomic status, social support, and the environment. The relative contribution of these factors in predicting the physical activity behavior of

older people has not previously been systematically investigated. The study also adds to our understanding of physical activity in older adults by examining light and energetic physical activity patterns (as defined by older people's self-report of their own activities). Our rationale is that distinguishing features may be amenable to modification via programs to increase activity among older people. To design effective interventions, we need a greater understanding of how older people perceive physical activity and the influences on participation. This is most important to enable a more person-centered approach to health care provision. Such guidance will further inform health practitioners, whose role in advising older people to become physically active and in supporting the maintenance of physical activity behavior has gained greater prominence over the past few decades.

The following questions are addressed in this paper:

1. To what extent is older peoples' physical activity behavior influenced by their health attitudes and beliefs about physical activity?
2. To what extent are older peoples' physical activity behavior, health attitudes, and beliefs about physical activity influenced by health status and sociodemographic factors (gender, marital status, age, education, occupation, and income)?
3. Do health attitudes and beliefs about physical activity predict physical activity behavior after controlling for health status and sociodemographic factors?

Methods

SAMPLE

The MELSHA study is a longitudinal study of 1000 persons aged 65 yrs and older living in noninstitutional settings in Melbourne, Victoria, Australia.¹³ The survey population for the 1994 baseline survey was defined as all residents of private dwellings in metropolitan Melbourne aged 65 yrs and older. With assistance from the Australian Bureau of Statistics, the Victorian electoral roll was used to develop a clustered sample of 1865 potentially eligible older people from 40 inner Melbourne postcodes. Eligibility was determined through home visits or telephone contact. The sample yielded 1422 eligible participants. Individuals defined as "out of scope" included those no longer living in metropolitan Melbourne (1.7%), those living in nonprivate accommodation (3.3%), deceased persons (2.0%), and people with incorrect date of birth (0.2%). Other exclusions were usual residents absent for the duration of the survey (1.3%), those who could not speak basic English (11.3%), and those who could not be interviewed for health reasons (3.7%). Excluding the "out of scope" categories, the response rate for the full interview was 70%. Comparisons with the Australian Census show that the sample was representative of older people in the Melbourne community, apart from those too ill to be interviewed and

non-English-speaking people. The survey slightly overrepresented homeowners and those not relying on a government pension as their main source of income.

PROCEDURE

Face-to-face interviews were conducted in respondents' homes on a rolling basis from May to December 1994. There was one 1994 interview per person. At the end of the interview, interviewers conducted a brief physical examination and a self-completion questionnaire was left for later return by mail. A short structured interview was used for people who were unable to complete the full interview or when a proxy was needed.

MEASURES

This paper reports on a subset of measures from the project's larger interview schedule. The full interview schedule is reported elsewhere.¹³ The measures included those believed to impact on physical activity (sociodemographic characteristics, health and functional status, health attitudes and beliefs about living a healthy life, and extrinsic enablers of and barriers to physical activity) and a self-report measure of physical activity. These measures capture the factors postulated to influence engagement in physical activity under the health action model (Figure 1).

Sociodemographic Characteristics

Gender, marital status, occupation, and age were recorded. For women who had not been in the labor force since the age of 40 yrs, occupational status was indicated as husband's occupation. Details of the highest level of education achieved and self-reported income (government pension only/pension plus other income) were obtained.

Health and Functional Status

Self-rated health was measured on a five-point scale, from excellent to poor, rated 1 through 5. The need for assistance with instrumental activities of daily living (IADL) was measured using the Multilevel Assessment Instrument developed by the Philadelphia Geriatric Center.³⁶ Participants were classified as IADL dependent if they had difficulty doing their own cooking, cleaning, or shopping and IADL independent if they had no difficulty in performing these activities. Objective health status was obtained using the Timed Get Up and Go Test³⁷ and an interviewer rating of walking disability based on visual assessment.

