Thesis on existing data: Social Policy & Public Health

The role of lifestyle in socioeconomic inequities in physical limitations in activities daily living among elderly in the Netherlands

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Abstract

Background: Physical limitations (PL) in activities daily living (ADL) significantly predict the need for assistance, caregiving, nursing home placement, and health care utilization. Therefore, it is important to reduce the socioeconomic inequities in PL in ADL for elderly. The current study is focused on socioeconomic inequity in PL in ADL and the role of lifestyle behaviours, namely diet, exercise, and smoking.

Methods: The data of a large-scale postal survey, for the longitudinal GLOBE study, among a stratified sample of the adult population (age 25–75 years) of Eindhoven and surrounding cities in October 2004 (N = 4785; response rate 64.4%) is used. In the current study participants above 65 are included. One participant was excluded because there was missing data for gender (N = 1046). A mediation analysis was conducted to see if diet, exercise, and smoking mediate the relationship between PL in ADL and the socioeconomic status (SES) of elderly in the Netherlands.

Results: SES had a significant negative relationship with PL in ADL (b=-.032, 95% CI [-.061, -.002], t= -2.113, p= .035). Exercise had a negative significant relationship with SES as well as PL in ADL. A partial mediation is present. For exercise as mediator the total effect is -.045. Smoking had a significant relation with SES, but no significant relation with PL in ADL. Diet had no significant relation with SES or PL in ADL.

Conclusions: Elderly with a higher SES had fewer PL in ADL than elderly in a lower SES. Elderly in a higher SES exercise more which leads to fewer PL in ADL. More research about lifestyle factors that mediate the relationship between SES and PL in ADL of elderly is needed. There is also a need for more research on the explanations for the differences in lifestyle factors across elderly in different socioeconomic groups.

Key words: Socioeconomic status (SES); Diet; Exercise; Smoking; Elderly; the Netherlands; Mediation

Chapter 1 *Introduction*

Limitations in performing activities of daily living (ADL) are negatively associated with quality of life in older people (Groessl et al., 2019; Jacob et al., 2016). ADL are the activities people perform every day to live independently within their environment, for instance bathing, eating, or using the restroom (Covinsky, 2006).

The population in the Netherlands is aging. The structure of the population is changing because there are more elderly (Central Bureau for Statistics [CBS], 2022b). The amount of people with an age-related disease is rising (Boshuizen et al., 2014). The prevalence of chronic conditions increases with age, as does the risk of having two or more chronic conditions, which is referred to as 'multimorbidity' (Raina et al., 2020). Individuals with multimorbidity are at greater risk for physical limitations (PL) in their ADL (Williams & Egede, 2016).

In the Netherlands people who have a higher education live without PL for a longer time (CBS, 2021). According to CBS (2021), people with a lower education on average live 65.7 years without PL, while people with a higher education on average live 77.8 years without PL —a difference of 12.1 years. This indicates a strong socioeconomic association with PL in ADL (Ramsay et al., 2008). Elderly in the lower class develop more PL in ADL than those in higher classes (Bleijenberg et al., 2017). These limitations are related to poorer self-rated health (Duntava et al., 2021; Hoeymans et al., 1997).

An important goal of the Dutch government is to decrease health inequities between the lowest and highest socioeconomic groups by 30% before 2040 (Health Holland, 2021). These health inequities lead to less participation in education and the labour market, less economic development, more healthcare use, and more healthcare expenses (*Numbers and facts health differences*, 2022). PL in ADL significantly predict the need for assistance, caregiving, nursing home placement, and healthcare utilisation (*Numbers and facts health differences*, 2022).

Older age, female sex, low education, low socioeconomic status (SES), being widowed or single, sedentary physical lifestyles, obesity, smoking, and multimorbidity are all commonly associated with disabilities (Batsis et al., 2015; Lestari et al., 2019; Ordunez & Campbell, 2020; Williams & Egede, 2016). The SES association is a less explored topic, however, when linked to lifestyle factors (LF). Research states that the right combination of healthy LF can compress the late-life disabled period (Jacob et al., 2016).

It is important to further investigate how LF influence PL in ADL. Creating effective preventative strategies requires knowledge of the risk factors involved (Rodrigues et al.,

2009). The focus of this research is to investigate whether elderly in different Dutch socioeconomic groups have different lifestyles and to see if these LF, namely healthy diets, regular exercise, and smoking, influence the adults' PL in ADL.

Chapter 2 *Literature review*

Physical limitations in activities of daily living and age

Globally, the proportion of elderly is increasing because of decreasing fertility rates and improving life expectancies (World Health Organization & World Bank, 2011). Global ageing has a major influence on disability trends. The relationship is straightforward: There is higher risk of disability at older ages (World Health Organization & World Bank, 2011). Old age is often associated with functional decline and physical dependence due to compromised ability to carry out ADL (Patra et al., 2020). These PL in ADL among the elderly are linked to multiple LF (Jacob et al., 2016) which are debated further below.

Physical limitations in activities in daily living and socioeconomic status

SES is a measure of combined economic and social status (Baker, 2014). It represents an individual or a group's position within a hierarchical social structure, measured by variables including education, occupation, income, wealth, and place of residence (Adler & Rehkopf, 2008).

Elderly living with disabilities are more likely to have low SES with low education levels, poor social networks, lesser engagement in the labour force, and poor health (United Nations DESA, 2010).

Research (Zhong et al., 2017) states that SES in childhood and early adulthood is related to functional disability among elderly, and the existing research proves that income and educational levels are predictors for PL in ADL later in life (Bootsma-van Der Wiel et al., 2005; Liu & Wang, 2022). Elderly subjects with low incomes have more chronic diseases and more disabilities than those with high incomes (Bootsma-van Der Wiel et al., 2005).

Dai et al. (2021) note that people of high SES usually have the necessary knowledge and social and economic means to improve their health behaviour and to use medical services, which significantly decreases their vulnerability to negative health outcomes (Dai et al., 2021). This confirms that SES has a significant impact on older people's PL in ADL (Dai et al., 2021).

Physical limitations in activities of daily living and exercise

Exercise is important for health (Langhammer et al., 2018; McPhee et al., 2016). Many studies confirm a negative relationship between disability and exercise (Gopinath et al., 2018; Yamada et al., 2012). Some research states that exercise reduces older adults' risk of PL in ADL (Cunningham et al., 2020; Osuka et al., 2018; Sjölund et al., 2015). Exercising more can prevent and slow the disablement process (Tak et al., 2013), but can also decrease the rate at which PL in ADL are already present (Groessl et al., 2019).

Physical limitations in activities of daily living and diet

Not much is known about diet's direct effect on PL in ADL. Optimal eating is associated with increased life expectancy and a dramatic reduction in lifetime risk of all chronic disease (Katz & Meller, 2014). Korean research (Kim et al., 2013) specifically investigated the link between diet and PL in ADL. Two dietary patterns were identified: the modified traditional dietary pattern—with less white rice and more fruits, dairy, and legumes—and the traditional dietary pattern—with more white rice. Koreans who followed the modified traditional dietary pattern had a lower likelihood of PL in ADL (Kim et al., 2013). Another French study investigated diet's effects on PL in ADL. The authors state that certain unhealthy dietary patterns may increase the risk of activity limitation in elderly (Pilleron et al., 2018). Further research in the Netherlands has not yet been published.

Physical limitations in activities of daily living and smoking

Smoking can affect PL in ADL (den Ouden et al., 2013). There is a 2% greater likelihood of PL in ADL per daily cigarette smoked (Reynolds & Silverstein, 2003). American research revealed that citizens who had never smoked had a substantially longer overall and disability-free life expectancy (Mehta & Myrskylä, 2017). Taiwan researchers state, however, that smoking has no significant effect on PL in ADL (Wu et al., 1999). Thus, the results surrounding smoking are contradictory.

