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Title: Diet quality in late midlife is associated with faster walking speed in later life in women, but not men: findings from a prospective British birth cohort

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Abstract

Healthy diet has been linked to better age-related physical functioning, but evidence on the relationship of overall diet quality in late midlife and clinically relevant measures of physical functioning in later life is limited. Research on potential sex differences in this relationship is scarce. The aim was to investigate the prospective association between overall diet quality, as assessed by the Healthy Eating Index-2015 at age 60-64y and measures of walking speed seven years later, among men and women from the Insight46, a neuroscience sub-study of the Medical Research Council National Survey of Health and Development. Diet was assessed at age 60-64y using five-day food diaries, from which total HEI-2015 was calculated. At age 69-71y, walking speed was estimated during four 10-meter walks at self-selected pace, using inertial measurement units. Multivariable linear regression models with sex as modifier, controlling for age, follow-up, lifestyle, health, social variables and physical performance were used. The final sample was 164 women and 167 men (n=331). Women had higher HEI-2015 scores and slower walking speed than men. A 10 point increase in HEI-2015 was associated with faster walking speed seven years later among women (B: 0.024, 95% CI: 0.006, 0.043), but not men. The association remained significant in the multivariable model (B: 0.021, 95% CI: 0.003, 0.040). In women in late midlife higher diet quality is associated with faster walking speed. A healthy diet in late midlife is likely to contribute towards better age-related physical capability and sex differences are likely to affect this relationship.

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Introduction

Life expectancy is increasing in middle and high income countries although this is typically accompanied by deterioration in physical and cognitive health [1], with physical capacity decline accelerating up to 20% per ten years in 70-year old people [2]. Rates of decline vary among individuals and differences in trajectories of muscle wasting by sex are well observed [3]. Nonetheless, the musculoskeletal system is considered a good reflector of the rate of decline of physical function in later life [4], a concept also referred to as physical capability [5].

Diet is proposed to play an important role in slowing the progression of the decline in physical capability [6]. A healthy diet, as described by the World Health Organization [7], has been found to delay the rates of decline in physical capability by limiting skeletal muscle and bone mass loss [8], reducing oxidative-stress damage and excessive levels of inflammation [9], as well as lowering the incidence of chronic and neurodegenerative diseases [7].

To date, research on diet and physical capability and performance of older people has mainly focused on single nutrients (vitamin D, calcium, protein, carotenoids) [10,11] or food items rich in antioxidants and anti-inflammatory factors, such as greens, vegetables and whole grain foods [12], which are important for musculoskeletal function and the prevention of sarcopenia [13]; yet nutrients are not consumed in isolation and it is the synergistic effect of an overall healthy diet [14] which protects against functional decline [15,16]. Healthy dietary patterns such as the Mediterranean and Nordic diets, have shown an association of higher diet quality and measures of physical performance [17-19]; however regional dietary patterns may not be appropriate in all contexts due to differences in food preference, availability and accessibility. Instead, diet indexes such as the U.S based Healthy Eating Index-2015 (HEI-2015) [20] are likely to reflect diet quality of most Western populations, independently of specific food items and in line with the latest dietary guidelines [21], which are comparable with those in the Eatwell Guide the UK [22]. HEI has been associated with lower disability rates and mortality in older people [23]. Emerging evidence on the relationship between high HEI scores at midlife and better physical performance [19] as well as physical function [16] has been published; yet findings were indicative of cross-sectional associations [19] or measures of physical functioning were self-reported and sample included only women [16].

Interestingly, findings from the National Survey of Health and Development (NSHD), suggest a positive association between data derived adulthood diet quality and objective measures of physical performance in late midlife [24], with diet at late midlife being of particular importance. But to further understand the impact of diet at this age, it would be useful to assess diet quality according to evidence-based healthy dietary recommendations. Finally, using an objective measure of physical capability that reflects cognitive functioning [25], musculoskeletal changes in older people and predicts survival [26], would also be of great importance.

Therefore, the purpose of this study was to investigate the extent that overall diet quality at age 60-64y, as indicated by an evidence-based diet quality index, is related to walking speed, which is an objective measure of physical capability, in later life of men and women from the longest running British birth cohort.