Health Attitudes and Beliefs about Physical Activity

Questions on health perceptions and the concept of health were based on items from the British Health and Lifestyle Survey.³⁸ Attitudes and beliefs were measured with the following questions:

TABLE 1. Participants Engaging in Energetic and Light Activity in the Past 2 Wks by Age and Gender*

	Male		Female		All
	65–74 yrs (n = 307)	75+ yrs (n = 144)	65–74 yrs (n = 307)	75+ yrs (n = 187)	(n = 945)
Activity level in past 2 wks, n (%)					
Energetic	146 (47.6)	56 (38.9)	158 (51.5)	63 (33.7)	423 (44.8)
Light	161 (52.4)	88 (61.1)	149 (48.5)	124 (66.3)	522 (55.2)

*Due to rounding, not all percentages sum to 100%. *Energetic* refers to those engaging in energetic activity or energetic plus light activity, and *light* refers to those engaging in light activity or none.

- How important is physical activity for the health of older people?
- Would you say that your level of physical activity is not enough, about right, or too much?
- Do you think there is a lot older people can do to keep healthy?
- Is the way you are living very healthy, healthy, or not so healthy?

Extrinsic Influences on Physical Activity Behavior

Information about extrinsic barriers and enablers to physical activity were assessed. People were asked whether they would like to be more physically active and whether they had commenced or ceased any physical activity in the past 5 yrs. They were also asked whether anyone encouraged them to be physically active. Finally, details of the persons' environment were also considered, using measures adapted from the Multilevel Assessment Instrument Personal Security Index.³⁶ The subjective neighborhood index assessed the influence of the local environment in facilitating or discouraging independence and activity. The personal security index measured the respondents' feelings of safety in their neighborhoods during the day and night and in their homes at night. Personal security index scores range from 3 to 6, with a higher score indicating lower personal safety.

Self-Reported Physical Activity

Respondents were asked whether during the previous 2 wks they had engaged in (1) any physical activity that made them breathe harder or puff or pant (defined as energetic or vigorous physical activity) or (2) any physical activity that did not make them breathe harder or puff or pant (defined as light physical activity). The respondents were asked to list up to three types of energetic activity and up to three types of light activity they had done. This method reflected that used in the Australian Risk Factor Prevalence Studies.¹³

To assess predictors of physical activity behavior according to perceived intensity, the interviewees' responses as to whether they participated in energetic and light activities were recoded into one new variable, termed "physical activity behavior." Those who had engaged in energetic activity with or without light activity formed one group (energetic). They were compared with those who reported only light

activity or no activity at all (light). It was hypothesized a priori that the classification would be predicted by people's demographic characteristics, their self-reported health status, their health beliefs, and their environment.

ANALYSIS

χ^2 tests were used to determine the relationships between physical activity behavior and health attitudes, beliefs about physical activity, health status, sociodemographic characteristics, and personal security. Independent *t* tests were conducted for the neighborhood index, a continuous variable. Variables that were significantly associated with physical activity behavior in the univariate analyses were examined in the subsequent multivariate regression analyses, using a backward entry, stepwise (likelihood ratio, LR) approach, allowing for the use of categorical independent variables.

Results

Of the 1000 participants interviewed, two thirds (64.2%) were aged between 65 and 74 yrs, and just over half (53%) were female. For the variables reported here, data were available for up to 992 participants. For the main variable under consideration, physical activity behavior, data were available for 945 participants

PHYSICAL ACTIVITY BEHAVIOR

A total of 423 people (44.8%) were in the energetic with/without light activity (energetic) category and 522 (55.2%) in the light/none (light) category. The majority of respondents (94.6%) reported that they had engaged in at least light activities in the 2 wks before the interview. Forty-four people reported energetic activities alone, and 51 reported no activity in the past 2 wks. Table 1 shows reported physical activity behavior by age and gender.

HEALTH ATTITUDES AND BELIEFS ABOUT PHYSICAL ACTIVITY

The majority of participants held positive beliefs about physical activity. Almost all participants (94.7%) perceived physical activity to be very important (or important) for the