Socioeconomic status and lifestyle factors

LF can differ depending on SES. Higher education and income have been associated with a healthier lifestyle (Glorioso & Pisati, 2013), especially related to diet (Mullie et al., 2010), physical activity during leisure time (Stalsberg & Pedersen, 2018), and smoking (Martinez et al., 2018).

However, Research (Osuka et al., 2018) found that the education gradient in smoking, the income gradient in fruit and vegetable consumption, and the education gradient in physical

activity among males all become smaller at older ages. Physical activity among females is the only lifestyle indicator where the income and education gradients increase at older ages. This indicates that associations between SES and lifestyle choices may not remain constant but may instead vary with age. Such variation could be important in explaining corresponding age and SES patterns in health (Osuka et al., 2018).

Lifestyle has been proven to mediate between SES and health (Wang & Geng, 2019). In the Netherlands there is a clear association between education and daily fruit and vegetable consumption: the higher a person's educational level, the healthier their diet. Physical activity is most popular among university graduates, while regular smokers are mostly people of a lower and higher secondary education (André et al., 2018).

Chapter 3 *Theoretical framework*

Health lifestyle theory

The health lifestyle theory (HLT) is based on work of Weber (1978) and Bourdieu (1984). It emphasizes the importance of SES in determining lifestyle patterns, along with other structural variables consisting of age, gender, race/ethnicity, collectivities, and living conditions (Cockerham, 2020).

According to the HLT (see Appendix 1), lifestyle behaviours tend to occur in cluster patterns that reflect differences in SES, gender, and other demographic variables (Cockerham et al., 2017). These patterns are shaped top-down by structural influences and living conditions. The structural structures determine the choices available according to the access and the social rules of the group, thus channelling health lifestyle choices onto specific pathways. People generally choose along class lines (Cockerham et al., 2017).

The HLT states that class circumstances provide the social context and experiences that influence life choices and life chances. These create a person's habitus, which is their disposition to act in ways that are practical and consistent with the approved norms of the larger social order (Cockerham et al., 2017). A habitus leads to practices involving alcohol use, smoking, dietary habits, exercise, and other health-related actions. As such, these health-related actions are the result of the social variables that people experience as groups (Cockerham et al., 2017).

Social determinants of health

Recently, the public health community has placed more attention on the social determinants of health (SDH) (Braveman & Gottlieb, 2014). These are factors other than medical care that

shape health and that can be influenced by social policies (Braveman & Gottlieb, 2014). The WHO Commission on Social Determinants of Health and World Health Organization (2008) take a holistic view on this topic. The weak health of impoverished people, the social gradient in health within individual countries, and the marked health inequities between all countries are caused by an unequal distribution of power, income, goods, and services. This inequity causes immediate, visible unfairness in key life areas like access to healthcare, education, work, and leisure conditions, and living environments, affecting the chances of a flourishing life (WHO Commission on Social Determinants of Health & World Health Organization, 2008).

The Commission calls on the WHO and all governments to lead global action aimed at achieving health equity (WHO Commission on Social Determinants of Health & World Health Organization, 2008). Their recommendations for the SDH are to measure the problem, to evaluate action, to expand the knowledge base, to develop a better trained workforce, and raise public awareness. This requires more focus on social determinants in public health research (WHO Commission on Social Determinants of Health & World Health Organization, 2008). The present study contributes to this goal. Braveman and Gottlieb (2014) list three pathways through which education can influence health outcomes, reflecting links that have been described in the literature (see Appendix 2).

Combined framework

The HLT and the SDH may help to explain the differences in lifestyle behaviors between the different SES groups. The choices and chances of people are the result of structural factors or social determinants that create the social codes of groups (Cockerham et al., 2017; WHO Commission on Social Determinants of Health & World Health Organization, 2008). These choices and chances channel health lifestyle choices onto specific pathways (Cockerham et al., 2017). The result is a difference in lifestyle behaviors between different SES groups. These differences in lifestyle result in inequity in health. The conceptual model (see Appendix 3) and the literature review led to the questions and hypotheses depicted in Figure 1:

1) Does SES have a direct effect on PL in ADL among elderly people?
H1: SES has a direct negative effect on PL in ADL. The higher the SES, the fewer the PL in ADL elderly experience *(H1).*

2) Does diet mediate the relationship between SES and PL in ADL among elderly people?

H2: The relationship between SES and PL in ADL is mediated by diet. SES has a positive relationship with diet *(H2a),* and diet has a negative relationship with the PL in ADL (*H2b)*.

3) Does exercise mediate the relationship between SES and PL in ADL among elderly people?

H3: The relationship between SES and PL in ADL is mediated by exercise. SES has a positive relationship with exercise *(H3a),* and exercise has a negative relationship with PL in ADL (*H3b)*.

4) Does smoking mediate the relationship between SES and PL in ADL among elderly people?

H4: The relationship between SES and PL in ADL is mediated by smoking. SES has a negative relationship with smoking (H4a) and smoking has a positive relationship with PL in ADL (H4b).

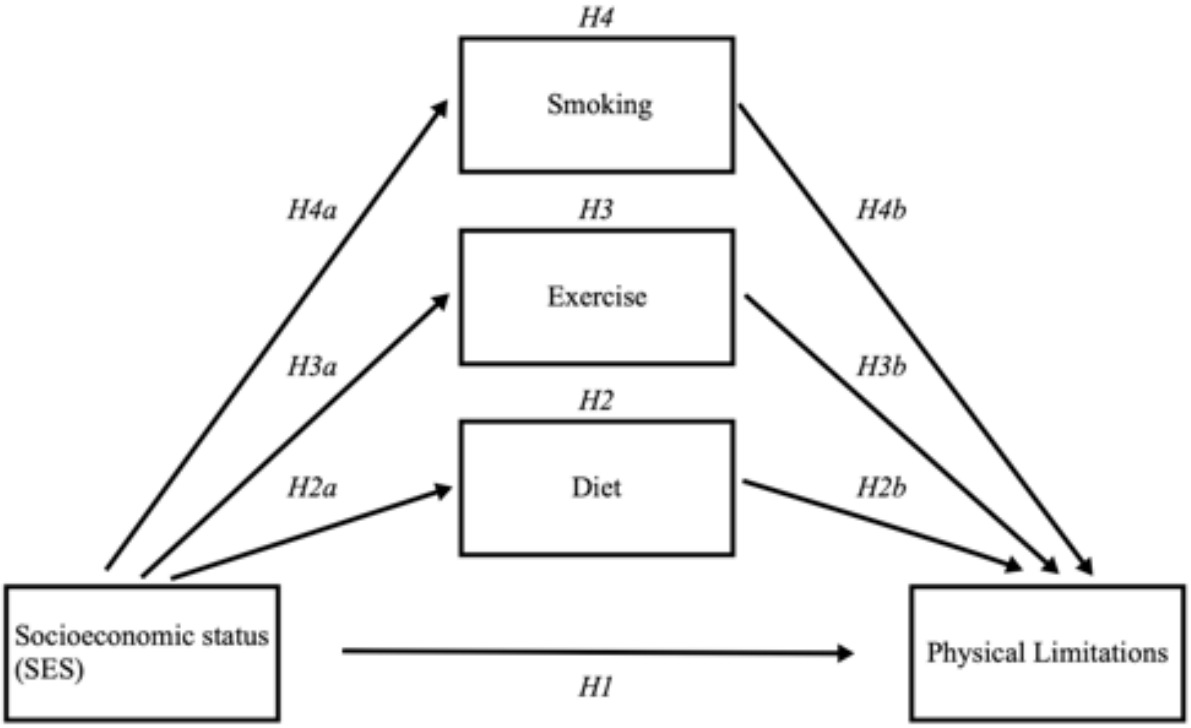

Figure 1.