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Methods

Design and study population

Insight 46 is a neuroscience sub-study of the Medical Research Council (MRC) National Survey of Health and Development (NSHD), consisting of 502 participants of the original NSHD, who were active during the 24th follow-up in 2014-2015 (68-69y, n=2,689)[27]. The NSHD cohort has been described in detail elsewhere[28]. A detailed overview of sampling eligibility, data collection procedure and response rates in Insight46 has been recently published [27,29]. In brief, of 841 participants who had participated in the 23rd follow-up (2006-2010), with a set of key life course data available and who were willing to attend a London-based clinic, 502 were randomly recruited and underwent cognitive function assessment, including gait assessment during the period 2015-2017 (Figure 1) [27,29]. Participants with <3 days of dietary data (n=54) and <2 walks in gait assessment (n=28) were excluded from the analysis to achieve optimal data validity. Men with walking speed >1.6 m/s (n=40) and women with >1.5 m/s (n=49) were further excluded, representing non-feasible values, as defined by two standard errors of normative values of walking speed from previous literature [30], as well as unpublished data. The final sample for this study was 331 people (167 men, 164 women) from the NSHD/Insight46, aged 60-64y in 2006-2010 (Figure 1). The study was conducted according to the guidelines of the Declaration of Helsinki; ethical approval was obtained from the Greater Manchester and the Scotland Research Ethics Committees (NSHD) and the National Research Ethics Service (NRES) Committee London (14/LO/1173, Insight46). Written informed consent was obtained from all the participants.

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Dietary Assessment

Dietary data was collected at age 60-64y (2006-2010), via five-day estimated diet diaries ([31]). Participants were asked to record all food and beverages consumed at all occasions in consecutive days including three weekdays and two weekend. Prior to completion, participants were provided with extended guidance notes and portion size photographs. Diaries were coded and analyzed by the MRC in-house software, Diet in Nutrient Out (DINO)([32]), from where the "McCance and Widdowson's" food tables were used to estimate macro and micronutrients, considering food composition, variation in food items and standardized portion sizes([31]). The food diaries have been validated([33]) and recommended energy cut-off points (<500 kcal, >3,500 kcal for women, <800 kcal, >4,000 kcal for men) were applied to account for misreporting([34]). No misreporters were identified.

Healthy Eating Index-2015 (HEI-2015)

The Healthy Eating Index-2015 (HEI-2015) is a multidimensional composite score, assessing overall diet quality according to the latest Dietary Guidelines for Americans (DGAs 2015-2020)([20]). HEI-2015 consists of 13 food and nutrient-based components, nine to be consumed in adequacy and four in moderation. An overview of the components and the scoring criteria is shown in Supplementary Table S1 ([20]). In brief, all components are equally important and their score ranges from 0 to 10 points. Specific constructs of the diet e.g. fruit, vegetable and protein, are represented by two components (each ranging 0-5 points) to comply with the latest dietary guidelines ([20]). The total score ranges from 0 to 100 points with higher values reflecting better diet quality. A maximum of 100 points reflects perfect adherence to the DGAs.

Added sugars were estimated as total sugars minus natural sugars for all fruit, vegetables and dairy products, by using U.S([35]) and UK ([36]) food databases. The U.S MyPyramid Equivalents Database ([37]) and data from the National Diet and Nutrition Survey (NDNS, UK) ([38]) were also used, to select items for HEI components. HEI component and total scores were calculated according to scoring standards ([20]). Units of scoring standards in HEI score were converted to grams instead of ounces and cup equivalents. For optimal visualization, radar plots were used to determine differences in patterns of diet quality between sexes by HEI-2015 component and total scores (Figure 2).

Walking Speed

Walking speed was estimated during gait assessment in the clinic visit in 2015-2017 (69-71y) over a pre-marked obstacle free walkway ([27]). Participants were asked to perform four standard 10-meter walks at self-selected walking pace, whilst being instrumented by an inertial measurement unit (IMU; Life Performance Research, Japan), attached over the fourth lumbar vertebra by double adhesive tape([39]). Data were analyzed using a bespoke programme (LabVIEW 15.1f, National Instruments, UK). To account for anthropometric differences between sexes, which affect walking pattern, derived walking speed was normalized for leg length at age 69-71y ([40]).

