



Expectation for Physical Activity to Minimize Dementia Risk and Physical Activity Level Among Older Adults

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Abstract

This study aimed to examine whether the expectation for physical activity to minimize dementia risk was associated with physical activity level and whether this association was moderated by perceived high value of dementia prevention among older adults. Participants (n = 2824) completed questionnaires and wore accelerometers to measure their average daily steps and level of physical activity. The expectation for physical activity to minimize dementia risk, perceived value of dementia prevention, and potential covariates (expectation of other desirable outcomes, demographic and health-related factors) were also measured. The main effects of the expectation and perceived value and their interaction were not significant for physical activity variables in generalized linear models. These findings indicate that expecting physical activity in minimizing dementia risk might not be sufficient to influence physical activity behavior regardless of perceived high value of dementia prevention among older adults.

Keywords: Health Promotion; Motor Activity; Motivation; Attitude to Health; Aged; Dementia

Expectation for Physical Activity to Minimize Dementia Risk and Physical Activity Level Among Older Adults

The increase in the population with dementia is widely recognized as one of the most important issues of public health in aged societies (Brookmeyer, Johnson, Ziegler-Graham, & Arrighi, 2007). Cognitive impairment is associated with physical performance (Ayán, Cancela, Gutiérrez, & Prieto, 2013). Previous studies have suggested that physical activity can minimize one's risk of developing cognitive impairments (Blondell, Hammersley-Mather, & Veerman, 2014; Sofi et al., 2011) and dementia (Aarsland, Sardahaee, Anderssen, & Ballard, 2010; Beckett, Arden, & Rotondi, 2015; Beydoun et al., 2014; Blondell et al., 2014; Larson et al., 2006; Laurin, Verreault, Lindsay, MacPherson, & Rockwood, 2001; Scarmeas et al., 2009). According to Varela, Ayán, Cancela, and Martín (2011), the intensities of physical activity might not be important factors for expecting cognitive benefits. Barnes and Yaffe (2011) estimated that population attributable risks of physical inactivity on Alzheimer's disease would be the first highest in the United States and third highest in the world among several modifiable risk factors. Despite the known benefits, physical activity level is lower in older adults (Inoue et al., 2011). Thus, promotions of physical activity are important to reduce the increase of the population with dementia (Barnes & Yaffe, 2011).

Increasing the expectation about the link between physical activities and reduction in dementia risk might be effective to promote physical activity among older adults. The Expectation–Value Theory (Atkinson, 1957), Social Cognitive Theory (Bandura, 1986), Theory of Planned Behavior (Ajzen, 1991), Trans-theoretical Model (Prochaska & DiClemente, 1983), and Protection Motivation Theory (Rogers, 1975) are some of the major psychological theories used in physical activity studies. These theories have proposed that expecting desirable outcomes influences physical activity motivation and behavior (Williams, Anderson, & Winett, 2005). Further, supporting these psychological theories, previous studies

1 have indicated that perceiving health benefits would be associated with physical activity
2 behaviors in community-dwelling healthy older adults (Harada, Shibata, Lee, Oka, &
3 Nakamura, 2014; White, Wójcicki, & McAuley, 2012). In the research area of cancer,
4 previous studies have also suggested that exposure to information about the role of exercise in
5 cancer prevention could increase exercise motivation among university students (Courneya &
6 Hellsten, 2001), general adults (Graham, Prapavessis, & Cameron, 2006), and adults with
7 higher cancer risk (McGowan & Prapavessis, 2010). In the research area of dementia,
8 although population-based studies have examined which and how many people expected
9 physical activity to minimize dementia risk (Ayalon, 2013; Friedman et al., 2013; Low &
10 Anstey, 2009; Smith, Ali, & Quach, 2014), it remains unclear whether the expectation about it
11 is related to physical activity level. If the expectation for physical activity to minimize
12 dementia risk influences physical activity engagement in older adults, it suggests that
13 increasing expectation about this effect would promote physical activity among this
14 population.

15 According to psychological theories such as the expectation-value theory (Atkinson,
16 1957) and social cognitive theory (Bandura, 1986), the influences of expecting physical
17 activity to minimize dementia risk on behavior change might be more relevant among older
18 adults who think that dementia prevention is an important issue for them. The
19 Expectation–value Theory (Atkinson, 1957) proposes that outcome expectations, expecting
20 desirable outcomes of certain behaviors, enhance people’s motivation if they perceive a high
21 value in expected outcomes. Social Cognitive Theory (Bandura, 1986) also considers that the
22 influence of outcome expectation on behavior is moderated by outcome values, subjective
23 values of expected outcomes. Corresponding to these theories, some previous studies have
24 indicated that outcome expectation values, multiplication of outcome expectation and
25 outcome values, are associated with physical activities (Anderson, Wojcik, Winett, &

Williams, 2006; Li et al., 2012; Petosa, Suminski, & Hertz, 2003). Therefore, the expectation for physical activity to minimize dementia risk would differently influence behavior according to the perceived high value of dementia prevention.

