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Walking for transport and all-cause mortality: a prospective cohort study of Australian community-dwelling older adults

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ABSTRACT

Background Walking for transport may prolong survival in younger and middle-aged adults; however, evidence for older adults is scarce. We examined a prospective relationship between transport-related walking and all-cause mortality among adults aged 70 years and over.

Methods Community-dwelling, apparently healthy older adults (n=11 539; mean age 75.1 years, 53.1% females), participants of the ASPirin in Reducing Events in the Elderly Longitudinal Study of Older Persons, reported their frequency of transport-related walking (never, rarely/once a week, more than once a week or every day). All-cause mortality was verified by two independent sources. Cox proportional-hazards models (HR and 95% CI) assessed the association between transport-related walking and all-cause mortality.

Results Of participants, 44.1% reported walking every day, 31.5% more than once a week, 21.7% rarely or once a week and 2.7% never engaged in transport-related walking. During the median follow-up of 8.6 years (IQR: 7.4–10.1), 1599 participants (13.9%) died. Compared with those who reported never walking for transport, the risk of all-cause mortality was lower for those walking rarely or once a week (HR 0.73, 95% CI 0.56 to 0.96); more than once a week (HR 0.76, 95% CI 0.59 to 0.99) and every day (HR 0.74, 95% CI 0.57 to 0.96). Analyses were adjusted for age, sex, education, smoking, alcohol consumption, living status, rurality, household income, socioeconomic status, chronic conditions, body mass index and overall physical activity levels.

Conclusions Engaging in any weekly transport-related walking helps older adults prolong survival. Public health campaigns and urban planning should promote and support transport-related walking to boost physical activity levels of older adults and support healthier ageing.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Engaging in >150 min of moderate-intensity or 75 min of vigorous intensity physical activity weekly is recommended for optimal health. The relationship between walking for transport, the most common activity for older adults and all-cause mortality is not well documented.

⇒ This is among the first longitudinal studies exploring the relationship between transport-related walking and all-cause mortality in relatively healthy community-dwelling older adults free of cardiovascular disease, dementia and independence-limiting physical disability.

WHAT THIS STUDY ADDS

⇒ Our findings indicate that compared with no engagement in walking for transport, engaging in any transport-related walking weekly was associated with a lower risk of all-cause mortality.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Replacing never walking for transport with any engagement in transport walking will have health benefits.

⇒ These results further underscore the rationale for endorsing interventions that promote transport-related walking aimed at increasing physical activity among community-dwelling older adults. Transport walking is simple, cost-free and does not require specialist training, making it a sustainable and accessible physical activity for ageing individuals.

INTRODUCTION

Average life expectancy is increasing for human populations globally.[1 2] By the year 2050, it is estimated that 1 in 6 people will be over the age of 65, compared with 1 in 11 in 2019.[3] Ageing is generally accompanied by a decrease in physical activity (PA) and mobility levels, leading to a gradual deterioration in physical capacity and an increased risk of chronic diseases, and to significant health and economic burden.[4] Engagement in regular PA is associated with physical and mental health benefits, reduced risk of chronic diseases and premature death, improved balance,

coordination and opportunities for social engagement and overall well-being in older adults.[5 6]

PA accumulated through incidental activity has significant health benefits across the lifespan.[6 7] For most older adults, walking as a form of transport is feasible and cost-free PA, which helps them reach destinations and meet necessities of daily living (e.g., shopping and other errands), build and maintain relationships, enjoy social lives with friends and families, and it is a way to contribute to the broader society through community or local events.[8] Walking for transport may be an appropriate and accessible mode of PA among older adults who need to limit their driving or stop driving altogether due to vision issues, cognitive decline or lack of confidence.[8 9] Evidence on the benefit of transport walking on prolonging survival is mostly available for younger and middle-aged adults,[10] while for older adults such evidence is limited, mostly being focused on those with pre-existing conditions.[11]

We examined the relationship of transport-related walking with all-cause mortality in a large cohort of community-dwelling adults aged 70 years and over.