TABLE 2. Physical Activity Behavior by Health Beliefs and Health Status

	Total No. (χ^2 , <i>p</i> value)	Physical Activity Behavior, <i>n</i> (%)	
		Energetic	Light
Health beliefs			
There is a lot older people can do to keep healthy.			
Yes	873	404 (98.1)	469 (94.7)
No	34	8 (1.9)	26 (5.3)
	(5.94, 0.01)		
The way I live my life these days is:			
Very healthy	419	190 (45.0)	229 (44.2)
Fairly healthy	458	201 (47.6)	257 (49.6)
Not so healthy	63	31 (7.3)	32 (6.2)
	(0.69, 0.71)		
How important is physical activity for older people?			
Very important	655	303 (72.8)	352 (68.6)
Important	227	98 (23.6)	129 (25.1)
Somewhat important	38	10 (2.4)	28 (5.5)
Not at all important	9	5 (1.2)	4 (0.8)
	(6.48, 0.10)		
Is your usual physical activity enough?			
Not enough	258	122 (29.0)	136 (26.3)
About right	668	289 (68.6)	379 (73.2)
Too much	13	10 (2.4)	3 (0.6)
	(6.71, 0.03)		
Health status			
Self-rated health			
Excellent	175	73 (17.4)	102 (19.8)
Very good	296	135 (32.1)	161 (31.3)
Good	316	140 (33.3)	176 (34.2)
Fair	128	64 (15.2)	64 (12.4)
Poor	20	8 (1.9)	12 (2.3)
	(2.36, 0.67)		
Interviewer-rated walking disability			
No	803	374 (88.4)	429 (82.5)
Yes	140	49 (11.6)	91 (17.5)
	(6.46, 0.01)		
Timed Get Up and Go Test			
10 sec	501	246 (58.6)	255 (49.5)
10–20 sec	385	159 (37.9)	226 (43.9)
20+ sec	12	3 (0.7)	9 (1.7)
Not completed	37	12 (2.8)	25 (4.8)
	(12.62, 0.01)		
Environment: personal security index			
3	620	283 (77.7)	337 (83.4)
4	87	41 (11.3)	46 (11.4)
5	45	31 (8.5)	14 (3.5)
6	16	9 (2.5)	7 (1.7)
	(9.61, 0.02)		

health of older people. While less than half of the sample (44%) believed that they currently led a very healthy life, two thirds (69%) believed that their present level of physical activity was “about right.” Several health attitudes and beliefs about physical activity were associated with reported physical activity behavior (Table 2). In the univariate analyses, physical activity behavior was distinguishable by the responses to “there is a lot older people can do to keep

healthy” ($\chi^2 = 5.94$, $p = 0.01$) and whether the person believed their usual physical activity level was enough ($\chi^2 = 6.71$, $p = 0.03$).

Commonly cited enablers of physical activity were motivation, enjoyment, the availability of activities to do, and the desire to achieve good health. One third (31.4%) of the interviewees reported receiving encouragement to be physically active. The commonest source of encouragement was

TABLE 3. Physical Activity Behavior by Sociodemographic Characteristics

Characteristic	Total No. (χ^2 , p value)	Physical Activity Behavior, n (%)	
		Energetic	Light
Marital status			
Married, partner	551	261 (61.7)	290 (55.6)
Widowed	299	125 (29.6)	174 (33.3)
Divorced/separated	51	23 (5.4)	28 (5.4)
Never married	44	14 (3.3)	30 (5.7)
	(5.65, 0.13)		
Highest qualification reached			
Left school at age 14 yrs	334	129 (30.5)	205 (39.5)
Left school at age 15+ yrs	219	98 (23.2)	121 (23.3)
Trade/apprenticeship	118	53 (12.5)	65 (12.5)
Certificate/diploma	213	113 (26.7)	100 (19.3)
University degree	58	30 (7.1)	28 (5.4)
	(12.15, 0.02)		
Income amount			
Pension only	496	202 (53.9)	294 (62.8)
More than pension	347	173 (46.1)	174 (37.2)
	(6.53, 0.01)		

the person's spouse (45.7%), followed by other family members (41.5%), health professionals (14%), friends or neighbors (8.6%), and organized groups (3.8%). Taking up an activity in the past 5 yrs ($\chi^2 = 7.08$, $p = 0.01$) and having someone to encourage physical activity ($\chi^2 = 4.61$, $p = 0.03$) were predictive of physical activity grouping. With regard to environmental factors, personal security scores were also predictive of energetic physical activity pattern ($\chi^2 = 9.61$, $p = 0.02$), but neighborhood satisfaction scores were not ($t = -0.35$, $p = 0.72$).

INFLUENCE OF HEALTH STATUS ON HEALTH ATTITUDES AND BELIEFS

The most commonly cited barrier to physical activity was "health problems." Although self-reported health status was not associated with physical activity behavior ($\chi^2 = 2.36$, $p = 0.67$), the interviewer's rating of walking disability and the Timed Get Up and Go Test scores were ($\chi^2 = 6.46$, $p = 0.01$; $\chi^2 = 12.62$, $p = 0.01$) (Table 2); the latter may be more specific measures of functional capacity for physical activity.