The purposes of the present study were to examine whether the expectation for physical activity to minimize dementia risk was associated with physical activity level and whether the association was moderated by perceived high value of dementia prevention among older adults.

Methods

Participants and Procedures

The present study analyzed the data of a sub-cohort of the XXXX-XXX (XXXXXX XXXXX xxx XXXXXXXX xxx XXXXXXXX - XXXX xx XXXXXXXX XXXXXXXX: XXXXXXXX et al., 2016), conducted in 2013 at XXXXXX, Japan. The XXXX-XXX received prior approval by the Ethics Committee of the (XXXXXX XXXXX xxx XXXXXXXX xxx XXXXXXXX), and informed consent was obtained from all participants. Among the XXXX-XXX sub-cohort data, the present study utilized the data from a questionnaire survey and an accelerometer survey.

An invitation document for the screening was sent to all people aged 70 years or more ($n = 24271$) on January 1, 2013, who lived in XXXXXX and were without long-term care needs or support. A questionnaire survey was conducted from July to December of 2013 as a part of a screening for cognitive and physical function. Three public facilities were utilized as screening sites. Among all invited people, 5257 participated in the screening and answered a questionnaire. We did not calculate the sample size in order to ensure sufficient statistical power before data collection because the XXXX-XXX did not focus on one specific hypothesis. Alternatively, post hoc power analyses were conducted using G*Power version 3.1.9.2. Since this study employed non-parametric methods, we corrected the statistical power of the parametric methods by an asymptotic relative efficiency of 0.864 (Hogges & Lehmann,

1956). The statistical powers ($1 - \beta$) to detect the relationships between the expectation and physical activity variables among those in the strongly important group for the perceived value were 0.557 for steps per day and 0.643 for moderate-to-vigorous physical activity per day.

Triaxial accelerometers were distributed to all screening participants. They were asked to wear the accelerometer every day for one month and visit one of nine pharmacies in Xxxxxx, which had data-readers to download the accelerometer data after one month. The display of the accelerometer was blinded. Among 5257 people, 79 refused to wear the accelerometer, 1627 did not visit any of the nine pharmacies within two months, and 18 experienced technical errors with the data-reader. Of the remaining 3533 people, 335 did not wear the accelerometer for at least seven days with ≥ 10 hours for each day, and seven were outliers from averages of steps per day (less than 300 steps per day, more than 30000 steps per day). Furthermore, 2824 individuals met the following criteria: 1) did not experience a decline in basic activities of daily living; 2) did not have a history of dementia, stroke, or Parkinson's disease; 3) scored 20 or higher on the Mini Mental State Examination; and 4) did not have any missing data used in the present study. We analyzed the data of 2824 people in the present study.

Measures

Physical activity. A triaxial accelerometer (GT40-020: ACOS Corporation, Limited: Nagano, Japan) was used to measure the step counts and time in moderate-to-vigorous physical activity. Moderate-to-vigorous physical activity was defined as activities involving ≥ 3 metabolic equivalents. The intensity level of activity was measured by the same algorithm of the Kenz Lifecorder (Suzuken Corporation Limited: Aichi, Japan); its validity was confirmed by Kumahara et al. (2004). The accelerometer estimates the intensity by 10 levels. A level 4 or higher correspond to ≥ 3 metabolic equivalents. The epoch length of the

1 accelerometer was set as 4 seconds. Time in moderate-to-vigorous physical activity in a day
2 was calculated by adding up all epochs in which the intensity level was estimated at level 4
3 (three metabolic equivalents) or higher.

4 **Expectation for physical activity to minimize dementia risk.** The expectation for
5 physical activity to minimize dementia risk was measured by a single item. Participants were
6 asked whether they thought that physical activity (exercising and being physically active)
7 could reduce the risk of dementia and selected one choice from “strongly disagree,”
8 “somewhat disagree,” “somewhat agree,” and “strongly agree.” Previous studies (Ayalon,
9 2013; Friedman et al., 2013) have employed a single-item method to evaluate the expectation
10 for physical activity to minimize dementia risk. Cancer studies (Coups, Hay, & Ford, 2008;
11 Miyawaki, Shibata, Ishii, & Oka, 2014) have also measured the expectation for physical
12 activity to reduce cancer risk using a single item. Thus, we determined the utilization of a
13 single item to be acceptable for measurement. The use of a single item was also advantageous
14 to our study procedure because the questionnaire survey was conducted as a part of the
15 screening and the available time for answering it was limited.

16 **Perceived value of dementia prevention.** In order to correspond to the expectation
17 for physical activity to minimize dementia risk, a single item was utilized to measure
18 perceived value of dementia prevention: “Is dementia prevention important in your daily
19 life?” The participants answered this question with one choice from “strongly unimportant,”
20 “somewhat unimportant,” “somewhat important,” and “strongly important.” In previous
21 studies, similar concepts of the perceived value have been measured by single items, such as
22 dementia worry (Harada et al., in press), concerns about developing dementia (Low & Anstey,
23 2009), and perceived importance of physical activity (Wójcicki et al., 2013). Thus, similar to
24 the expectation, we determined the utilization of a single item to be acceptable.