Covariates

Identification of descriptive parameters up to age 64 was done both a priori as well as according to previous evidence in the NSHD ([6,24,31]). Education attainment up to 26y (no – compulsory – higher education), occupation at age 53y (professional – skilled - unskilled), and the following characteristics at age 60-64y were self-reported: marital status (married/with partner– no partner), leisure time physical activity during past four weeks (none – one to four times per week – five or more times per week), smoking status (former – current – never), use of at least one dietary supplement (yes – no). Body mass index (BMI) was calculated as body weight in kilograms by height in meters squared, both measured during the clinic/home visit at age 60-64y. Total number of comorbidities up to age 60-64y was estimated as a construct of either self-reported or diagnosed prevalence or incidence or medication for each of the following conditions: cardiovascular disease including angina, heart failure, myocardial infarction and coronary artery bypass graft, diabetes type I or II, stroke, cancer, hypertension and hypercholesterolemia. Balance ability was measured as the longest time, to a maximum of 30 seconds, for which participants could maintain a one-legged stance in a standard position with eyes open. Missing values of all variables were <4% of study sample, with the exception of BMI equal to 10% (n=331).

Statistical methods

Descriptive characteristics were presented as mean±standard deviations for continuous (independent samples t-tests) and frequencies for categorical variables (chi-square tests), overall and by sex. Unadjusted, sex adjusted and multivariable linear regression models were used to determine the association between 10 point increment of HEI-2015 and walking speed. Due to evidence from previous literature ([18,41]), a moderating effect of sex was

explored and detected and further analysis was stratified by sex. A 10 point increment in HEI-2015 was selected to reflect more meaningful changes in walking speed. A post hoc estimator was used to detect a medium effect size on up to 20 independent predictors, on an alpha level of 0.05 and statistical power of 0.8 (n estimated=210 vs n study=331)([42]). The multivariable models were adjusted for age at dietary assessment, follow-up period, occupation, education, marital status, leisure physical activity, smoking, supplement use, total number of comorbidities, body mass index and balance time. In sensitivity analyses, the relationship between the 13 individual HEI-2015 components scores and walking speed was also explored in women using simple and multivariable linear regression models with stepwise function and same covariate adjustments. All tests were performed using SPSS version 25 (IBM Co., Armonk, NY, USA). Statistical significance was set at $p \leq .05$ (two sided) for all tests.

Results

Characteristics of participants up to age 60-64y are presented in Table 1. On average, women were less likely to have professional occupation, less likely to be married and performed worse in the balance test than men; yet they were more moderately active, used supplements more and had higher diet quality (Figure 2 & Table 2). Men had faster walking speeds than women at age 69-71y (Table 3).

Table 3 shows the associations of HEI-2015 and walking speed by sex. Over a median follow-up period of 7.2y, no overall association was found; yet there was evidence for a moderating effect of sex. In stratified analysis, a 10 point increment in HEI-2015 was associated with faster walking speed among women but not men. This association remained following adjustment for confounders. No association was found for men in any model.

Of 13 HEI-2015 components, higher scores for greens & beans, whole grains and seafood & plant proteins were associated with faster walking speed in women in the unadjusted model but only greens & beans and total protein foods in the multivariable model (Supplementary Table S2).

Discussion

Utilizing data from the longest running British birth cohort, this study showed that diet quality, as indicated by higher HEI-2015 scores at age 60-64y, was associated with faster walking speed among women, but not men, seven years later, independently of a wide range of factors. To the best of our knowledge, this is the first prospective study to show sex differences in the relationship between a valid diet quality index in late midlife that reflects current dietary guidelines and better physical capability in later life, as indicated by walking speed. It further confirms evidence that healthy dietary choices at late midlife, as those reflected by high HEI-2015 scores, may slow down the rate of decline of physical capability in later life, as indicated by faster walking.