Those who rated their health as excellent or good were more likely to report that "there was a lot older people could do to stay healthy," to "live a healthy life," and to judge their level of physical activity as "about right" ($\chi^2 = 18.33$, $p = 0.001$; $\chi^2 = 253.14$, $p = 0.0001$; and $\chi^2 = 86.30$, $p = 0.0001$, respectively). Those who rated their health as excellent or good were also significantly more likely to rate physical activity as "very important," but the trend was not as significant ($\chi^2 = 22.78$, $p = 0.03$). Those with IADL dependencies were less likely to rate their life as healthy and were more likely to believe that their activity level was "not enough" ($\chi^2 = 44.14$, $p = 0.0001$; $\chi^2 = 46.62$, $p = 0.0001$).

PHYSICAL ACTIVITY AND SOCIODEMOGRAPHIC CHARACTERISTICS

In univariate analyses, physical activity behavior was modestly but significantly associated with age ($r = 0.13$, $p = 0.001$), but there was no significant gender difference. Those aged 75 yrs and older were more likely to engage in light rather than energetic activity, although one third (36%) had engaged in energetic activities (Table 1). There was a nonsignificant trend for those who had never been married to be less likely to have engaged in energetic activity than those who were or had been married ($\chi^2 = 5.65$, $p = 0.13$) (Table 3). There was no difference across occupational groupings, but there was a negative correlation with income ($r = -0.08$, $p = 0.03$). Those receiving only a government pension were less likely to engage in energetic activity ($\chi^2 = 6.53$, $p = 0.01$).

INFLUENCE OF SOCIODEMOGRAPHIC CHARACTERISTICS ON HEALTH ATTITUDES AND BELIEFS

Health beliefs were influenced by sociodemographic factors. Perceived importance of physical activity varied significantly by age, occupation, and education. People in the younger age group were more likely to rate physical activity as "very important" ($\chi^2 = 8.12$, $p = 0.04$), as were those with higher occupational status and level of education ($\chi^2 = 42.96$, $p = 0.01$; $\chi^2 = 30.41$, $p = 0.002$). Participants generally had positive beliefs about the adequacy of their present level of physical activity. Those who were 75 yrs and older were more likely to believe that their level of physical activity was "about right," while those aged between 65 and 74 yrs were more likely to think they were doing too much ($\chi^2 = 6.40$, $p = 0.04$). The less educated thought they were

TABLE 4. Multivariate Logistic Regression: Predictors of Physical Activity Behavior, Adjusting for Relevant Sociodemographic and Health-related Factors

Variable	Odds Ratio	95% Confidence Interval
Attitudes and beliefs (n)		
There is a lot older people can do to keep healthy.		
No (26)		
Yes (706)	1.98	0.80–4.92
Environment		
Personal security index		
3 (591)		
4 (84)	1.03	0.65–1.66
5 (42)	2.87*	1.43–5.74
6 (15)	1.94	0.66–5.66
Does anyone encourage you to be physically active?		
No (493)		
Yes (239)	1.30	0.95–1.80
Sociodemographic factors		
Age group (yrs)		
65–69 (236)		
70–74 (257)	0.99	0.70–1.45
75–79 (129)	0.64†	0.41–0.99
80–84 (87)	0.59†	0.35–0.99
85+ (23)	0.27	0.10–0.76
Level of education reached		
Left school aged 14 yrs or younger, no other qualification (236)		
Left school aged 15+ yrs, no other qualification (172)	1.27	0.84–1.92
Trade/apprenticeship (98)	1.27	0.78–2.07
Certificate/diploma (178)	1.66*	1.11–2.50
Batchelor's degree or higher (48)	2.30*	1.21–4.45

Note. Sample $n = 732$ (268 missing cases). First category is the referent category.
Exp(B): * $p < 0.01$, † $p < 0.05$.

doing enough, whereas the more educated were more likely to report doing too much ($\chi^2 = 30.87$, $p = 0.001$). There were no significant differences for gender or marital status.