25 **Potential covariates.** The expectation of other desirable outcomes of physical

activity and demographic and health-related factors were utilized as potential covariates.

Expectation of other desirable outcomes of physical activity was measured using six items: “physical activity (doing exercise and being physically active) can improve physical fitness,” “physical activity can induce positive mindset,” “physical activity can increase chances to talk with others,” “physical activity can contribute to reduction of CO₂ and energy saving,” “physical activity can provide opportunities to commit to communities,” and “physical activity can reduce depressive mood.” A four-point Likert scale was utilized for answering each item as follows: “strongly disagree (1),” “somewhat disagree (2),” “somewhat agree (3),” and “strongly agree (4).” These six items were newly developed in this study based on an existing Japanese scale for perceived benefits scales for exercise (Ishii et al., 2009; Oka, Hirai, & Tsutsumi, 2003), walking (Kochi, Harada, Katayama, & Nakamura, 2013), and strength training (Harada et al., 2014). Scores for all items were summed. The Cronbach’s alpha was 0.85 in the sample of the present study. The range of score for each item was from 1 to 4, and the total possible score for all the items ranged from 6 to 24.

Gender (men or women), age, years of education, employment in paid work (yes or no), living alone (yes or no), driving a car and/or motorbike (yes or no), current drinking and/or smoking habit (yes or no), and a history of hypertension, diabetes, hyperlipidemia, heart disease (yes or no) were included as demographic and health-rated factors in the present study. Drinking habit was defined as consumption of alcohol three or more days per week, which is consistent with the definition of the frequency for drinking habit by the Japan Ministry of Health, Labour and Welfare (2016).

Analyses

Since the normality tests (Kolmogorov-Smirnov test) did not indicate normal distributions for both steps ($p < 0.001$) and moderate-to-vigorous physical activity ($p < 0.001$), the present study did not employ parametric methods. Binary associations of physical activity

variables (average daily steps, minutes of moderate-to-vigorous physical activity) with potential covariates were examined using Spearman's rank correlation coefficients. Dichotomous variables (gender, employment in paid work, living alone, driving a car/motorbike, drinking/smoking habit, chronic disease) were treated as dummy variables for calculating the coefficients.

Stratified by perceived value of dementia prevention, we conducted Kruskal-Wallis tests with physical activity as the dependent variable and the expectation for physical activity to minimize dementia risk as the independent variable. Since the sample sizes were small in the "strongly disagree" and "somewhat disagree" groups for the item of the expectation, we combined both the groups into one category as "disagree." Similarly, due to the smaller sample size in "strongly unimportant" and "somewhat unimportant," we also categorized the perceived value item into three groups: 1) unimportant, 2) somewhat important, and 3) strongly important.

Furthermore, generalized linear models were conducted to examine the associations of the expectation for physical activity and the perceived value with physical activity variables. This model can analyze dependent variables with non-normal distributions. Physical activity studies (Jack & McCormack, 2014; Liao et al., in press; McCormack et al., 2012) have employed this model to analyze physical activity variables with skewed distributions. Similar to the previous studies (Jack & McCormack, 2014; Liao et al., in press; McCormack et al., 2012), the present study used gamma distribution with a log link for a generalized linear model. The dependent variables were steps and moderate-to-vigorous physical activities per day, and independent variables were expectation for physical activity to minimize dementia risk, perceived value of dementia prevention, and the interaction term of the expectation with the perceived value. Among potential covariates, the variables that significantly correlated with each physical activity variable were also included as the

independent variables in the generalized linear models.

Statistical significance was set at $p < 0.05$. All statistical analyses were conducted using SPSS (version 21.0) software packages.

Results

Characteristics of Participants

Among all respondents, 48.1% were men (age, 75.8 [SD 4.2] years), and 51.9% were women (age, 75.5 [SD 3.9] years). Demographic and health-related characteristics are summarized in Table 1.

As shown in Table 2, among potential covariates, gender, employment in paid work, driving car/bike, drinking and/or smoking habit, age, years of education, and expectation for another desirable outcome were significantly correlated with steps per day. Gender, living alone, age, years of education, and expectation for another desirable outcome were significantly correlated with moderate-to-vigorous physical activity. All correlation coefficients between potential covariates were less than 0.60.

Associations of Expectation for Physical Activity to Minimize Dementia Risk and Perceived Value of Dementia Prevention with Physical Activity Level

The frequency of the item of the expectation for physical activity to minimize dementia risk is shown in Figure 1. For the frequency of the item of perceived value of dementia prevention, 1.9% ($n = 55$) were in the strongly unimportant group, 3.4% ($n = 95$) in the somewhat unimportant group, 17.5% ($n = 494$) in the somewhat important group, and 77.2% ($n = 2180$) in the strongly important group.