METHODS

Design and population

We conducted a secondary analysis of data from the ASPirin in Reducing Events in the Elderly (ASPREE) clinical trial,[12] its substudy the ASPREE Longitudinal Study of Older Persons (ALSOP)[13] and the ASPREE Extension study (ASPREE-XT).[14] ASPREE was a randomised, double-blind, placebo-controlled trial that aimed to evaluate the effect of low-dose aspirin to extend disability-free survival in 19 114 adults aged 70 years and older from Australia (n=16 703) and the USA (n=2411, including minorities aged 65+ years). At enrolment, ASPREE participants were free of cardiovascular disease, dementia, independence-limiting physical disability and did not have a known illness that would be life-ending in the next 5 years. They were recruited between March 2010 and December 2014, and detailed inclusion and exclusion criteria have been described previously.[12]

Australian participants were sent the baseline ALSOP Medical and Social questionnaires, generally within the first year of the ASPREE study, to collect information on a broad range of additional general health, lifestyle, behavioural, social, economic and environmental factors relevant to ageing.[13] Following cessation of the ASPREE intervention phase (aspirin or matched placebo) which ended in 2017, participants were invited to continue observational follow-up into the ASPREE-XT study.[14]

Of the 16 703 Australian participants enrolled in the ASPREE trial, 12 896 returned the ALSOP Medical and Social baseline questionnaires. Participants who did not answer questions on transport walking and putative confounders were excluded. To ensure that the exposure (transport walking) did not precede the events (death from any cause), participants who died from any cause within the first 12 months were excluded from the analysis. In total, 11 539 were considered in the analysis (figure 1).

Exposure: transport walking

Transport-walking data were self-reported by participants, collected at baseline via the Social Health Questionnaire that was administered to most of the participants 6–9 months after randomisation into ASPREE trial. Participants were asked 'how often would you usually use walking (outside the home) to get around', and transport walking was assessed on a 5-point response scale: 1=never, 2=rarely, 3=once a week, 4=more than once a week and 5=every day. Higher rankings indicate engagement in greater frequency of transport walking. For this study, categories rarely (n=1140) and once a week (n=1367) were merged as they both present low walking frequency and due to a small number of events in both categories.

This simple measure of transport walking, as well as PA (see the section on confounders), was used in light of the population under study (older adults), size of the cohort (cost-efficiency), to ensure ease of administration and to lower burden on the study participants (to ensure it does not interfere with their daily routine).

Outcome: all-cause mortality

All-cause mortality was defined as death from any cause that occurred after enrolment, confirmed by two independent sources. Specifically, death was detected during the trial (quarterly phone calls to the participant and annual clinic visits), or notified by next of kin or close contact at any time.[15] Death that was logged through failure to establish contact, or when the next of kin/close contact notified the centre, led to a review of health records. In all circumstances, death required confirmation from two independent sources, such as family members, primary care physician or public death notice.[15 16] The vital status was checked and verified weekly through the Ryerson Index,[17] a community-maintained online index of Australian death notices. Vital status of all participants lost to follow-up or withdrawn was verified with the National Death Index at the end of the trial and during the ASPREE-XT period.[15 16]

Confounders

Confounders were chosen in accordance with previous evidence.[18–22] All confounding variables were measured at baseline. Demographic factors such as age (years), sex (male, female), education status (more than or equal to 12 years and less than 12 years of formal education) and living status (living alone vs. not living alone that is, living with someone) were collected during the face-to-face interviews. Participants' self-reported gross annual income (<$A20 000/$A20 000–$A49 000/$A50 000–$A99 000/≥$A100 000/prefer not to say) was collected using the ALSOP baseline social questionnaire, and health-related behaviours, such as smoking (never/current/former) and alcohol status (never/current/former) were