Chapter 5 *Methodology*

Study design

The data used were obtained through a large-scale postal survey, a component of the new wave of data collection for the longitudinal GLOBE study, with a stratified sample of the adult population (age 25 – 75 years) of Eindhoven (the fifth-largest city in the Netherlands) and surrounding cities in October 2004 (N = 4785; response rate 64.4%). The use of personal data in the GLOBE study follows the Dutch Personal Data Protection Act and the Municipal Database Act, and it has been registered with the Dutch Data Protection Authority (number 1248943).

Study sample

The data were collected using a postal survey through which participants were also provided with background information. They were asked to fill in the questions, which would take approximately 30 minutes, and then send the answers back. All the data are anonymised and can only be accessed by authorised researchers. People above the age of 65 have a much lower life expectancy without PL than people under the age of 65. PL increase for older people (CBS, 2021). Therefore, in this research only participants above 65 were considered. One was excluded from analysis because the participant had a missing value for gender (*n*=1046).

Data and measurements

Independent variable

Socioeconomic status

SES is measured through educational level, as is typical in the Netherlands. Education represents the cultural dimension of SES and is possibly the most related to lifestyle (National Insitute for Health and Environment, 2018). It was measured with the question: 'Would you like to tick the highest level of education you have completed with a degree?' (see appendix 4). This was followed by an ordinal scale of 9 from no education to scientific education. The answers were recoded into three levels of education according to the International Standard Classification of Education: 1 = low education (no or primary education; 1 – 2), 2 = medium education (lower vocational and intermediate vocational education; 3 – 4), 3 = high education (intermediate vocational education, higher general secondary education, higher vocational education/college, university education; 5 – 8). No education (9) was coded as missing values and was left out of the analysis.

Mediators

Diet

According to the Health Counsel (2015) in the Netherlands, a healthy daily diet includes at least 200 grams of vegetables and 200 grams of fruit. Survey participants were asked how much fruit and vegetables they eat in a week (see appendix 5). Answers were recoded into two categories: 0 = not enough fruit/vegetables a week (under 1,400 grams of vegetables and under 14 pieces of fruit) and 1 = enough fruit/vegetables a week (1,400 grams of vegetables and 14 pieces of fruit or more).

Exercise

According to the Health Counsel (2017) in the Netherlands, the recommendation for exercise is to perform at least 150 minutes/week of medium intensive exercise and at least two exercises/week that strengthen the muscles and bones. This was measured by means of the validated SQUASH questionnaire (Wendel-Vos, 2003). Participants were asked to provide the frequency and time (in hours and minutes a day) for walking, cycling, doing odd jobs, gardening, physical jobs, and housework (see appendix 6). Based on this, the total amount of minutes and days per week spent on all exercise was calculated. If it was more than 150 minutes/week it was considered sufficient. Muscle and bone strengthening was not specifically asked, performing a sport two times a week was considered enough exercise. Then a dichotomous outcome was created that indicates whether someone was sufficiently physically active to comply with the Dutch movement guidelines or not (0= not sufficient, 1= sufficient). Participants were considered sufficient (=1) if both medium intensive exercise and performing sports two times a week was met.

Smoking

Participants were asked whether they smoked (see appendix 7). Answers were recoded into two categories: 0 = smoking and 1 = not smoking.

Dependent variable

Physical limitations in activities of daily living

This variable was measured using 12 questions with 4-point scales (1 = without effort, 2 = with a bit of effort, 3 = with a lot of effort, and 4 = only with help). The questions included different types of ADL (see appendix 8). The Cronbach alpha for these 12 questions was .896. This is a

relatively high score; therefore, no questions were removed. An average score was created from the answers to all 12 questions.

Confounders

In this research sex, age, partner status, and country of origin were used as potential confounders. The measurement level of gender was dichotomous (1 = woman, 2 = man). Age was measured in years. Both partner status and country of origin were dichotomous (1 = no partner, 2 = yes, partner present; 1 = Netherlands, 2 = other).

Data analysis

To visualise the research, the researcher used Hayes' (2012) simple mediation model (see figure 1). Before conducting the mediation analysis, the researcher viewed the descriptives, correlations, and assumptions. The assumptions of normality (see Appendix 9) and multicollinearity (see Appendix 10) were met. Then the researchers used the Baron and Kenny (1986) steps (see Appendix 11). The SYNTAX is included in the appendix (see Appendix 12).

Chapter 6 *Results*

Descriptive statistics

The sample's characteristics are presented in Table 1. The sample consisted of 510 men (48.8%) and 536 women (51.2%) above the age of 65. The average age of the sample was 69.33 (*SD* 2.95). The high-educated reported better compliance to exercise than the low-educated. In a slight difference, medium-educated participants on average smoked less often than low- and high-educated participants. The medium- and high-educated participants had a slightly better diet than the low-educated. The low-educated had the most PL in ADL (1.24), and the high-educated had the least PL in ADL (1.16). As gender and partner status are significantly correlated with SES and PL in ADL, age and partner status are included as covariates in the mediation analysis (see Table 2). One case was excluded from the mediation analysis because the participant had a missing value for gender.

Table 1

Sample characteristics by educational level

	Educational level			
	Total	1 low education	2 medium education	3 high education
	(*n*= 1047)	(*n*=205)	(*n*=465)	(*n*=377)
Total sample, % *(n)*	100 (1047)	19.6 (205)	44.4 (465)	36.0 (377)
Gender, % *(n)*				
Male	48.8 (510)	36.1 (74)	36.9 (171)	70.3 (265)
Female	51.2 (536)	63.9 (131)	63.1 (293)	29.7 (112)
Age, mean *(SD)*	69.33 (2.95)	69.53 (2.84)	69.23 (2.92)	69.35 (3.05)
Country of origin, % *(n)*				
Netherlands	93.5 (979)	89.8 (184)	97.2 (452)	91 (343)
Other	6.5 (68)	10.2 (21)	2.8 (13)	9.0 (34)
Partner status, % *(n)*				
No partner	23.9 (250)	31.7 (65)	22.6 (105)	21.2 (80)
Yes, partner present	76.1 (797)	68.3 (140)	77.4 (360)	78.8 (297)
Mediators				
Exercise, % *(n)*				
Not according to norm	75.9 (795)	90.2 (185)	76.8 (357)	67.1 (253)
According to the norm	24.1 (252)	9.8 (20)	23.2 (108)	32.9 (124)
Smoking, % *(n)*				
Not according to norm	66.1 (692)	71.7 (147)	63.0 (293)	66.8 (252)
According to the norm	33.9 (355)	28.3 (58)	37.0 (172)	33.2 (125)
Diet, % *(n)*				
Not according to norm	92.4 (967)	93.7 (192)	91.8 (427)	92.3 (348)
According to the norm	7.6 (80)	6.3 (13)	8.2 (38)	7.7 (29)
Physical Limitations in ADL, mean *(SD)*	1.20 (0.34)	1.24 (0.37)	1.20 (0.35)	1.16 (0.30)

[a] Educational level with 1 = low education 2 = medium education, 3 = high education

Table 2

Pearson correlations between study variables

	1	2	3	4	5	6	7	8	9
1 SES									
2 Physical Limitations	-.082**								
3 Exercise	.192**	-.151**							
4 Smoking	.024	-.016	.036						
5 Diet	.014	-.046	.082**	.052					
6 Lifestyle	.025	-.034	.221**	.174**	.433**				
7 Age	-.014	.142**	-.099**	.035	-.066*	-.056			
8 Gender	-.282**	.063*	-.068*	.342**	.036	.059	-.017		
9 Partner Status	.080**	-.082**	.048	-.039	.009	.015	-.047	-.177**	
10 Country of origin	-.010	-.002	.012	-.081**	-.070*	-.030	-.015	-.029	.107**

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Direct effect

BK Step 1: The direct effect of SES on PL is significant (b=-.032, 95% CI [-.061, -.002], t= -2.113, p= .035). There is indeed a negative association among SES and PL in ADL indicating that elderly with a higher level of SES tend to have fewer PL in ADL. Specifically, we estimate that if SES goes up 1 point, the elder would be expected to have a -.032 lower PL score.