The box plots of steps or moderate-to-vigorous physical activity per day by the expectation and perceived value are shown in Figures 2 and 3. Stratified by perceived value of dementia prevention, no significant association of the expectation for physical activity to minimize dementia risk with either physical activity variable was revealed among all groups.

Based on the generalized linear models, the main effects of the expectation and perceived value and their interaction were not significant for either step per day (Table 3) or moderate-to-vigorous physical activity (Table 4). Instead, age, expectations for another desirable outcome, gender, and driving car/bike were significantly regressed on steps per day. For moderate-to-vigorous physical activity per day, significant regressions were observed in age, expectations for another desirable outcome, gender, and living alone.

Discussions

To the best of our knowledge, this is the first study to explore behavioral influences of expecting physical activity effects on dementia prevention among older adults. Previous studies have found that physical activity could minimize the risk of dementia (Aarsland et al., 2010; Beckett et al., 2015; Beydou et al., 2014; Blondell et al., 2014; Larson et al., 2006; Laurin et al., 2001; Scarmeas et al., 2009). However, no studies have investigated whether expecting physical activity to minimize dementia risk would influence physical activity behavior among older adults. Thus, the present study would contribute to a better understanding of the potential effects of expecting the role of physical activity in dementia prevention.

The major finding of the present study was that the expectation for physical activity to minimize the dementia risk was not significantly associated with physical activity level among older adults. Moreover, the significant association between the expectation and physical activity levels was not revealed even among those with higher perceived value of dementia prevention. These results indicate that expecting physical activity to minimize the dementia risk might not be sufficient to promote physical activity behavioral change regardless of the perceived value. Unlike the present study, previous studies have reported significant associations of perceived health benefits with physical activity (White et al., 2012) and stages of change for strength training behavior (Harada et al., 2014) among

community-dwelling healthy older adults. Cancer studies have also suggested the positive relationships between the expectation for exercise to minimize cancer risk and exercise motivations among various populations (Courneya & Hellsten, 2001; Graham et al., 2006; McGowan & Prapavessis, 2010). In terms of social cognitive theory, some studies have indicated that multiplication of outcome expectation and perceived values of outcome would influence physical activities among general adults (Anderson et al., 2006; Li et al., 2012) and university students (Petosa et al., 2003). Thus, the findings of the present study did not support previous studies.

There might be some potential explanations for why the significant relationship between the expectation of dementia prevention effect and physical activity level was not revealed in the present study. The first potential explanation is that the expectation might be indirectly associated with physical activity mediated by intentions. The Theory of Planned Behavior (Ajzen, 1991) assumes that attitude, beliefs strength and evaluation of outcomes, indirectly influences behavior through intentions. The Health Action Process Approach Model (Schwarzer, 2008) also proposes that outcome expectation, expecting desirable outcomes of behavior, directly influences not behavior but intentions. Supporting these, previous studies have reported that attitude (Ahmad et al., 2014; Gretebeck et al., 2007) and outcome expectations (Barg et al., 2012; Chiu, Lynch, Chan, & Berven, 2011; Schwarzer, Luszczynska, Ziegelmann, Scholz, & Lippke, 2008) are indirectly associated with physical activity. Thus, following these studies, there is a possibility that expecting the effect might influence intention rather than the behavior itself.

Another potential explanation is that perceived proximity of dementia prevention might influence the relationships between the expectation of a dementia prevention effect and physical activity level. According to Evans, Cooke, Murray, and Wilson (2014), among the various benefits of physical activities, acute and immediately gained benefits are regarded as

proximal benefits such as burning calories, feeling confident, and feeling good; chronic and longer-term benefits are considered distal benefits such as losing weight, improving self-esteem, improving physical and mental health. Generally, older adults develop dementia over many years, and a longer time would be required for older adults to realize the effects of physical activity on dementia prevention on their own. Thus, perceived proximity of dementia prevention can be regarded as low. A review (Williams et al., 2005) suggests that perceived proximity of physical activity outcomes would be a moderator of the relationships between outcome expectation and physical activity. Supporting a suggestion of the review (Williams et al., 2005), recent studies have suggested that expecting outcomes more proximally would be more associated with physical activity behavior (Li, 2013) and motivations (Evans et al., 2014) than expecting outcomes distantly. According to these studies, the influences of expecting dementia prevention effect on physical activity behavior might be limited compared to the influences of expecting other more proximal outcomes.