THE RELATIVE INFLUENCE OF PREDICTORS OF PHYSICAL ACTIVITY BEHAVIOR

The relationship between physical activity behavior and sociodemographic characteristics, health status, health attitudes, and beliefs about physical activity was tested using logistic regression analyses (Table 4). Those who were younger (65–74 yrs) and more educated were more likely to be in the energetic group. Personal security scores were also predictive of energetic physical activity. Interestingly, those with less secure environments were more likely to be in the energetic category. Having someone who encouraged phys-

ical activity was indicative of energetic behavior but failed to reach significance in the final model (odds ratio, 1.30; 95% confidence interval, 0.95–1.80; $p = 0.10$). Similarly, holding the view that there was a lot that older people could do to keep healthy was also suggestive of energetic physical activity behavior (odds ratio, 1.98; 95% confidence interval, 0.8–4.92; $p = 0.10$).

Discussion

The present study investigated the relationship between sociodemographic characteristics, health status, health attitudes, beliefs about physical activity, the environment, and physical activity behavior using a health action approach.

In terms of the reported physical activity, while some people reported several types of activity, most reported only one main activity. Walking, gardening, home maintenance or housework, and exercises or sports were the main activities reported. Notably, these activities were common to both the energetic and the light item responses, indicating that older people believe that it is possible to do them with varying intensity. For example, 50 (12%) of those categorized as “energetic” referred to walking as both a light and an energetic activity undertaken in the past fortnight.

TO WHAT EXTENT ARE OLDER PEOPLES' LEVELS OF PHYSICAL ACTIVITY INFLUENCED BY THEIR HEALTH ATTITUDES AND BELIEFS ABOUT PHYSICAL ACTIVITY?

Demographic and extrinsic predictors notwithstanding, intrinsic factors remain important predictors of behavior. The belief that there is a lot that older people can do to keep healthy reflects an internal locus of control and may be a proxy for the respondent's own sense of self-efficacy. This belief is one that can be promoted among older people as part of a strategy for optimizing independent living. Those participants who were younger and better educated appeared to feel more in control of their health, as supported by other research.²⁸ Ferrini et al.,³⁹ who examined the relationship between health beliefs and health behavior change in older adults, reported that participants who held positive beliefs about exercise and diet were more likely to report behavior change. Those who were mentally confused or had motivational problems were less likely to report positive changes. Similarly, Berger et al.⁴⁰ found that healthy lifestyle (not smoking and adherence to a healthy diet) predicted physical activity behavior. Among older women surveyed about their attitude to and knowledge about exercise, precontemplators were less likely than contemplators and actives to have knowledge about physical activity, to see the psychological benefits of physical activity, and to have family support to exercise and were more likely to perceive practical barriers to exercise.^{41,42} Health promotion programs can encourage such groups to adopt and maintain active physical activity behavior; the evidence gathered over recent years shows that goal setting,

reinforcement, self-monitoring, and provision of social support are important strategies for successful physical activity promotion⁴³ that could be used with these groups.

Older people want to be physically active to maintain their independence.⁴⁴ Positive attitudes and beliefs are vital to the adoption and maintenance of this physical activity. Brown et al. conducted focus groups with older Australians and reported that keeping healthy and independent and avoiding the negative stereotypes of aging were key factors motivating physical activity behavior.⁴⁵

TO WHAT EXTENT ARE OLDER PEOPLES' LEVELS OF PHYSICAL ACTIVITY, HEALTH ATTITUDES, AND BELIEFS ABOUT PHYSICAL ACTIVITY INFLUENCED BY HEALTH STATUS AND SOCIODEMOGRAPHIC FACTORS?

It appeared that younger, more-educated older people were more likely to participate in energetic activity. It may be that people with a higher socioeconomic status level display better physical activity profiles as they enter old age and that they maintain their physical activity behavior. Lynch et al.,²⁹ investigating the influence of social class on older men's health behaviors, reported that those in the least educated group were more likely to report not doing any physical activity. Others have investigated the influence of psychosocial factors on a range of health behaviors. In one study, those aged 65 yrs and older who engaged in vigorous exercise more than once per week were more likely (than those who did not do so) to have a higher education level, be male, and have no activity limitation restrictions.⁴⁶

There is growing evidence that a person's environment can influence his or her physical activity behavior,^{47,48} with calls for environmental enhancement to promote behavior change. The findings here suggest that a less secure rather than a more secure environment is predictive of energetic physical activity behavior. While this might contradict the view that people are more likely to be physically active given a pleasant neighborhood, it draws attention to the complexity of choices people make about physical activity. An alternative interpretation is that people who want to be active go outside of their immediate environment to exercise. The study data do not allow this explanation to be tested further. However, it is in line with calls by Giles-Corti et al.³⁴ to determine where people participate in physical activity.