Mediation analysis with diet

The results of the mediation analysis including diet is shown in Figure 2.

BK Step 2: Different than expected, SES was not significantly associated with diet (b= .009, 95% CI [-.014, .033], t= .800, p= .424). There is no association among SES and diet.

BK Step 3: Also, opposite of expected diet was not significantly associated with PL in ADL (b= -.061, 95% CI [-.139, .016], t=-1.546, p= .122). There is no association among diet and PL. Since there is only a significant direct effect there is no mediation.

Figure 2.

Results of mediation analysis testing diet as mediator of the effect of SES on Physical Limitations, while controlling for gender and partner status. *p < .05, **p < .01.

Mediation analysis with exercise

The results of the mediation analysis including exercise is shown in Figure 3.

BK Step 2: As expected, SES was significantly associated with exercise (b= .110, 95% CI [.073, .147], t= 5.905, p= <.001). There is indeed a positive association among SES and exercise indicating that elderly with a higher level of SES tend to exercise more. Specifically, we estimate that if SES goes up 1 point, the elder would be expected to have a .110 higher exercise score.

BK Step 3: Also, as expected exercise was significantly associated with PL in ADL (b= -.115, 95% CI [-.163, -.067], t= -4.731, p= <.001). There is indeed a negative association among exercise and PL in ADL indicating that elderly with a higher level of exercise tend to have fewer PL in ADL. Specifically, we estimate that if exercise goes up 1 point, the elder would be expected to have a -.115 lower PL score.

Since there is an indirect effect and a direct effect, there is a partial mediation. The direct effect is -.032, the indirect effect is -.013, and the total effect is -.045.

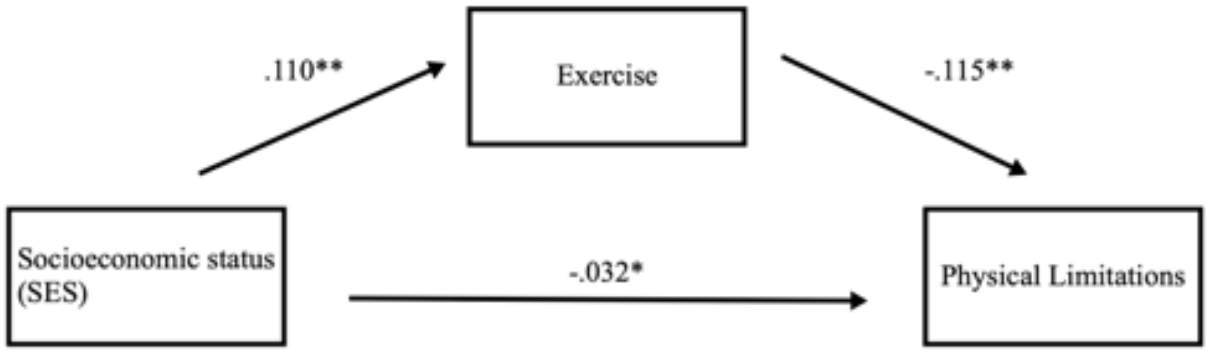

Figure 3.

Results of mediation analysis testing diet as mediator of the effect of SES on Physical Limitations, while controlling for gender and partner status. *p < .05, **p < .01.

Mediation analysis with smoking

The results of the mediation analysis including smoking is shown in Figure 4.

BK Step 2: As expected, SES was significantly associated with smoking (b= .085, 95% CI [.046, .123], t= 4,337, p= <.001). There is a negative association among SES and smoking indicating that elderly with a higher level of SES smoke less often than elderly in a lower SES. Specifically, we estimate that if SES goes up 1 point, the elder would be expected to have a .085 higher smoking score. This means less likely to smoke, since not smoking is coded as 1 and smoking is coded as 0.

BK Step 3: Different as expected, smoking was not significantly associated with PL in ADL (b= -.030, 95% CI [-.076, .017], t= 1.251, p= .211).

Since there is an only a direct effect and an effect of SES on smoking, there is no partial or full mediation.

Figure 4.

Results of mediation analysis testing exercise as mediator of the effect of SES on Physical Limitations, while controlling for age. *p < .05, **p < .01.

Chapter 6 *Discussion*

Main findings

The goals of this study were to investigate whether elderly in different Dutch socioeconomic groups have different lifestyles and to see if these LF, namely healthy diets, regular exercise, and smoking, influence the adults' PL in ADL. Ultimately, this study revealed socioeconomic differences in PL in ADL.

The findings supported the first hypothesis, elderly people with higher SES have fewer PL in ADL than those with lower SES.

The second hypothesis was not met, as diet has no significant association with SES or PL in ADL.

Additionally, this research demonstrated that exercise partially mediates the association between SES and PL in ADL. In accordance with hypothesis 3a SES has a positive relationship with exercise. Hypothesis 3b was also met, as exercise has a negative relationship with PL in ADL.

The findings supported hypothesis 4a, as smoking has a negative relationship with SES. Contrary to hypothesis 4b smoking was not significantly associated with PL in ADL. Therefore, no mediation of smoking between SES and PL in ADL is present.

In context of literature

As expected, this study revealed a significant negative relationship between SES and PL in ADL. Certain studies (Bootsma-van Der Wiel et al., 2005; Dai et al., 2021; Liu & Wang, 2022) have found the same negative relationship this study demonstrated between the factors in question.

The results of Dai et al. (2021) suggested that people of high SES usually have the necessary knowledge, social and economic means to improve their health behaviours and use medical services. The difference in means and knowledge for a 'healthy' lifestyle between the different socioeconomic groups was also mentioned in this study's combined framework, suggesting that the different characteristics of each educational group could result in different lifestyles (Braveman & Gottlieb, 2014).

Contrary to the second hypothesis and existing research (Kim et al., 2013; Pilleron et al., 2018), this study did not find an effect of diet in the association between SES and PL in ADL. These results might have been produced because measuring vegetables and fruit alone is not sufficient for measuring if elderly have a good diet. That is, other dietary elements could be important, such as dairy products or nuts (Health Counsel, 2015) or the variety of products (Zhang et al., 2020). Beyond this, other research has stated that variety in diet significantly affect PL in older people's ADL (Zhang et al., 2020).

As expected, elderly in a higher SES on average exercise more than elderly in a lower SES. This is in accordance with existing literature (André et al., 2018; Stalsberg & Pedersen, 2018). Research (Stalsberg & Pedersen, 2018) states that the positive relationship between SES and exercise is mainly a relationship between physical activity in leisure time and SES. This cannot be confirmed by the current study.

Elsewhere, research (Yamakita et al., 2015) proved that non-regular participation in sports groups was associated with lower educational levels. They stated multiple factors that influence this association, demographic-, psychosocial-, social-, and cultural factors as well as environmental factors (Yamakita et al., 2015).

Fulfilling expectations from the literature review (Cunningham et al., 2020; Osuka et al., 2018; Sjölund et al., 2015), this study demonstrated that exercise was associated with less PL in ADL. Also, physical activity is not only associated with having fewer PL in ADL, but physical activity can also be protective against the development of PL in ADL (Balzi et al., 2009).

As expected, people with a lower SES generally smoke more often than people with a higher SES. This finding is consistent with existing research (Jahnel et al., 2018; Reid et al., 2010).

For example, research (Pisinger et al., 2011) found this statistic to be true because people with a lower SES have different motives for smoking than people with a higher SES. Smokers with a low SES were significantly more likely than smokers with a higher SES to state that they wanted to quit because smoking was too expensive or because they had health related problems. When looking at previous quit attempts, smokers with low SES were significantly more likely to report that it had been a bad experience and that they had relapsed because they were more nervous/restless/depressed (Pisinger et al., 2011).