In our study, 85.7% of respondents (38.0% in “somewhat agree” and 47.7% in “strongly agree”) expected that physical activity could minimize the risk of dementia. In previous studies employing open-ended questions, 30.2% (Low & Anstey, 2009) or 31.3% (Smith et al., 2014) of respondents indicated physical activity as one of the preventive factors for dementia. Previous studies with multiple-choice questions showed that 83.6 to 90.0% (Ayalon, 2013) or 82.6% (Friedman et al., 2013) answered that physical activity is associated with getting dementia. Therefore, the prevalence of those who perceived a link between physical activities and dementia prevention would be comparable to previous studies (Ayalon, 2013; Friedman et al., 2013). The remarkable differences in the prevalence between the results from open-ended (Low & Anstey, 2009; Smith et al., 2014) and multiple-choice questions (Ayalon, 2013; Friedman et al., 2013, the present study) would indicate that the expectation does not automatically come to mind and is not strongly held by many people.

1 The strengths of the present study are the objective assessments of physical activity
2 and adequate sample size. However, the present study has several limitations. First, the data
3 are cross-sectional, and therefore, causal associations cannot be demonstrated. Second,
4 sampling bias would be included. Since our sample was made up of participants of screening
5 for cognitive and physical function (participation rate, 21.7%), they would be more motivated
6 to be healthy and prevent dementia compared with the non-participants of the screening.
7 Third, we analyzed data from one Japanese urban community and, thus, it lacked diversity in
8 the backgrounds of participants, especially since the residential area (rural or not) influences
9 physical activity level among Japanese people (Shibata, Oka, Harada, Nakamura, & Muraoka,
10 2009), the physical activity level among the participants of the present study would differ
11 among older adults living in rural areas. Fourth, we measured the expectation and perceived
12 value by single item, respectively. The utilization of single items to measure the expectation
13 and concepts similar to them are common in previous studies (Ayalon, 2013; Coups et al.,
14 2008; Friedman et al., 2013; Harada et al., in press; Low & Anstey, 2009; Miyawaki et al.,
15 2014; Wójcicki et al., 2013). Thus, the employment of single items in the present study would
16 be acceptable. However, it is impossible to measure the details of the expectation and the
17 perceived values. For example, it is unclear how many respondents understood the desirable
18 type of physical activity, physiological mechanisms of the physical activity effects, and the
19 relative importance of dementia prevention compared with other health problems. The
20 psychometric characteristics of each item are unclear; confirmation would be desirable to
21 establish the findings of the present study. Fifth, the present study did not measure the
22 potential confounders, such as physical activity level at the middle-age period and preference
23 for physical activity. In order to examine the effects of expectation more rigorously, these
24 factors should be included. Finally, the present study was not based on the prior calculation of
25 an appropriate sample size in order to ensure detective statistical powers. Post hoc power

1 analyses indicated the statistical powers ($1 - \beta$) were below the adequate level of 0.8. Thus,
2 further longitudinal studies with a more generalizable sample of older adults, controlling for
3 potential confounders, and sample size calculations are required. Despite these limitations, the
4 present study contributes to a better understanding of the potential influences of expecting a
5 dementia prevention effect on physical activity behavior.

6 In conclusion, the findings of the present study indicate that expecting physical
7 activity to minimize dementia risk may not be sufficient to influence behavior regardless of
8 perceived high value of dementia prevention. Based on our findings, examining effective
9 communication strategies to promote physical activity among older adults should be expected.

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Figure Caption

Figure 1. Frequency for the item of expectation for physical activity to minimize dementia risk.

Figure 2. Box plot for associations of expectation for physical activity to minimize dementia risk and perceived value of dementia prevention with steps per day.

Kruskal Wallis tests stratified by perceived value of dementia prevention revealed that the associations of the expectation with steps per day were not significant among all groups ($\chi^2[2] = 0.11, p = 0.945$ in unimportant group; $\chi^2[2] = 0.40, p = 0.819$ in somewhat important group; $\chi^2[2] = 1.25, p = 0.536$ in strongly important group).

Figure 3. Box plot for associations of expectation for physical activity to minimize dementia risk and perceived value of dementia prevention with moderate-to-vigorous physical activity per day.

Kruskal Wallis tests stratified by perceived value of dementia prevention revealed that the associations of the expectation with moderate-to-vigorous physical activity per day were not significant among all groups ($\chi^2[2] = 0.03, p = 0.985$ in unimportant group; $\chi^2[2] = 0.04, p = 0.983$ in somewhat important group; $\chi^2[2] = 5.42, p = 0.763$ in strongly important group).