The participants confirmed the importance of social support and having someone with whom to exercise. Participants noted the role of motivation as an important enabler, aligned to recent research highlighting lack of interest as the greatest deterrent for physical activity behavior.⁴⁹ In the multivariate model, the role of an encourager was a modest predictor of physical activity behavior. Because the spouse was the commonest reported source of encouragement, this finding probably reflects the trend seen in univariate analyses for those who had never been married to be less likely to have engaged in energetic activity than those

who were or had been married, in line with previous research.^{32,33} Only a small proportion of this group cited health professionals among those providing encouragement. There is scope for their role to be further developed.

DO HEALTH ATTITUDES AND BELIEFS ABOUT PHYSICAL ACTIVITY PREDICT LEVELS OF PHYSICAL ACTIVITY AFTER CONTROLLING FOR HEALTH STATUS AND SOCIODEMOGRAPHIC FACTORS?

The decreased prevalence of energetic physical activity behavior with aging is not simply related to a person's health status. Although health problems were cited as a key barrier to physical activity, health status was not a predictor of physical activity behavior in the regression modeling, suggesting that attitudes may be more important predictors of physical activity behavior. These findings are in contrast to those of other researchers,⁴⁰ who found that higher levels of physical activity were associated with a healthier lifestyle. Here, physical activity behavior was not predicted by subjective (self-report) health status or more objective health status (IADL), suggesting that behavior is being influenced by sociocultural factors. Clearly, both intrinsic and extrinsic factors need to be further addressed in the promotion of physical activity among older people. These findings have implications for tailored health promotion interventions.

The fact that older people were less likely to be engaged in higher intensity physical activity independent of health status suggests that we still need to overcome the influences of societal myths about the older person's capacity to be physically active and prevailing stereotypes and views on the acceptability of physical activity behavior in older people. It is well documented that these societal factors influence individual older people's behavior.⁵⁰ Such cultural and ageist expectations need to be challenged for the health benefits of regular activity in later life to be realized.⁵¹

To extend the adoption of vigorous activity, promotion needs to be targeted at older, single, less educated people, perhaps with a focus on overcoming social isolation rather than becoming physically active per se. To extend the adoption of light activity, those with limited motivation need to be targeted. Research has shown the importance of self-efficacy in the adoption and maintenance of physical activity.¹⁸ This characteristic may need enhancement before people are ready to consider physical activity programs. Our findings suggest that it may be useful to engage older people in psychological programs to encourage healthy aging as a precursor to any physical activity promotion.

In summary, the physical activity message needs to be tailored so that people are aware that activity is of benefit at any age. In order to set goals and make the right decisions to adopt and maintain physical activity behavior, older people require empowerment to support the belief that there is much they themselves can do to keep healthy. This will involve not only encouragement but also infrastructure

support via access to a range of environments that are conducive to physical activity that meets the needs of a diverse community of older people.

Although health attitudes and beliefs about physical activity were associated with a number of sociodemographic variables, the strength and direction of any relationship can only be determined with longitudinal data. We intend to explore this further, using data collected from the MELSHA cohort at later dates.

Our findings add to the evidence base and lend further support to the recommendation that both intrinsic and extrinsic social, environmental, and economic barriers to participation need to be addressed.^{28,52,53} The current evidence base suggests that it is possible to increase physical activity behavior, at least in motivated volunteers, and particularly when multifaceted interventions are used.^{22,23,43,54} By creating supportive policies and environments and using a more targeted approach to physical activity promotion, health service planners and providers should achieve greater success.