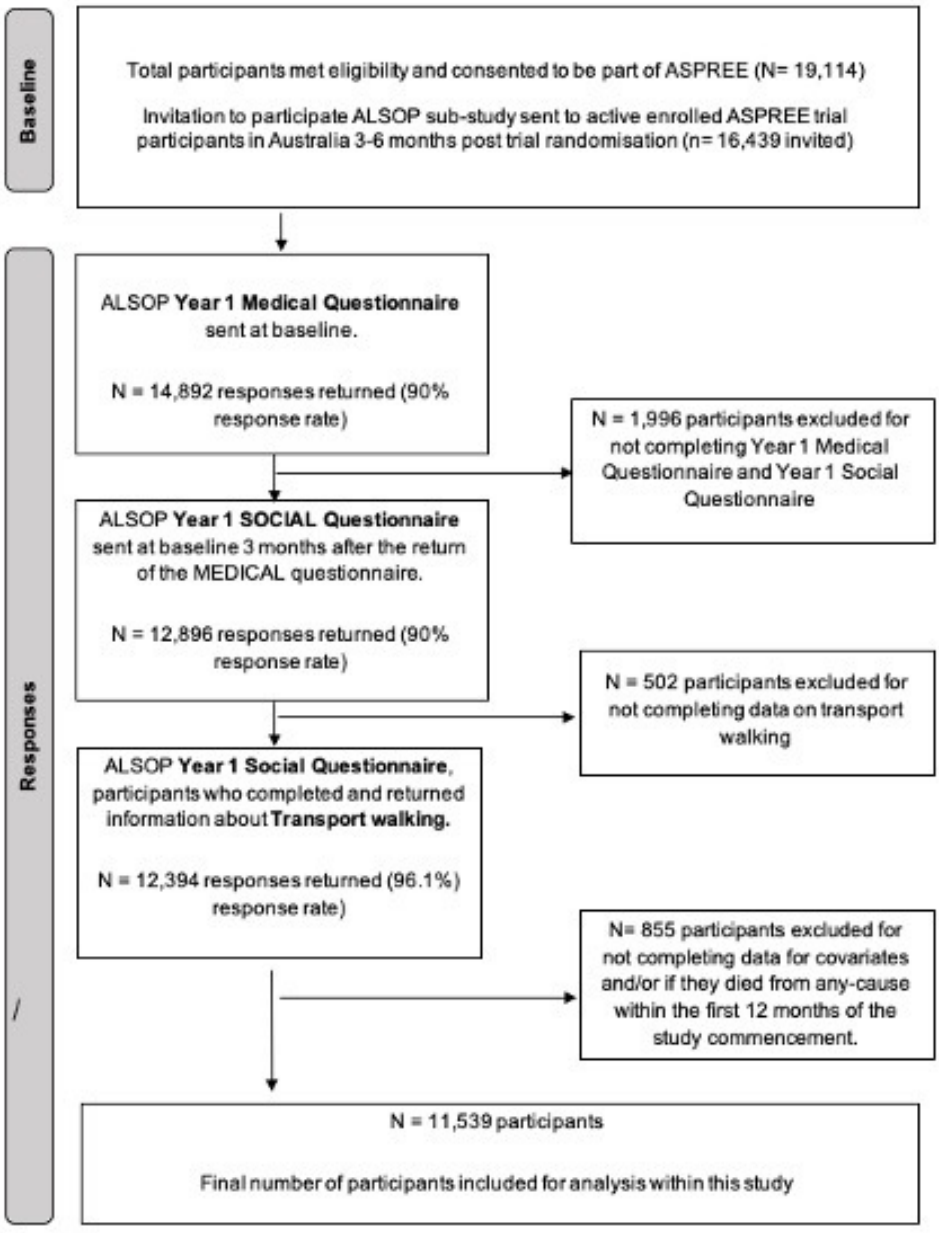

Figure 1 Participant flow chart. ALSOP, ASPREE Longitudinal Study of Older Persons; ASPREE, ASPirin in Reducing Events in the Elderly.

collected during the face-to-face ASPREE interviews. Body mass index (BMI) was calculated from objectively measured weight (kg) and height (metres) as the ratio of weight and height squared (kg/m^2). Hypertension was defined as the blood pressure readings above normal range (systolic ≥140 mm Hg or diastolic ≥90 mm Hg) or if patients reported use of antihypertensive medications. Dyslipidaemia (yes vs no) was defined by participants taking lipid lowering medications or an elevated total serum cholesterol ≥5.5 mmol/L or low-density lipoprotein cholesterol ->4.1 mmol/L. Diabetes mellitus (yes vs. no) was defined based on self-report, fasting blood glucose ≥7 mmol/L or prescribed medication treatment for diabetes. Depression was assessed by capturing of depression symptom burden using the Centre for Epidemiologic Studies-Depression (CES-D)-10 questionnaire[23] or by hospitalisation for depression. A score of 8 or above on the CES-D 10 scale was defined as the presence of depression.[12]

PA was self-reported by participants, and the following question was asked 'Thinking about how much PA you do at present, in a typical week, what describes your level of activity'. Participants could choose from 'never do any PA, do no more than light PA, do no more than moderate PA or do regular vigorous PA'. Participants were defined as frail if they satisfied at least three of the following five criteria, or prefrail if they met one or two criteria: (1) BMI<20 kg/m^2 (shrinking); (2) lowest 20% of grip strength taking into account sex and weight (weakness); (3) the participant reported that 'I felt that everything I

did was an effort' and/or 'I could not get going' for three or more days during last week, according to a question on the CESD-10 scale ('exhaustion'); (4) time to walk 3 m (10 ft) was in the lowest 20% taking into account for sex and height ('slowness') and (5) no walking outside the home in the last 2 weeks, or the longest amount of time walking outside without sitting down to rest was less than 10 min, ('low activity') according to the LIFE Disability questionnaire responses.[24]

Information on area-level socioeconomic status (SES) was derived using the Socio-Economic Indexes for Areas (SEIFA). SEIFA ranks areas in Australia according to relative socioeconomic advantage and disadvantage, in terms of peoples' access to material and social resources and their ability to participate in society; it was derived from the Australian Bureau of Statistics Census for 2011.[25] SEIFA was expressed in quintiles whereby a lower quintile presents more disadvantage or less advantage. Rurality (live in major cities vs. outsider major cities) was derived from the linkage of residential postcodes to the Australian Statistical Geography Standard remoteness structure.[26]

Statistical analyses

Baseline participant characteristics were described according to participation in transport walking, and categorical data were presented as counts (n) and percentages (%).