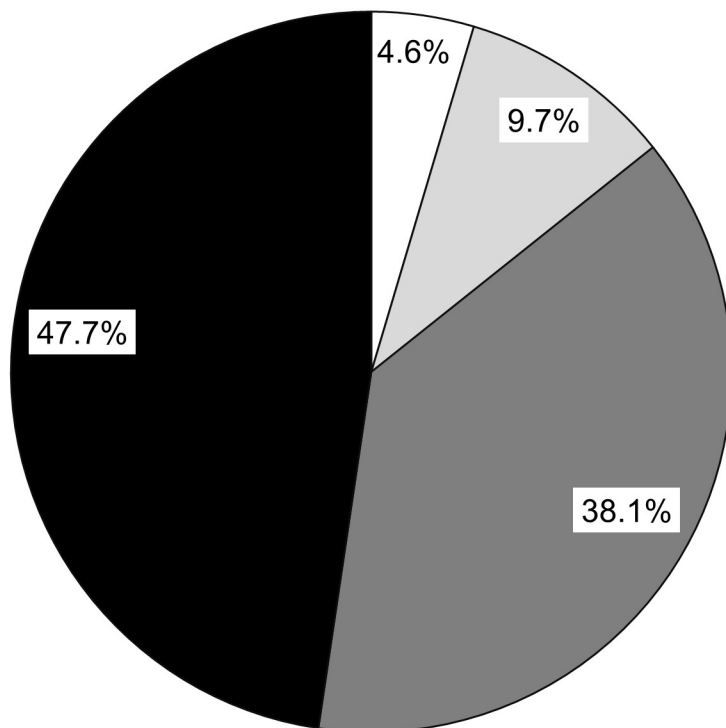
Expectation for physical activity to minimize dementia risk