It is novel in this study that high diet quality, as indicated by high HEI-2015 scores, was linked to faster walking speed in older women but not men. Similar sex differences have been observed in studies investigating associations between diet and physical function ([11,18,41]). A healthy Nordic diet has been associated with better physical performance, measured by the Senior Fitness Test ([18]) and with muscle strength ([41]), only in women. Data from the UK Hertfordshire Cohort Study, revealed similar sex difference in the association between micronutrients and vitamins with physical performance, with shorter 3-meter walk times among older women with higher intakes of antioxidants, vitamin D and energy, but not men ([11]). Potential explanations of these findings can be hypothesized. First, women had higher diet quality compared to men in the present study and higher scores in assumedly beneficial food groups. Likewise, women of similar age in the Multiethnic Cohort (U.S) had higher HEI-2015 scores than men ([23]). HEI-2015 is a multidimensional score which allows for different combinations of components to achieve the same total score ([20]). Several studies have shown sex differences in the general direction of healthier food choices for women than men with regards to both food groups and nutrient intakes ([31,43,44]). Results from the NSHD show that women in this study have increased intakes of antioxidants overtime due to higher consumption of fruit and vegetables and lower consumption of whole milk, butter and red meat, compared to men([31,43,44]). We should consider the possibility of biological sex differences in ageing, with men having more muscle and bone mass than women over the lifespan, despite decline rates being much faster for men in older age ([3]). Sex hormones are well known to decline much steeper in older women than men, resulting in significant loss of physical function ([45]). Despite women having on average longer life expectancy than men, they also have higher morbidity rates ([1]), weaker musculoskeletal system ([46]) and slower walking speed values in the study. Therefore, given considerable evidence that links healthy

diet to muscle mass, strength and function of older adults ([8]), it is likely to be more important for the more "vulnerable" women to maintain high diet quality than men, who tend to be more robust despite lower life expectancy. This may also indicate a threshold in walking speed below which variability in diet quality might be of greater importance. Finally, sex differences in the observed association may reflect differences in long-term cumulative exposure of high diet quality over the lifespan, which are linked to physical performance in later life, as shown previously ([6,24]).

Evidence has shown an association between higher diet quality and healthy ageing ([16]), overall health-related quality of life ([47]) and better physical performance among older adults ([19]). A recent analysis from the Nurses' Health Study (NHS) showed a lower risk of self-reported physical impairment among participants with higher alternative HEI-2010 scores over an 18-year period among older adults ([48]). In our study, a 37-unit increase in HEI-2015 was associated with a considerable change of 0.1 m/s in walking speed, proposed to be predictive of survival among older people ([26]), thus suggesting a small but important estimate. Similarly, after controlling for the same kind of potential confounders in this study, a cross-sectional association between higher HEI-2005 total scores and faster walking speed among ~ 2,100 older men and women was found in the U.S; yet compared to this study, the sample was older and was less high-functioning, as indicated by slower walking speed, higher prevalence of comorbidities and higher body mass indices ([19]).

Using healthy dietary patterns, albeit cultural and regional specific, cross-sectional and observational studies, support the finding of this study regarding the relationship of high diet quality in midlife with better physical function in later life([15,17,18,24]). In a prospective study of community-dwelling older adults, walking speed over an 8-year period was faster among those with better diet quality as indicated by higher MedDiet scores at baseline, suggesting a long-term effect of diet on mobility performance ([17]). High diet quality, as reflected by a healthy Nordic diet score, was associated with better physical performance in the 6-min walk test among Nordic women over 60y over a 10-year period ([18]). Despite cultural and regional differences in food choice, all these dietary patterns highlight the importance of diet quality over quantity with the main focus on intakes of plant foods, whole grains and fish/long-chain ω-3 PUFA as well as lower intakes of red and processed meats, added sugars and saturated fat ([17,18]). Therefore, it is likely that overall diet quality, rather than a specific diet, is important for maintaining physical capability, as shown in this study.

This study also showed that higher HEI-2015 scores for greens & beans, whole grains, total protein, seafood & plant proteins were associated with faster walking speed among women.

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Findings are consistent with evidence from a longitudinal study which showed that lower fruit and vegetable consumption among older people was associated with functional limitations and disability over a 17-year period ([12]). The NSHD study assessed the effect of adult diet quality over 30y on physical performance, as measured by chair rise, timed-up-and-go and standing balance tests and showed a positive association between early adulthood and early older age dietary patterns, high in fruits, vegetables and wholegrains, and measures of physical performance ([24]). It is interesting that using data from the same cohort, the present study confirmed those findings additionally for walking speed, which is another valid measure of physical capability. Regarding protein, our findings support previous research from the NSHD, which suggested a weak relationship of higher protein intake in lifetime adulthood with better physical capability in older age ([6]); the low strength of the association might be due to the study assessing quantity as total protein intake rather than quality as source of protein (seafood versus meat protein). Finally, the UK Hertfordshire Cohort Study further confirms our results for seafood & plant protein foods, as they also showed a positive association of fatty fish consumption, rich in vitamin D and ω-3 fatty acids, and objective-measures of physical capability among ~2,000 older adults ([49]).