The association between transport walking and all-cause mortality was explored using Cox proportional-hazards models. Four models were fitted. Model 1 was crude (unadjusted); model 2 was adjusted for age and sex, model 3 was as model 2 with further adjustment for education status, smoking status, alcohol consumption, living status, rurality, household income and SEIFA. Model 4 was as model 3 with additional adjustment for BMI, diabetes, hypertension, dyslipidaemia, depression and frailty. In this same model, we adjusted for overall PA levels, to explore whether transport walking was associated with all-cause mortality independently of overall PA levels.[27] HRs and 95% CI were reported. The proportional hazards assumption was tested and assessed graphically based on Schoenfeld residuals. These were completed for all models and concluded that the proportional hazards assumption was not violated.

Additional sensitivity analyses were undertaken to investigate the robustness of the findings. This included (1) adjusting for study treatment allocation (aspirin or placebo), as it has previously been reported that aspirin was associated with increased mortality, particularly cancer-related mortality in this sample of adults aged 70 years and older[16]; (2) exploring the association after excluding participants who developed the outcome in the first 2 years to address potential reverse causality (n=54) and (3) using rarely/once a week category as a reference category considering that it has been argued that the greatest health benefit is observed when moving from no activity to some activity.[28] Since males, females, individuals of different socioeconomic position, education and age engage in different levels of PA, and frailty is associated with premature mortality,[29 30] we explored whether these factors modified the relationship using interaction terms in the Cox models.

Spearman correlation analyses were performed, the largest Spearman correlation coefficient was 0.17 and the mean variance inflation factor was 1.15 suggesting multicollinearity in the data to be unlikely. Analyses were conducted in STATA statistical software V.17.0.[31] A $p<0.05$ was used to denote statistical significance.

RESULTS

Baseline characteristics

Of 12 896 potential participants, 1357 were excluded due to missing data on exposure, confounders or having died in the first year since the ASPREE study baseline. Age, sex, education, income, socioeconomic position and frailty did not modify the association between transport walking and all-cause mortality (interaction analyses were not statistically significant); therefore, the analysis was performed on the total study sample. Compared with participants included in the study (n=11 539), those excluded from the study (n=1357) due to missing data were more likely to be older, females, have lower level of formal education, live alone, live in most disadvantaged areas, never smokers, never consume alcohol, diagnosed with dyslipidaemia, diabetes, hypertension or more likely to be prefrail or frail. They were also more likely to report never to engage in PA behaviour (online supplemental table 1).

There were 11 539 eligible participants (average age: 75.1 years, SD=4.3; females: 53.1%). Of these, 2.7% never engaged in transport walking, 21.7% walked for transport rarely/once a week, 31.5% walked more than once a week and 44.1% walked for transport every day. Those who reported never walking for transport, compared with their counterparts reporting any walking for transport, were more likely to be older, female, have lower level of formal education, live outside major cities, live in more socioeconomically deprived neighbourhoods, current smokers and with a greater BMI. They were less likely to be current consumers of alcohol, but more likely to have hypertension, diabetes, depression or to be prefrail or frail. They were also more likely to report never to engage in PA behaviour (table 1).

After 8.6 median years of follow-up (IQR 7.4–10.1 years), 1599 (13.9%) deaths were recorded (figure 2). The rate of death from any cause was highest for those who reported never walking for transport with 45.8 events per 1000 person-years, compared with 30.6 events per 1000 person-years for transport walking rarely or once a week; 29.9 events per 1000 person-years for transport walking more than once a week and 29.4 events per 1000 person-years for every day transport walking.