□ Strongly disagree

□ Somewhat disagree

■ Somewhat agree

■ Strongly agree

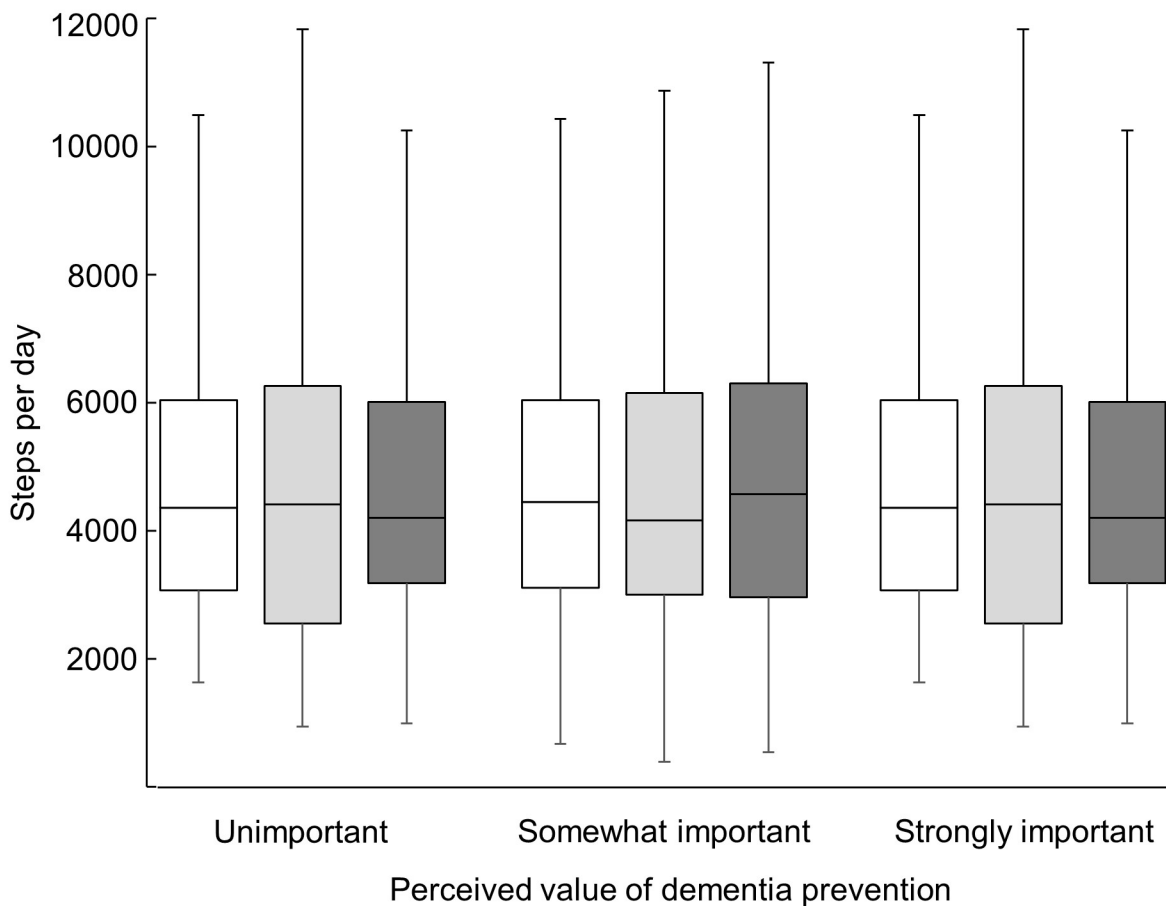


Expectation for physical activity to minimize dementia risk

Disagree

Somewhat agree

Strongly agree



Expectation for physical activity to minimize dementia risk

Disagree

Somewhat agree

Strongly agree

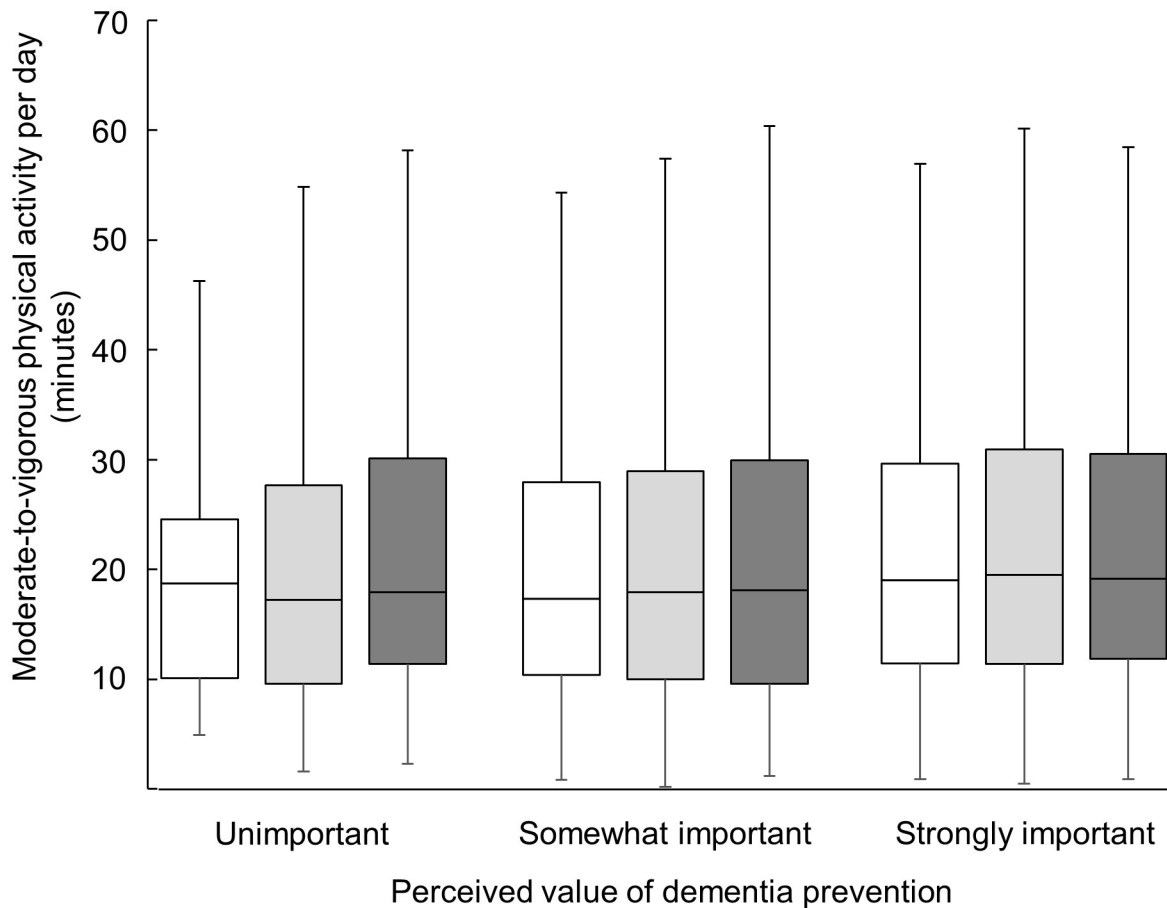


Table 1

Demographic and Health-related Characteristics of Participants

	N, mean, or median
Gender, n (%)	
Women	1359 (48.1)
Men	1465 (51.9)
Employment in paid work, n (%)	
No	2332 (82.6)
Yes	492 (17.4)
Living alone, n (%)	
No	2403 (85.1)
Yes	421 (14.9)
Driving car/bike, n (%)	
No	1110 (39.3)
Yes	1714 (60.7)
Drinking and/or smoking habit, n (%)	
No	2012 (71.2)
Yes	812 (28.8)
Chronic disease, n (%)	
No	752 (26.6)
Yes	2072 (73.4)
Age, mean (SD)	75.6 (4.0)
Years of education, mean (SD)	12.0 (2.6)
Expectations of another desirable outcome, mean (SD)	19.7 (3.6)
Steps/day, median (quartile range)	4613.5 (3160.0, 6396.0)
MVPA/day, median (quartile range)	18.9 (11.3, 29.9)

Note. MVPA, moderate-to-vigorous physical activity.