The study has major strengths including the longest running and in most cases nationally representative British birth cohort of women and men, long follow-up to detect relatively long-term dietary effects, the use of a valid measure of diet quality ([20]), objective measures of walking speed indicating physical capability ([50]) and detailed information on a broad range of covariates at baseline. Dietary assessment was undertaken using food diaries over all seasons, which despite potential for measurement error, are still considered the gold standard method ([51]) and provide extensive information about food type and thus reflect diet quality. Finally, all study participants were within the same age group and we also controlled for age at dietary assessment, hence limiting important source of confounding.

Limitations include participants being more likely to have provided dietary information at age 60-64y than those in the original NSHD but not in Insight46; hence they were likely more health conscious ([29]). Interim health events between baseline and follow up were not available; however the models were controlled for number of comorbidities at baseline. In addition, participants in the Insight 46 were in general healthier individuals ([29]). Indeed, walking speed of men and women in this study were significantly higher than normative values ([52]), indicating overall healthy ageing. Walking speed via IMUs was not assessed at baseline and this might have affected the observed associations; however findings likely express true relationship as models were controlled for physical activity and balance tests at

baseline and previous literature of similar design supports the present findings ([18,41]). Moreover, men tend to outperform women in walking status at all ages ([53]), conditional on anthropometric differences ([52]) with similar trends in speed decline by sex ([53]). Therefore, dramatic changes of speed between baseline and follow-up by sex are unlikely. Although selection procedure of the Insight46 was thoroughly designed, potential collider bias deriving may lead to biased estimates of the observed associations ([54]). Attrition rates and loss to follow-ups are common issues in longitudinal studies; however the cohort in 2006 was still representative of the British population in most aspects ([29]). Only white British-born people were included; thus generalizability should be made with caution; however, when compared to the NDNS, reflecting dietary intake of the British population, the original NSHD sample showed notable agreement regarding age-matched trends in dietary intake ([31,38,44]). Despite the prospective design and thorough adjustment for major confounders, we cannot exclude the possibility of residual confounding. Although the sample size was relatively small, it is adequate to detect the observed associations, as per post hoc analysis ([42]).

In conclusion, this study adds evidence for the relationship of high diet quality in late midlife, in particular among women, and better physical capability in later life, as indicated by faster walking speed, reflecting healthier ageing. Despite the estimate size being relatively small, it is important that adaptation to high diet quality at midlife e.g. increase in consumption of greens, whole grains and whole fruits alongside lower intakes of added sugars and saturated fat from animal sources, in line with established dietary guidelines, is likely to contribute towards better physical capability in later life and sex differences are likely to affect this relationship, suggesting different strategies in lifestyle interventions of ageing people to be further explored.

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Authorship

JMS and MR were responsible for the design and conduct of the Insight46. TGT, PE, SC and HD formulated the research question and designed the study. TGT, PE and FM performed data cleaning, TGT conducted the statistical analyses with support from HI. TGT wrote the first draft of the manuscript, supervised by PE, SC and HD. All authors contributed to revising the manuscript and approval of the final version.