In contrary with expectations (Mehta & Myrskylä, 2017; Reynolds & Silverstein, 2003), this study did not find an effect of smoking on PL in ADL. This result might have been produced because research (Townsend & Mehta, 2020) has proven that smoking appeared to contribute more to educational disparities in disability at younger ages than older ages. Other research has shown that smoking in middle age would increase future risks of impaired ADL. Smoking cessation may be important to prevent future impairment of ADL as well as death (Takashima et al., 2010).

In context of theory

The results of the current study show a difference in exercise between the elderly in different SES groups. These variations could partly explain the difference in PL in ADL among elderly people. According to the HLT, this difference in exercising could arise from the choices available and the access and social rules of the SES groups which result from structural factors or social determinants which create the social codes of groups (Cockerham et al., 2017).

As mentioned earlier (Braveman & Gottlieb, 2014), these social determinants shape health and produce an unequal distribution of power, income, goods, and services. In turn, this issue causes differences in availability and access to key services like healthcare access, education, work, leisure, and desirable living environments.

Additionally, research has shown that these structural factors or social determinants influence lifestyle behaviours and cause health inequity. The following structural factors or social determinants have been mentioned in existing research: demographic characteristics (Braveman & Gottlieb, 2014; Lestari et al., 2019; Yamakita et al., 2015); knowledge (Braveman & Gottlieb, 2014); psychosocial factors (Yamakita et al., 2015); poor social networks (United Nations DESA, 2010); neighbourhood characteristics (Braveman & Gottlieb, 2014; Kamphuis et al., 2007); sports facilities (Yamakita et al., 2015), social means (Yamakita et al., 2015); economic means (Liu & Wang, 2022; Yamakita et al., 2015); and health care access (Braveman & Gottlieb, 2014; Yamakita et al., 2015).

Theory and research have indicated that one should consider factors regarding all aspects of life for the SES group including the elderly.

Strengths and Limitations

Notably, this study illuminates health inequity in PL in ADL and the role of LF in this issue by empirically using an interdisciplinary approach. However, there are several limitations of the study to consider.

First, participants responded to questions regarding dietary, exercise and smoking habits, subjects on which people may have felt pressure to give socially desirable answers. However, this social-desirability bias was reduced by anonymising the questionnaire and by ensuring that the data were available to only those with permission.

Second, the number of participants in the lowest socioeconomic group of the study was quite low, meaning this sample may not have been representative of the older population in the Netherlands. That is, most elderly people in the Netherlands are of low SES, and a smaller group has a high SES (CBS, 2022). However, CBS (2022) measures less educated people by primary education, lower vocational education, intermediate general secondary education, and intermediate vocational education. This research classifies low SES as having no education or primary education, which could explain the differences in the sizes of the SES groups.

Third, according to CBS (2021), the indicator for PL in ADL for people above 55 years of age, scoring ‘yes’ if at least one of the questions is answered as follows: ‘with a lot of

difficulty' or 'only with the help of others'. Additionally, according to CBS in 2021, the average PL in ADL was 0.2. This is not a high number, consistent with the results of this study, which states that the average PL is 1.2 for people 65 years or older on a scale of 1–4.

Fourth, the GLOBE study included participants between the ages of 25 and 75 years. In the current study, all participants were over 65 years, meaning that the age of the population is between 65 and 75 years. No participants of 75 or older were included, which could have altered the results.

Additionally, diseases have not been considered in this research, which may have influenced the results. For instance, previous research has shown that chronic diseases affect PL in ADL (Maresova et al., 2019). Therefore, future research should consider this factor.

The last limitation to this research was that this study employed the steps developed by Baron and Kenny (1986), an outdated form of mediation analysis (Rasoolimanesh et al., 2021). However, this method is still used by many researchers (Rasoolimanesh et al., 2021), whereas PROCESS-macro could not be used in this study because dichotomous mediators are not allowed (Hayes, 2012).

Implications and Recommendations

The Dutch government has pledged to decrease health disparities by 30% before 2040 (Health Holland, 2021). This study shows that elderly people in lower SES groups exercise less than their higher SES counterparts, resulting in having more PL in ADL than the elderly in a higher SES group. To decrease these health inequities, the government should focus on reducing differences in PL in ADL between the different SES groups. In turn, such work could indirectly affect society (e.g., producing less health care use or decreasing health care expenses; *Numbers and facts health differences*, 2022).

Because research has shown that a holistic view is needed to decrease these health inequities since many factors influence health inequities (Braveman & Gottlieb, 2014; WHO Commission on Social Determinants of Health & World Health Organization, 2008). Thus, the best way to tackle these differences is to improve structural factors or SDH. Thus, some of the most important factors are addressed in the following paragraphs.

Thus, the first focus can be to give the elderly in a lower SES the tools they need for exercising more. As mentioned, (Braveman & Gottlieb, 2014; Dai et al., 2021) knowledge is one of the factors that maintains the difference in lifestyle between the elderly in lower SES groups and higher SES groups. Research (Geboers et al., 2014) has stated that there is a significant association between inadequate health literacy and physical activity.

In Barcelona, a program has been developed with community nurses providing elderly community members with advice on physical activities, diet, and medication schedules. This program reduced the use of health care services and the mortality rate of individuals over 65 years old in this community (Chiu et al., 2020). Similarly, this program could also be implemented in the Netherlands to improve the physical activity of elderly people.

Additionally, the government could try to reduce the disparities between neighbourhoods because, according to research (Kamphuis et al., 2007), people of higher SES consider their neighborhoods to be green and spacious and thus inviting for playing outdoor sports. On the other hand, people of low SES sometimes feel unsafe in their neighborhoods and thus refrain from walking during the evening (Kamphuis et al., 2007). Therefore, focusing on improving low SES neighborhoods could increase the physical activity of the elderly in these areas (Powell et al., 2006).

Research has revealed that people of low SES have found accessibility to sports facilities more difficult than people of high SES (Kamphuis et al., 2007). Therefore, to improve accessibility to facilities to increase participation in sports groups, these areas could provide free resistance training sessions in neighbourhoods, nursing homes or other areas where elderly live (Yamakita, et al., 2015). That is, regular resistance sessions significantly enhance muscle strength, muscle power and functional outcomes (Lopez et al., 2017).

Conclusion

In this study, elderly with higher SES had fewer PL in ADL than elderly people with lower SES. Additionally, this work revealed that exercise could partly explain the relationship between SES and PL in the ADL of the Dutch elderly population over 65 years. Elderly with higher SES exercised more than their counterparts of lower SES, producing fewer PL in their ADL. Notably, dietary, or smoking differences did not produce a mediating effect. However, more research is needed regarding LF that mediate the relationship between SES and PL in the ADL of elderly. Similarly, there is a need for more in-depth research on the explanations for the differences in LF among elderly of different socioeconomic groups. Examining these results, the government should design and implement new strategies and policies to reduce health inequities related to lifestyle factors that influence PL in ADL.