Cox regression analysis indicates that engagement in transport walking was associated with a lower risk of

Table 1 Baseline characteristics of 11 539 adults aged 70 years and older presented by categories of transport walking

		Transport walking			
Characteristics	**All participants** N=11 539	**Never** n=314 (2.7)	**Rarely/once a week** n=2507 (21.7)	**More than once a week** n=3628 (31.5)	**Every day** n=5090 (44.1)
Age, years mean (±SD)	75.1 (4.3)	76.1 (4.8)	75.1 (4.3)	75.0 (4.2)	75.0 (4.2)
Age, n (%)					
70.00–74.99	6920 (60.0)	159 (50.6)	1491 (59.5)	2172 (59.9)	3098 (60.9)
75.00–79.99	2974 (25.6)	86 (27.4)	644 (25.7)	951 (26.2)	1293 (25.4)
80+	1645 (14.4)	69 (22.0)	372 (14.8)	505 (13.9)	699 (13.7)
Females, n (%)	613 (53.1)	203 (64.7)	1489 (59.4)	2015 (55.5)	2423 (47.6)
Education, n (%)					
<12 years	5421 (47.0)	197 (62.7)	1218 (48.6)	1685 (46.4)	2321 (47.0)
≥12 years	6118 (53.0)	117 (37.3)	1289 (51.4)	1943 (53.6)	2769 (53.0)
Living status, n (%) Alone Not living alone	 3535 (30.7) 8004 (69.3)	 97 (30.9) 217 (69.1)	 768 (30.6) 1739 (69.4)	 1090 (30.0) 2538 (70.0)	 1580 (31.0) 3510 (69.0)
Gross income per year (AUD), n (%)					
<$20 000	1748 (15.2)	73 (23.2)	399 (15.9)	522 (14.5)	754 (14.8)
$20 000–$49 999	6014 (52.1)	141 (44.9)	1357 (54.1)	1894 (52.2)	2622 (51.5)
$50 000–$99 000	2075 (17.9)	42 (13.4)	401 (16.0)	686 (18.8)	946 (18.6)
≥$100 000	508 (4.4)	15 (4.8)	88 (3.5)	171 (4.7)	234 (4.6)
Prefer not to say	1194 (10.4)	43 (13.7)	262 (10.5)	355 (9.8)	534 (10.5)
Remoteness, n (%) Live outside major cities Live in major cities	 5348 (46.4) 6191 (53.6)	 210 (66.9) 104 (33.1)	 1141 (45.5) 1366 (54.5)	 1539 (42.4) 2089 (57.6)	 2458 (48.3) 2632 (51.7)
SEIFA quintiles, n (%)					
Most disadvantaged	1760 (15.3)	70 (22.3)	414 (16.5)	505 (13.8)	771 (15.2)
2	1940 (16.7)	73 (23.2)	411 (16.4)	586 (16.2)	870 (17.1)
3	3064 (18.6)	86 (27.4)	678 (27.0)	931 (25.7)	1369 (26.9)
4	1346 (11.7)	35 (11.2)	287 (11.5)	417 (11.5)	607 (11.8)
5-least disadvantaged	3429 (29.7)	50 (15.9)	727 (28.6)	1189 (32.8)	1473 (29.0)
Alcohol status, n (%)					
Current	9277 (80.4)	218 (69.4)	1940 (77.4)	2958 (81.5)	4161 (81.8)
Former	537 (4.6)	21 (6.7)	138 (5.5)	140 (3.9)	243 (4.6)
Never	1725 (15.0)	75 (23.9)	429 (17.1)	530 (14.6)	702 (13.6)
Smoking status, n (%)					
Current	319 (2.8)	16 (5.1)	87 (3.5)	84 (2.3)	132 (2.6)
Former	4801 (41.6)	117 (37.3)	1037 (41.3)	1506 (41.5)	2141 (42.1)
Never	6419 (55.6)	181 (57.6)	1383 (55.2)	2038 (56.2)	2817 (55.3)
BMI (kg/m^2), mean (±SD)	27.9 (4.5)	30.0 (5.5)	29.0 (5.0)	27.9 (4.4)	27.2 (4.0)
Dyslipidaemia, n (%)	7726 (67.0)	204 (65.0)	1712 (68.3)	2467 (68.0)	3343 (65.7)
Diabetes, n (%)	1095 (9.5)	50 (15.9)	267 (10.7)	327 (9.0)	451 (8.9)
Hypertension, n (%)	8546 (74.1)	258 (82.2)	1893 (75.5)	2702 (74.5)	3693 (72.6)
Depression, n (%)	5408 (46.9)	170 (54.1)	1324 (52.8)	1693 (46.7)	2221 (43.6)
Frailty					
Non-frail	7381 (64.0)	145 (46.2)	1381 (55.1)	2349 (64.8)	3506 (68.9)
Prefrail	3988 (34.5)	142 (45.2)	1051 (41.9)	1247 (34.4)	1548 (30.4)
Frail	170 (1.5)	27 (8.6)	75 (3.0)	32 (0.8)	36 (0.7)
Physical activity					