REFERENCES

- Mazzeo RS, Tanaka H: Exercise prescription for the elderly. *Sports Med* 2001; 31:809–818.
- Astrand PO: Why exercise? *Med Sci Sports Exerc* 1992; 24:153–162.
- Bauman A: Health benefits of physical activity for older adults—epidemiological approaches to the evidence. In: Morris M, Schoo A, eds: *Optimizing Exercise and Physical Activity in Older People*. Edinburgh: Butterman Heinemann; 2004.
- Pate RR, Pratt M, Blair SN, et al: Physical activity and public health: a recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *JAMA* 1995; 273:402.
- Armstrong T, Bauman A, Davies J: *Physical Activity Patterns of Australian Adults: Results of the 1999 National Physical Activity Survey*. Canberra: Australian Institute of Health and Welfare; 2000.
- Australian Bureau of Statistics: *National Health Survey: Summary of Results 2004–2005*. Canberra: Australian Bureau of Statistics; 2006.
- Bauman A: *Physical Activity Levels of Australians: Results of the Active Australia Baseline Survey*. Canberra: Active Australia; 1997.
- Agency for Healthcare Research and Quality and the Centers for Disease Control and Prevention: *Physical Activity and Older Americans: Benefits and Strategies*. Washington, DC: AHRQ/CDC, Dep of Health and Human Services; 2002. Available at: <http://www.ahrq.gov/ppip/activity.htm>. Accessed Jan 27, 2005.
- National Health Service Information Centre: *Health Survey for England—updating of trend tables to include 2004 data*. London: The Information Centre; 2005. Available at: <http://www.ic.nhs.uk/pubs/hseupdate05>. Accessed Jan 27, 2005.
- Bull F, Bauman A, Bellow B, et al: *Getting Australia Active II: An Update of Evidence on Physical Activity for Health*. Melbourne: National Public Health Partnership; 2004.
- National Public Health Partnership: *Be Active Australia: A Health Sector Framework for Action 2005–2010*. Melbourne: National Public Health Partnership; 2003.
- Prohaska T, Belansky E, Belza B, et al: Physical activity, public health and aging: critical issues and research priorities. *J Gerontol* 2006; 61B:S267–S273.
- Kendig H, Helme R, Teshuva K, et al: *Health Status of Older People Project: Data Report*. Melbourne: Victorian Health Promotion Foundation; 1996.
- Bull F, Jamrozik K: Advice on exercise from a family physician can help sedentary patients to become active. *Am J Prev Med* 1988; 15(2):85–94.
- Wagner E, Grothaus L, Hecht J, et al: Factors associated with participation in a senior health promotion program. *Gerontologist* 1991; 31:598–602.
- Ruuskanen J, Ruoppila I: Physical activity and psychological well-being among older people aged 65 to 84 years. *Age Ageing* 1995; 24:292–296.
- Kendig H: Understanding health promotion for older people: sociological contributions. In: Minichiello V, Chappell N, Kendig H, et al, eds: *The Sociology of Ageing*. Melbourne: International Sociological Association; 1996: pp 360–375.
- Dishman R: The impact of behaviour on quality of life. *Qual Life Res* 2003;12(suppl 1):43–49.
- Spiriduso W, Cronin D: Exercise dose-response effects on quality of life and independent living in older adults. *Med Sci Sports Exerc* 2001; 33(suppl):S598–S606.
- Young D, Masaki K, Curb J: Associations of physical activity with performance-based and self-reporting physical functioning in older men: the Honolulu Heart Program. *J Am Geriatr Soc* 1995; 43:845–854.
- Sims J, Hill K, Hunt S, et al: *National Physical Activity Recommendations for Older Australians: Discussion Document. A Report to the Department of Health and Ageing*. April 2006. Melbourne: National Ageing Research Institute; 2006.
- Conn VS, Minor MA, Burks KJ, et al: Integrative review of physical activity intervention research with aging adults. *J Am Geriatr Soc* 2003; 51:1159–1168.
- Cyarro EV, Moorhead GE, Brown WJ: Updating the evidence relating to physical activity intervention studies in older people. *J Sci Med Sport* 2004; 7(1 suppl):30–38.
- Dallosso HM, Morgan K, Bassey EJ, et al: Levels of customary physical activity among the old and very old living at home. *J Epidemiol Community Health* 1988; 42:121–127.
- Lee I, Skerrett P: Physical activity and all cause mortality: what is the dose-response relation? *Med Sci Sports Exerc* 2001; 33(6 suppl): S459–S471.
- Wong C, Wong S, Pang W, et al: Habitual walking and its correlation to better physical function: implications for prevention of physical disability in older persons. *J Gerontol (A)* 2003; 58:555–560.
- Gochman DS: *Handbook of Health Behavior Research*. London: Plenum; 1997.
- Burton N, Turrell G, Oldenberg B: Participation in physical activity: why do socioeconomic groups differ? *Health Educ Behav* 2003; 30:225–244.
- Lynch JW, Kaplan GA, Salonen JT: Why do poor people behave poorly?: variation in adult health behaviours and psychosocial characteristics by stages of the socioeconomic lifecourse. *Soc Sci Med* 1997; 44:809–819.
- Kendig H, Browning C, Teshuva K: Health actions and social class among older Australians. *Aust NZ J Public Health* 1998; 22:808–813.
- Kendig H, Browning C, Wells Y: Australian research on ageing, families and health promotion. *Soc Policy J NZ* 1998; 11:169–181.
- Andrews G, Cheok F, Carr S: The Australian Longitudinal Study of Ageing. *Aust J Ageing* 1989; 8:31–35.
- Kendig H, Dykstra PA, van Gaalen RI, et al: Health of aging parents and childless individuals. *J Fam Issues* 2007; 28:1457–1486.
- Giles-Corti B, Timperio A, Cutt H, et al: Development of a reliable measure of walking within and outside the local neighbourhood: RESIDE Neighbourhood Physical Activity Questionnaire. *Prev Med* 2006; 42:455–459.
- Owen N, Humpel N, Leslie E, et al: Understanding environmental influences on walking Americans. *J Prev Med* 2004; 27:67–76.
- Lawton M, Moss M, Fulcamer M, et al: A research and service oriented multilevel assessment instrument. *J Gerontol* 1982; 37:91–99.
- Podsiadlo D, Richardson S: The Timed 'Up and Go': a test of basic functional mobility for frail elderly persons. *J Am Geriatr Soc* 1991; 39:142–148.
- Cox BD, Blaxter M, Buckle A, et al: *The Health and Lifestyle Survey*.