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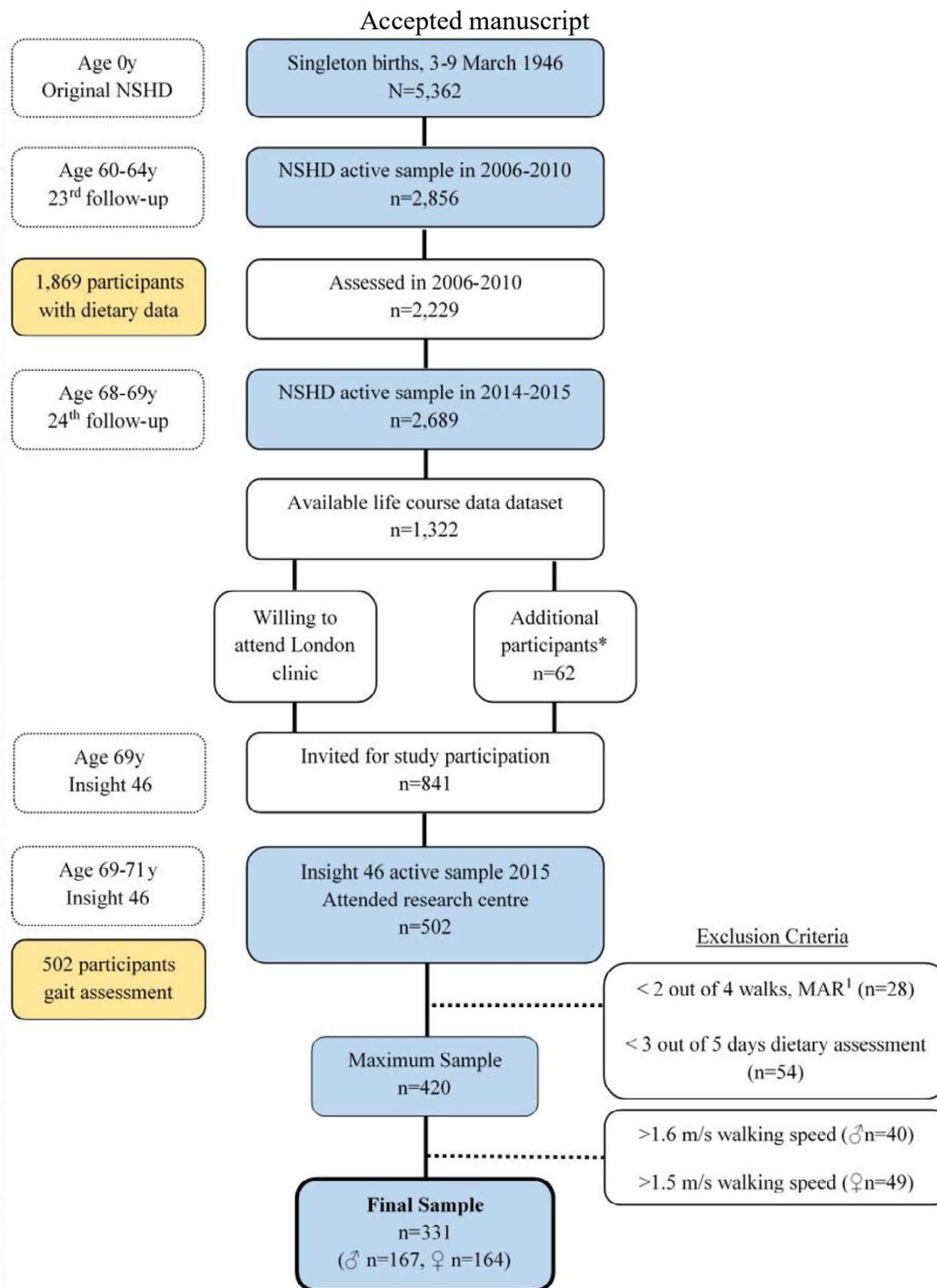
Figure 1. Number of participants in the National Survey of Health and Development / Insight46 and selection criteria for the present study. Note: MAR: Missing at random, y: years, *to reach target sample of 500, participants without full set of life course data were included.
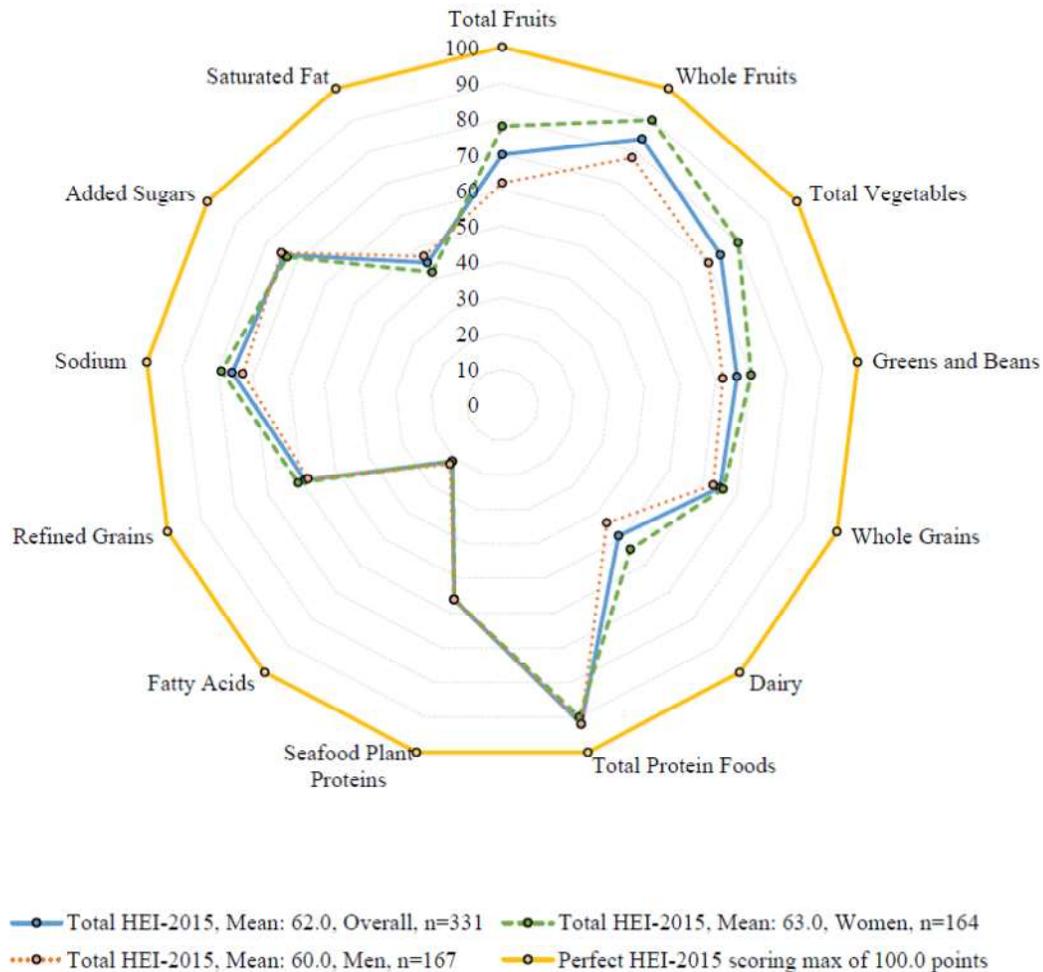
Figure 2. Radar plot of HEI-2015 components and total scores at age 60-64 of participants with valid data of walking speed in single gait task at age 69-71, overall and by sex, NSHD/Insight46, n=331. Percentage of maximum points received for each component on average, overall and by sex, with 0% in the center and 100% at the outer edge. A perfect HEI-2015 scores a total maximum of 100 points (100% in each component) and is represented by the dashed line around the perimeter of the graph. HEI-2015, Healthy Eating Index-2015