Continued

Table 1 Continued

Transport walking					
Never	144 (1.3)	23 (7.3)	70 (2.8)	26 (0.7)	25 (0.5)
Light	3729 (32.3)	162 (51.6)	1160 (46.3)	1154 (31.8)	1253 (24.6)
Moderate	5847 (50.7)	96 (30.6)	1000 (39.8)	1940 (53.5)	2811 (55.2)
Vigorous	1819 (15.7)	33 (10.5)	277 (11.1)	508 (14.0)	1001 (19.7)

AUD, Australian Dollar; BMI, body mass index; SEIFA, Socio-Economic Indexes for Areas.

all-cause mortality (figure 3). Adjustment for demographic, socioeconomic, behavioural and clinical factors slightly reduced the size of the effect of transport walking on all-cause mortality risk (online supplemental table 2). In the fully adjusted model (model 4) and compared with those reporting never engaging in transport walking, the risk of all-cause mortality was lower in those who reported engaging in transport walking rarely or once a week (HR 0.73 (95% CI 0.56 to 0.96)), more than once a week (HR 0.76 (95% CI 0.59 to 0.99)) or every day (HR 0.74 (95% CI 0.57 to 0.96)) (online supplemental table 2).

The results from sensitivity analyses remained similar after adjusting for treatment allocation (aspirin) (online supplemental table 3) and after excluding participants who developed the outcome after 24 months of study commencement (online supplemental table 4). We also observed that, compared with people reporting engagement in transport walking rarely or once a week, those who reported never engaging in transport walking had 36% higher risk of all-cause mortality (HR 1.36 (95% CI 1.04 to 1.79)) (online supplemental table 5). We observed no difference in mortality risk between people who reported engaging in activity more than once a week or every day compared with their counterparts engaging in transport walking rarely/once a week (online supplemental table 5).

DISCUSSION

In this large prospective study of 11 539 apparently healthy adults aged 70 years or older, participating in any transport walking during the week, compared with no walking for transport, was associated with a lower risk of all-cause mortality. These findings are consistent with previous, although limited, evidence. Ueshima *et al*.[11] investigated the association between engagement in PA (including transport walking) and mortality risk in older adults (65–84 years) who were receiving treatment for pre-existing disease, showing a 32% lower risk of all-cause mortality in those who walked for transport