39. Ferrini R, Edelstein S, Barrett-Connor E: The association between health beliefs and health behavior change in older adults. *Prev Med* 1994; 23:1–5.
40. Berger U, Der G, Mutrie N, et al: The impact of retirement on physical activity. *Ageing Soc* 2005; 25:181–195.
41. Barké CR, Nicholas DR: Physical activity in older adults: the stages of change. *J Appl Gerontol* 1990; 9:216–223.
42. Lee C: Attitudes, knowledge, and stages of change: a survey of exercise patterns in older Australian women. *Health Psychol* 1993; 12:476–480.
43. King AC: Interventions to promote physical activity by older adults. *J Gerontol Series A Biol Sci Med Sci* 2001; 56:36–46.
44. Melillo KD, Futrell M, Williamson E, et al: Perceptions of physical fitness and exercise activity among older adults. *J Adv Nurs* 1996; 23:542–547.
45. Brown WJ, Fuller B, Lee C, et al: Never too late: older people's perceptions of physical activity. *Health Promotion J Aust* 1999; 9:53–63.
46. Wister A: The effects of socioeconomic status on exercise and smoking: age-related differences. *J Aging Health* 1996; 8:467–488.
47. Handy S, Boarnet M, Ewing R, et al: How the built environment affects physical activity. *Am J Prev Med* 2002; 23(2S):64–73.
48. Saelens BE, Sallis JF, Black JB, et al: Neighborhood-based differences in physical activity: an environment scale evaluation. *Am J Public Health* 2003; 93:1552.
49. Crombie IK, Irvine L, Williams B, et al: Why older people do not participate in leisure time physical activity: a survey of activity levels, beliefs and deterrents. *Age Ageing* 2004; 33:287–292.
50. Ory M, Kinney Hoffman M, Hawkins M, et al: Challenging aging stereotypes: strategies for creating a more active society. *Am J Prev Med* 2003; 25(suppl 2):164–171.
51. McMurdo M: A healthy old age: realistic or futile goal? *BMJ* 2000; 321:1149–1151.
52. Minkler M, Schauffer H, Clements-Nolle K: Health promotion for older Americans in the 21st century. *Am J Health Promotion* 2000; 14:371–379.
53. Seefeldt V, Malina R, Clark M: Factors affecting levels of physical activity in adults. *Sports Med* 2002; 32:143–168.
54. van der Bij A, Laurent M, Wensing M: Effectiveness of physical activity interventions for older adults. *Am J Prev Med* 2002;