Wordcount: 5000

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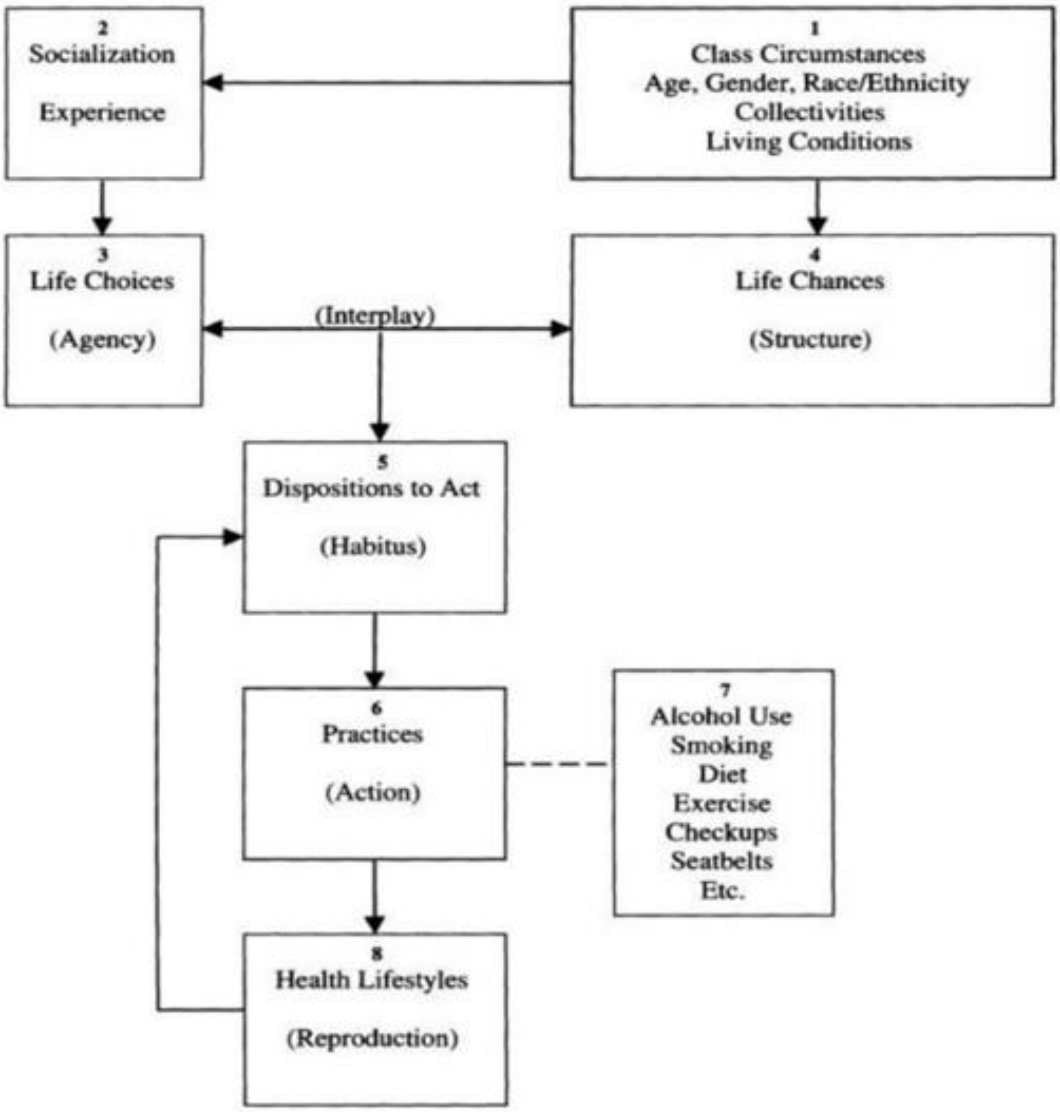
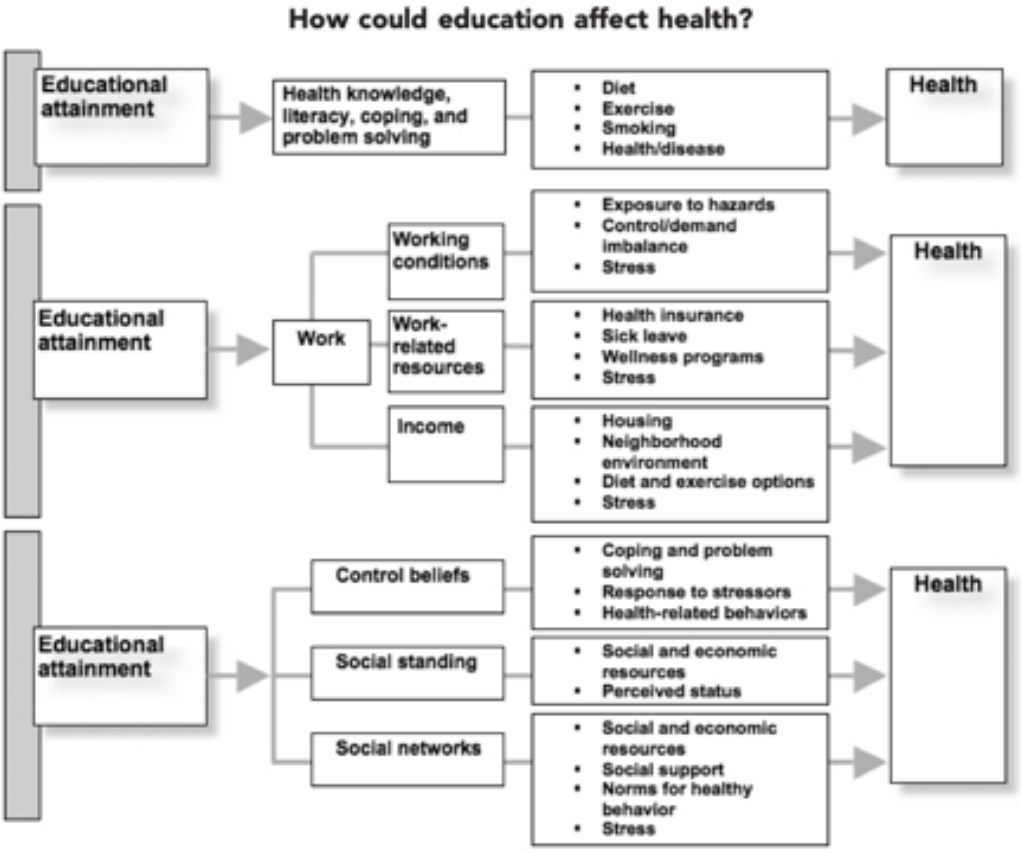
Appendix

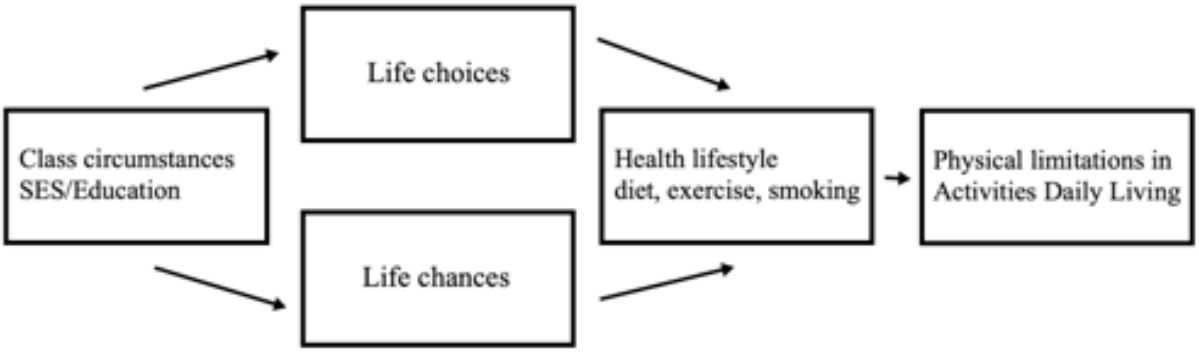
Appendix 1



Appendix 2



Appendix 3



Appendix 4

Questions are in Dutch

42. Wat is de hoogste opleiding die u met een diploma heeft afgesloten?	☐ geen opleiding ☐ lager onderwijs/basisonderwijs ☐ lager beroepsonderwijs (bijv.VMBO, LTS, LHNO, huishoudschool, LEAO) ☐ middelbaar algemeen onderwijs (bijv. LAVO, MULO/MAVO, 3-jaar HBS) ☐ middelbaar beroepsonderwijs (bijv. MTS, MEAO) ☐ voortgezet algemeen onderwijs (bijv. HAVO, VWO, HBS, MMS) ☐ hoger beroepsonderwijs (bijv. HTS, HEAO, MO) ☐ wetenschappelijk onderwijs ☐ anders, nl. ☐

Appendix 5

Questions are in Dutch

j. Op een dag dat u fruit eet , hoeveel stuks eet u dan meestal in totaal? (appelmoes en sap niet meetellen)

In totaal ☐ stuks fruit per dag (een schaaltje aarbeien of druiven telt bijv. ook als één stuk fruit)

k. Op hoeveel dagen van de week eet u dit totaal aantal stuks fruit per dag?