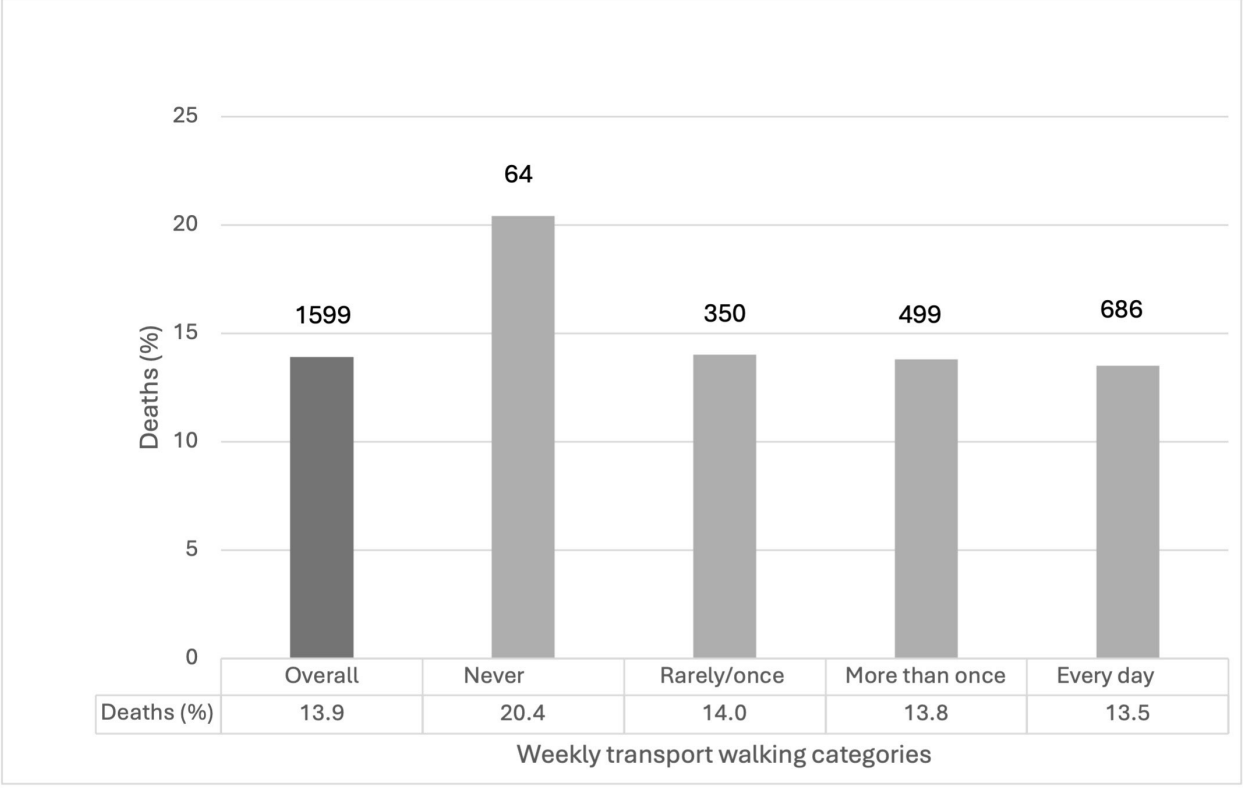

Figure 2 Deaths from all-causes in a total sample (n=11 539) of older adults according to transport walking frequency.

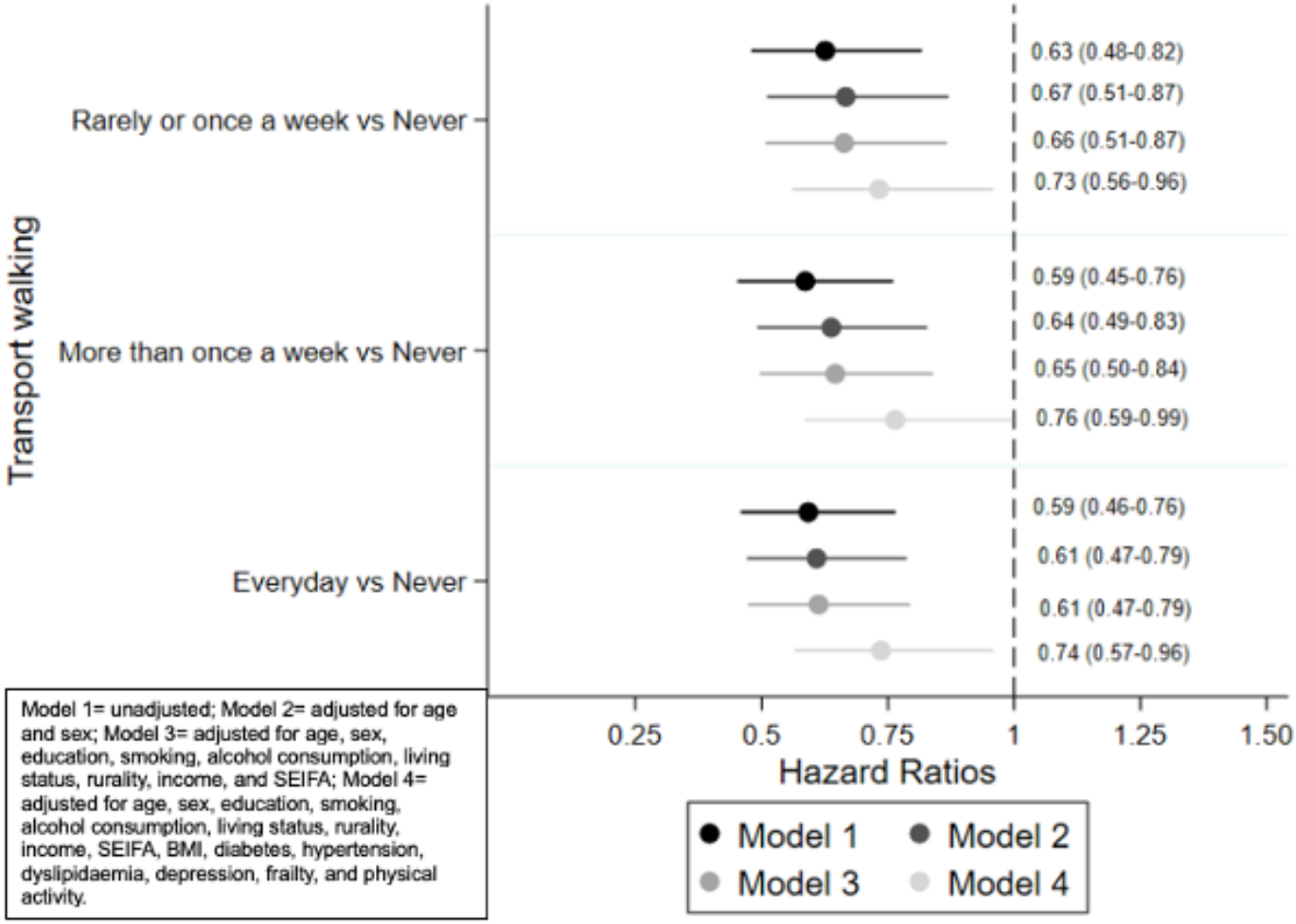

Figure 3 The association between transport walking and all-cause mortality risk in 11 539 older adults: the results of the Cox proportional hazards regression. BMI, body mass index; SEIFA, Socio-Economic Indexes for Areas.