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Table 1. Descriptive characteristics of participants up to age 60-64y with valid data of walking speed in single gait task at age 69-71y, overall and by sex, NSHD/Insight46, n=331

	Overall, n=331		Women, n=164		Men, n=167	
	mean	SD	mean	SD	mean	SD
	n	%	n	%	n	%
Age, 2006-2010, y	63.3	1.1	63.3	1.0	63.3	1.1
Occupation						
Professional	212.0	64.0	90.0	55.0	122.0	73.0[†]
Skilled	117.0	35.0	74.0	45.0*	43.0	26.0
Unskilled	2.0	1.0	0.0	0.0	2.0	1.0
≥ Secondary education,	250.0	76.0	123.0	75.0	127.0	76.0
Married / with partner	268.0	81.0	126.0	77.0	142.0	85.0[‡]
Total comorbidities, n>2	36.0	12.0	16.0	10.0	20.0	12.0
Leisure physical activity						
None	173.0	52.0	79.0	48.0	94.0	56.0
1 to 4 times/week	66.0	20.0	41.0	25.0[‡]	25.0	15.0
≥5 time/week	92.0	28.0	44.0	27.0	48.0	29.0
Smoking status, current	14.0	4.0	7.0	4.0	7.0	4.0
Supplement use, yes	159.0	48.0	92.0	56.0[†]	67.0	40.0
Body mass index, kg/m^2	27.1	3.8	27.1	4.2	27.1	3.2
Balance Time, eyes open, ≥30s[a]	179.0	54.0	75.0	46.0	104.0	62.0[†]

NSHD, National Survey of Health and Development, y, years, kg, kilogram, m, meter, cm, centimetre, s, seconds, SD, standard deviation.

[a] Balance time is presented as percentage of participants who achieved balance of 30s with eyes open.