Gemiddeld op ☐ dagen per week.

Hoe vaak heeft u dit gegeten of gedronken? **(u kunt dit per week OF per maand invullen)**					**Als u het at of dronk, hoeveel nam u dan op zo'n dag?**
a. Groenten, warm *(gekookt, gebakken, gestoomd of anders verhit, denk ook aan groenten in bijv. saus)*	☐	dagen per week	☐☐	dagen per maand	☐ opscheplepels (=50g)
b. Sla of rauwkost *(sla, komkommer, tomaat enz.)*	☐	dagen per week	☐☐	dagen per maand	☐ opscheplepels

Appendix 6

Questions are in Dutch

23 d. Beweging op werk en school (per WEEK)

	gemiddelde tijd **per week**	
Licht en matig inspannend werk: (zittend, staand werk met af en toe lopen, zoals bureauwerk of lopend werk met lichte lasten)	☐☐ uren	☐☐ min.
Zwaar inspannend werk: (lopend werk, waarbij regelmatig zware dingen moeten worden opgetild)	☐☐ uren	☐☐ min.

☐ niet van toepassing

23 e. Huishoudelijke activiteiten

	aantal dagen **per week**	gemiddelde tijd **per dag**	
Licht en matig inspannend huishoudelijk werk: (staand werk, zoals koken, afwassen, strijken, kind eten geven/in bad doen en lopend werk, zoals stofzuigen, boodschappen doen)	☐ dagen	☐ uur	☐☐ min.
Zwaar inspannend huishoudelijk werk: (vloer schrobben, tapijt uitkloppen, met zware boodschappen lopen)	☐ dagen	☐ uur	☐☐ min.

☐ niet van toepassing

23. Neem in gedachte een normale week in de afgelopen maanden. Wilt u aangeven:

- **hoeveel dagen per week u de hieronder genoemde activiteiten verrichtte en,**
- **hoeveel uren en minuten u daar gemiddeld op zo'n dag mee bezig was en,**
- **hoe inspannend deze activiteit was.**

! *Heeft u de genoemde activiteit helemaal niet gedaan? Vult u dan bij "aantal dagen per week" het getal 0 in.*

23 a. Woon-werk-verkeer (in totaal, dus heen en terug)

	aantal dagen **per week**	gemiddelde tijd **per dag**		inspanning (één aankruisen) **langzaam**	**gemiddeld**	**snel**
Lopen van/naar werk of school	☐ dagen	☐ uur	☐☐ min.	☐	☐	☐
Fietsen van/naar werk of school	☐ dagen	☐ uur	☐☐ min.	☐	☐	☐

23 c. Sport

Maximaal 4 sporten invullen, bijvoorbeeld voetbal, aerobics, fitness, zwemmen, e.d.	aantal dagen **per week**	gemiddelde tijd **per dag**		inspanning (één aankruisen) **licht**	**gemiddeld**	**zwaar**
	☐ dagen	☐ uur	☐☐ min.	☐	☐	☐
	☐ dagen	☐ uur	☐☐ min.	☐	☐	☐
	☐ dagen	☐ uur	☐☐ min.	☐	☐	☐
	☐ dagen	☐ uur	☐☐ min.	☐	☐	☐

☐ Ik heb niet aan sport gedaan

23 b. Vrije tijd

	aantal dagen **per week**	gemiddelde tijd **per dag**		inspanning (één aankruisen) **licht**	**gemiddeld**	**zwaar**
Wandelen	☐ dagen	☐ uur ☐☐	min.	☐	☐	☐
Fietsen	☐ dagen	☐ uur ☐☐	min.	☐	☐	☐
Tuinieren	☐ dagen	☐ uur ☐☐	min.	☐	☐	☐
Klussen/ doe-het-zelven	☐ dagen	☐ uur ☐☐	min.	☐	☐	☐

Appendix 7

Questions are in Dutch

19. Rookt u?
Eén hokje aankruisen s.v.p.

☐ ja, ik rook ongeveer: ☐☐ sigaretten/shaggies per dag.

☐ ja, ik rook ongeveer: ☐☐ pijpen/sigaren per dag.

☐ ja, maar ik rook niet dagelijks. Ik rook ongeveer: ☐☐ sigaretten/sigaren per week.

☐ nee, maar vroeger heb ik wel dagelijks gerookt.

☐ nee, ik heb nooit dagelijks gerookt ➔ **ga verder met vraag 22**

Appendix 8

Questions are in Dutch

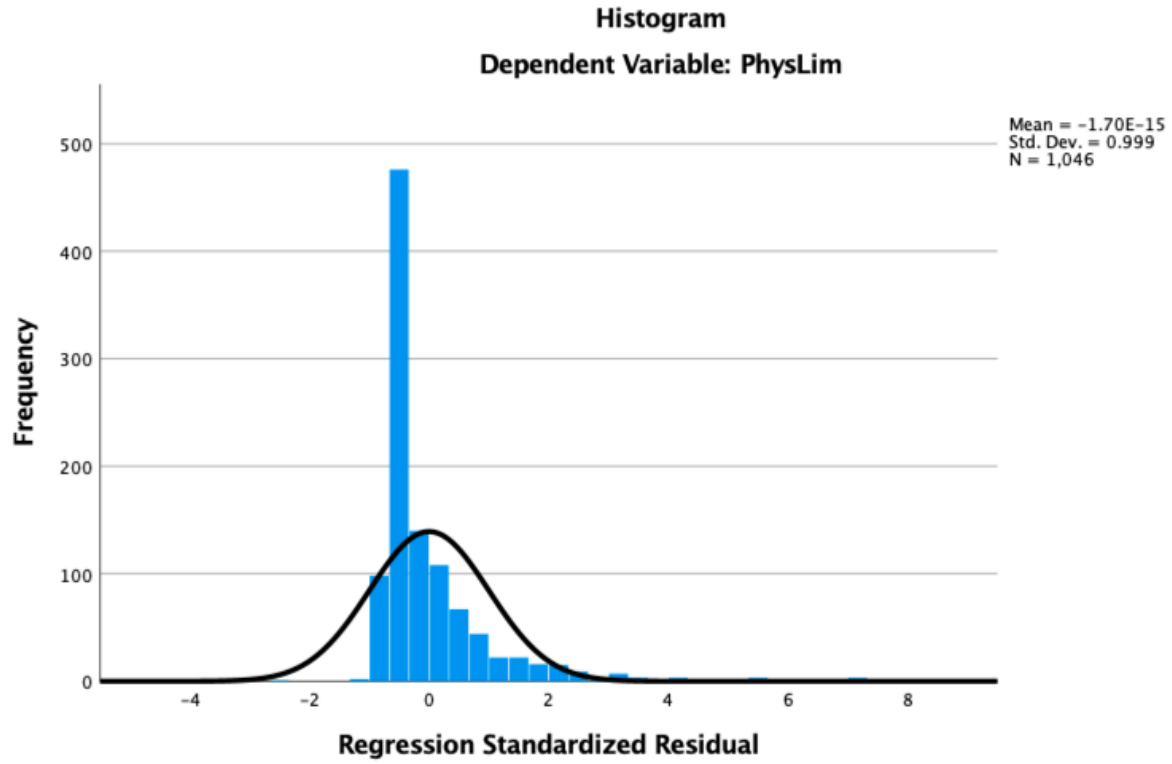
4. Hieronder staan enkele handelingen waarmee sommige mensen moeite hebben. Wilt u per handeling aangeven of u deze zonder moeite, met enige moeite, met grote moeite, of alleen met hulp van anderen kunt doen?
(Het gaat niet om tijdelijke problemen, van voorbijgaande aard, maar om blijvende problemen die u steeds opnieuw ervaart).