Table 2

Spearman's Rank Correlation Coefficient Between Potential Covariates with Steps and Minutes in Moderate-to-Vigorous Physical Activity Per Day

	2	3	4	5	6	7	8	9	10	11
1. Gender (men)	0.10***	-0.24***	0.51***	0.41***	-0.03	0.03	0.21***	-0.17***	0.09***	0.06**
2. Employment in paid work (yes)	—	-0.04*	0.13***	0.09***	-0.06**	-0.16***	0.07***	-0.00	0.07***	0.02
3. Living alone (yes)		—	-0.15***	-0.11***	0.02	0.12***	-0.08***	0.03	-0.00	0.04*
4. Driving car/bike (yes)			—	0.26***	-0.05*	-0.18***	0.20***	-0.03	0.04*	-0.01
5. Drinking and/or smoking habit (yes)				—	-0.02	-0.07**	0.10***	-0.08***	0.04*	0.01
6. Chronic disease (yes)					—	0.08***	-0.03	-0.01	-0.03	-0.01
7. Age						—	-0.13***	0.00	-0.21***	-0.16***
8. Years of education							—	-0.03	0.09***	0.07***
9. Expectations of another desirable outcomes								—	0.07***	0.06**
10. Steps/day									—	0.93***
11. MVPA/day										—

Notes. MVPA, moderate-to-vigorous physical activity.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3

Result of a Generalized Linear Model for Associations of Expectation for Physical Activity to Minimize Dementia Risk and Perceived Value of Dementia Prevention with Steps Per Day

	B	SE	95% CI	p-value
Age	-0.03	0.00	-0.04, -0.03	<0.001
Years of education	0.00	0.00	-0.00, 0.01	0.302
Expectations for another desirable outcome	0.01	0.00	0.01, 0.02	<0.001
Gender (women as reference)				
Women	(reference)			
Men	0.18	0.02	0.13, 0.23	<0.001
Employment in paid work				
No	(reference)			
Yes	0.02	0.03	-0.03, 0.07	0.383
Driving car/bike				
No	(reference)			
Yes	-0.10	0.02	-0.15, -0.06	<0.001
Drinking and/or smoking habit				
No	(reference)			
Yes	0.01	0.02	-0.04, 0.05	0.714
Expectation for physical activity to minimize dementia risk				
Disagree	(reference)			
Somewhat agree	-0.03	0.10	-0.23, 0.17	0.771
Strongly agree	0.03	0.11	-0.19, 0.24	0.800
Perceived value of dementia prevention				
Disagree	(reference)			
Somewhat agree	0.08	0.09	-0.10, 0.25	0.372
Strongly agree	0.10	0.08	-0.06, 0.26	0.206
Interaction term of expectation and perceived value ^a				
Expectation (somewhat agree) × value (somewhat agree)	-0.03	0.11	-0.26, 0.19	0.785
Expectation (somewhat agree) × value (strongly agree)	0.00	0.11	-0.21, 0.21	0.996
Expectation (strongly agree) × value (somewhat agree)	-0.07	0.13	-0.32, 0.18	0.567
Expectation (strongly agree) × value (strongly agree)	-0.04	0.11	-0.26, 0.18	0.714

Notes. B, partial regression coefficient; SE, standard error; 95% CI, 95% confidence interval

Dependent variable: steps per day

A generalized linear model (specifying a gamma distribution and using a log link) was used.

^a Interaction of expectation for physical activity to minimize dementia risk with perceived value on dementia prevention

Table 4

Result of a Generalized Linear Model for Associations of Expectation for Physical Activity to Minimize Dementia Risk and Perceived Value of Dementia Prevention with Moderate-to-Vigorous Physical Activity Per Day

	B	SE	95% CI	p-value
Age	-0.03	0.00	-0.04, -0.03	<0.001
Years of education	0.00	0.01	-0.01, 0.01	0.860
Expectations for another desirable outcome	0.01	0.00	0.01, 0.02	0.002
Gender				
Women	(reference)			
Men	0.21	0.03	0.16, 0.27	<0.001
Living alone				
No	(reference)			
Yes	0.15	0.04	0.07, 0.22	<0.001
Expectation for physical activity to minimize dementia risk				
Disagree	(reference)			
Somewhat agree	0.04	0.14	-0.23, 0.31	0.775
Strongly agree	0.09	0.15	-0.20, 0.39	0.534
Perceived value of dementia prevention				
Disagree	(reference)			
Somewhat agree	0.16	0.12	-0.08, 0.40	0.189
Strongly agree	0.19	0.11	-0.03, 0.41	0.090
Interaction term of expectation and perceived value				
Expectation (somewhat agree) × value (somewhat agree)	-0.09	0.16	-0.39, 0.22	0.578
Expectation (somewhat agree) × value (strongly agree)	-0.05	0.14	-0.33, 0.23	0.723
Expectation (strongly agree) × value (somewhat agree)	-0.13	0.17	-0.47, 0.21	0.461
Expectation (strongly agree) × value (strongly agree)	-0.09	0.15	-0.40, 0.21	0.540

Notes. B, partial regression coefficient; SE, standard error; 95% CI, 95% confidence interval

Dependent variable: moderate-to-vigorous physical activity per day

A generalized linear model (specifying a gamma distribution and using a log link) was used.

^a Interaction of expectation for physical activity to minimize dementia risk with perceived value on dementia prevention.