*p value ≤ .001, [†]p value ≤ .01, [‡]p value ≤ .05

Table 2. The Healthy Eating Index-2015 total & component scores of participants at age 60-64y with valid walking speed at age 69-71y, overall and by sex, NSHD/Insight 46, n=331

	Overall, n=331				Women, n=164				Men, n=167			
	median	range			median	range			median	range		
HEI-2015, 0.0-100.0	61.0	27.0-93.0			63.0	27.0-93.0			59.0	30.0-92.0		
Component Scores	mean	SD	n max score [a]	%	mean	SD	n max score [a]	%	mean	SD	n max score [a]	%
Adequacy												
Total Fruits [b]	3.5	1.6	140.0	42.0	3.9 *	1.4	85.0	52.0 *	3.1	1.7	55.0	33.0
Whole Fruits [b]	4.2	1.4	243.0	73.0	4.5 *	1.1	135.0	82.0 *	3.9	1.6	108.0	65.0
Total Vegetables [b]	3.7	1.1	121.0	36.0	4.0 *	1.0	73.0	45.0 *	3.5	1.1	48.0	29.0
Greens & Beans [b]	3.3	1.7	123.0	37.0	3.5	1.6	67.0	41.0 †	3.1	1.7	56.0	34.0
Whole Grains	6.5	3.5	119.0	36.0	6.6	3.4	63.0	38.0	6.3	3.6	56.0	34.0
Dairy	4.9	2.3	17.0	5.0	5.4 *	2.5	14.0	9.0 †	4.4	2.0	3.0	2.0
Total Protein Foods [b]	4.6	0.8	252.0	76.0	4.5	0.9	118.0	72.0	4.6	0.7 †	134.0	80.0
Seafood & Plant Proteins [b]	2.8	1.9	109.0	33.0	2.8	1.9	56.0	34.0	2.8	1.9	53.0	32.0
Fatty Acids	2.1	2.4	6.0	2.0	2.1	2.6	5.0	3.0	2.2	2.2	1.0	1.0
Moderation												
Refined Grains	5.9	3.4	86.0	26.0	6.1	3.3	47.0	29.0	5.8	3.5	39.0	23.0
Sodium	7.6	2.5	115.0	35.0	7.9 †	2.5	68.0	42.0 †	7.3	2.5	47.0	28.0
Added Sugars	7.4	2.0	56.0	17.0	7.3	2.0	29.0	18.0	7.5	1.9	27.0	16.0
Saturated Fat	4.5	3.0	20.0	6.0	4.2	3.0	10.0	6.0	4.7	3.0	10.0	6.0

NSHD, National Survey of Health and Development, y, years, s, seconds, HEI-2015, Healthy Eating Index-2015, SD, standard deviation.

[a] Number of participants the standard for maximum score in each component. [b] Maximum score is 5; for the rest components is 10.

* p value ≤ .001, † p value ≤ .05

Table 3. Unstandardized coefficients (B) and 95% confidence intervals (95% CIs) of walking speed in single gait task at age 69-71y by 10 point increment of the Healthy Eating Index-2015 score of participants at age 60-64y, stratified by sex, NSHD/Insight46, n=331

	HEI-2015, 0.0 – 100.0, per 10 point increment			
	Women, n=164		Men, n=167	
	mean	SD	mean	SD
Walking speed, m/s, mean (sd)	1.32	0.14	1.39	0.15
	B	95% CI	B	95% CI
Sex stratified[a]	0.024	0.006, 0.043[*]	- 0.012	-0.030, 0.006
Multivariable adjusted[b]	0.021	0.003, 0.040[†]	- 0.009	-0.028, 0.009
	mean	SD	mean	SD
Normalized walking speed, -, mean (sd)	0.44	0.05	0.47	0.05
	B	95% CI	B	95% CI
Sex stratified	0.008	0.002, 0.014[†]	- 0.004	-0.010, 0.002
Multivariable adjusted[c]	0.008	0.001, 0.014[†]	- 0.005	-0.011, 0.001

NSHD, National Survey of Health and Development, HEI-2015, Healthy Eating Index-2015, SD, standard deviation, B: unstandardized coefficient, 95% CI: 95% confidence interval

[a] Sex stratified model: 10 point increment of HEI-2015 as predictor of walking speed, stratified by sex. [b] Adjusted for 2016-2010 factors: age, time period until gait, occupation, married / with partner, at least secondary education, smoking status, leisure physical activity per month, supplement use, number of comorbidities, body mass index, and balance time. [c] Not adjusted for body mass index because walking speed was already normalized for leg length.

[*]p value ≤ .001, [†]p value ≤ .05