at least 5 days a week.[11] The results of our study are also consistent with those reported in younger and middle-aged adults. A meta-analysis on the relationship between active commuting to work (walking specifically) and all-cause mortality showed all-cause mortality to be 13% lower in middle-aged working adults who actively commuted (walked) to work.[10] A meta-analysis by Dinu *et al*[32] reported an 8% (RR 0.92 (95% CI 0.85 to 0.98)) lower all-cause mortality from active commuting (walking and cycling). Our findings indicate that replacing never walking for transport with any engagement in transport walking will have health benefits.

Walking as a form of PA at older age helps maintain physical and cognitive independence which prevents various health problems and promotes healthy ageing.[33] Transport walking could be sustainable and help older adults achieve the minimum PA levels,[34] help them connect better socially,[8] reduce social isolation,[34] stay connected to local amenities (e.g., libraries and cafes), run errands (e.g., shopping centre and grocery stores), reduce risk of chronic diseases,[35] improve mental,[36] physical well-being and cognitive function.[37] This may be particularly relevant when older adults no longer drive due to associated physiological and cognitive changes, such as poor vision, cognitive decline and poor reflexes.[9 38] Participation in PA for those aged 70 years and over declines sharply with age.[39 40] Lifestyle interbentions to promote transport-walking[41 42] would help increase overall PA levels in older adults which may help provide long-term health benefits. This could particularly be effective for older adults who live in walkable environments and have the infrastructure to support self-propelled PA as a means of transport.[43 44]

It is important to note that alongside behaviour change interventions (e.g., public health messaging), recommendations need to consider the context of the local environment characteristics including availability of safe sidewalks, green spaces, high density residential areas, availability of public transport,[44] richness to services in the local area meeting the needs of active older commuters, places to rest if needed (e.g., public seating) and street lighting.[43 45 46] Additionally, walk-friendly social environment was also associated with more minutes of walking for travel per week.[44] Supporting the environment in which older adults feel safe to walk will be crucial to the effectiveness of interventions to increase transport walking in this population group.

Future studies should explore the association between transport walking and all-cause mortality using

more robust measures of transport walking while also controlling for environmental factors that can influence engagement in transport walking.

Strengths and limitations

These findings are among the first to explore relationship of walking for transport with all-cause mortality among community-dwelling older men and women initially free of chronic disabling disease. The study also included a relatively large sample size of 11 539 participants with sex balance (53.1% females). High participation rates, low attrition rates for questionnaire completion (10%) and the availability of detailed data on clinical factors, study outcomes and confirmed mortality endpoints were strengths of this study. The cohort was mostly Caucasian, slightly skewed towards a higher SES and with good access to healthcare, limiting generalisability of findings.[13] Self-reported transport walking was limited to a single-item measure, whereas having data on commuting distance, frequency/duration of trips, or objectively measured (e.g., via accelerometers, pedometers), would provide a more robust measure. Similar is with adjustment for confounders such as diet and leisure time PA is important but was not available. In addition, other factors that may influence engagement in walking for transport were not assessed and should be explored in future studies.

CONCLUSION

In this large cohort of more than 11 000 adults aged 70 years and older, any weekly transport walking, compared with no engagement in transport walking, was associated with lower risk of all-cause mortality. Integrating transport walking into daily routines may prolong survival in older age and contribute to healthy ageing.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval ASPREE and ALSOP were conducted according to the Declaration of Helsinki 1964 and the NHMRC Guidelines on Human Experimentation. The ASPREE study was approved by multiple institutional review boards across Australia with primary approval provided by Monash University Human Research Ethics Committee (MUHREC approval number 2006-745MC). ALSOP was reviewed by the MUREC (project numbers CF11/1100 and CF11/1935). The secondary data analysis proposed for this study was approved by the Monash University Human Research Ethics Committee (project ID: 25829).

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available on reasonable request. Data are available on reasonable request from the ASPREE data custodian (aspree.ams@monash.edu)

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