		zonder **moeite**	**met *enige*** **moeite**	**met *grote*** **moeite**	**alleen met hulp**
a.	Trap op- en aflopen.	☐	☐	☐	☐
b.	U verplaatsen buitenshuis.	☐	☐	☐	☐
c.	Woning verlaten en binnengaan.	☐	☐	☐	☐
d.	Gaan zitten en opstaan uit een stoel.	☐	☐	☐	☐
e.	U verplaatsen naar andere kamer op *dezelfde* verdieping.	☐	☐	☐	☐
f.	In en uit bed stappen.	☐	☐	☐	☐
g.	Eten en drinken.	☐	☐	☐	☐
h.	Aan- en uitkleden.	☐	☐	☐	☐
i.	Gezicht en handen wassen.	☐	☐	☐	☐
j.	Volledig wassen.	☐	☐	☐	☐
k.	Van en naar het toilet gaan.	☐	☐	☐	☐
l.	Voeten en teennagels verzorgen.	☐	☐	☐	☐

Appendix 9

Normality

As can be seen in the graph below (Graph 1) the conclusion can be drawn that the outcome of physical limitations in ADL is divided quite normally.



Appendix 10

Multicollinearity

The VIF score is approximately 1 which is below 10, so there is no evidence of multicollinearity.

Appendix 11

The Baron and Kenny (1986) method is an analysis strategy for testing mediation hypotheses. In this method there are two paths to the dependent variable. The independent variable must predict the dependent variable, and the independent variable must predict the mediator. The mediation is tested through three regressions:

1. Independent variable predicting the dependent variable
2. Independent variable predicting the mediator
3. Independent variable and mediator predicting the dependent variable

Complete mediation is present when the independent variable no longer influences the dependent variable after the mediator has been controlled for and all conditions have been met. Partial mediation occurs when the independent variable's influence on the dependent variable is reduced after the mediator has been controlled for (Moran, 2021).

Appendix 12

SYNTAX

```
* Encoding: UTF-8.
* Encoding: .

RELIABILITY
  /VARIABLES=v017 v018 v019 v020 v021 v022 v023 v024 v025 v026 v027 v028
  /SCALE('ADL') ALL
  /MODEL=ALPHA.

DATASET ACTIVATE DataSet1.
COMPUTE ADL=SUM(v017, v018, v019, v020, v021, v022, v023, v024, v025, v026, v027,
v028).
EXECUTE.

RECODE v260 (3 thru 4=2) (5 thru 8=3) (1 thru 2=1) (ELSE=SYSMIS) INTO Educ.
EXECUTE.

DATASET ACTIVATE DataSet1.
COMPUTE SPORTWEEK=SUM(v114,v119,v124,v129,0).
EXECUTE.

RECODE SPORTWEEK (0 thru 1=0) (ELSE=1) INTO WeekSport.
EXECUTE.

RECODE v073 (5=1) (ELSE=0) INTO smoking.
EXECUTE.

COMPUTE PhysLim=ADL / 12.
EXECUTE.

RECODE v098 (MISSING=0) (ELSE=Copy) INTO walkhours.
EXECUTE.

RECODE v099 (MISSING=0) (ELSE=Copy) INTO walkminutes.
EXECUTE.
```

```
COMPUTE walktotal=walkhours * 60 + walkminutes.
EXECUTE.

RECODE v102 v103 (MISSING=0) (ELSE=Copy) INTO cyclehours cycleminutes.
EXECUTE.

COMPUTE cycletotal=cyclehours * 60 + cycleminutes.
EXECUTE.

RECODE v106 v107 (MISSING=0) (ELSE=Copy) INTO gardenhours gardenminutes.
EXECUTE.

COMPUTE gardentotal=gardenhours * 60 + gardenminutes.
EXECUTE.

RECODE v110 v111 (MISSING=0) (ELSE=Copy) INTO oddhours oddminutes.
EXECUTE.

COMPUTE oddtotal=oddhours * 60 + oddminutes.
EXECUTE.

RECODE v090 v091 (MISSING=0) (ELSE=Copy) INTO workhours workminutes.
EXECUTE.

COMPUTE worktotal_1=workhours * 60 + workminutes.
EXECUTE.

RECODE v094 v095 (MISSING=0) (ELSE=Copy) INTO workhours_2 workminutes_2.
EXECUTE.

COMPUTE worktotal_2=workhours_2 * 60 + workminutes_2.
EXECUTE.

RECODE v134 v135 v136 v137 (MISSING=0) (ELSE=Copy) INTO worklighthours
worklightminutes
    workintensehours workintenseminutes.
EXECUTE.

COMPUTE worktotal_3=worklighthours * 60 + worklightminutes.
EXECUTE.

COMPUTE worktotal_4=workintensehours * 60 + workintenseminutes.
EXECUTE.

RECODE v140 v141 v143 v144 (MISSING=0) (ELSE=Copy) INTO houselighthours
houselightminutes
    houseintenshours houseintensminutes.
EXECUTE.

COMPUTE houselight_1=houselighthours * 60 + houselightminutes.
```

```
EXECUTE.

COMPUTE houseintens_1=houseintenshours * 60 + houseintensminutes.
EXECUTE.

COMPUTE Exercisetotal=houseintens_1 + houselight_1 + worktotal_4 + worktotal_3 +
worktotal_2 +
    worktotal_1 + oddtotal + gardentotal + cycletotal + walktotal.
EXECUTE.

RECODE Exercisetotal (0 thru 149=0) (ELSE=1) INTO AccExcercise.
EXECUTE.

COMPUTE ExSportTotal=Weeksport + AccExcercise.
EXECUTE.

RECODE ExSportTotal (0 thru 1=0) (ELSE=1) INTO ExSportFinal.
EXECUTE.

DATASET ACTIVATE DataSet1.
RECODE v207 v208 (MISSING=0) (ELSE=Copy) INTO Fruitpieces Daysfruit.
EXECUTE.

COMPUTE Fruittotal=Fruitpieces * Daysfruit.
EXECUTE.

RECODE Fruittotal (0 thru 13=0) (ELSE=1) INTO Fruitacc.
EXECUTE.

RECODE v180 v182 (MISSING=0) (ELSE=Copy) INTO WarmWeek Warmveg.
EXECUTE.

COMPUTE WarmGrams=Warmveg * 40.
EXECUTE.

COMPUTE GramsWeek=WarmGrams * WarmWeek.
EXECUTE.

RECODE v183 v185 (MISSING=0) (ELSE=Copy) INTO ColdWeek Coldveg.
EXECUTE.

COMPUTE ColdGrams=Coldveg * 40.
EXECUTE.

COMPUTE GramsCWeek=ColdWeek * ColdGrams.
EXECUTE.

DATASET ACTIVATE DataSet1.
COMPUTE VegTotal=GramsWeek + GramsCWeek.
EXECUTE.
```

```
RECODE VegTotal (0 thru 1399=0) (ELSE=1) INTO Vegacc.
EXECUTE.

COMPUTE TotalLife=ExSportFinal + Fruitacc + Vegacc + Smoking.
EXECUTE.

RECODE TotalLife (0 thru 3=0) (ELSE=1) INTO Lifestyle.
EXECUTE.

DATASET ACTIVATE DataSet1.
RECODE v261 (1=1) (ELSE=0) INTO Country.
EXECUTE.

COMPUTE Diet_first=Vegacc + Fruitacc.
EXECUTE.

RECODE Diet_first (2=1) (ELSE=0) INTO Diet.
EXECUTE.

DATASET ACTIVATE DataSet1.
RECODE v258 (1 thru 2=1) (ELSE=0) INTO Partner.
EXECUTE.

USE ALL.
COMPUTE filter_$=(NMISS(Educ, PhysLim, Diet, ExSportFinal, Smoking) <1) AND v255
>= 65.
VARIABLE LABELS filter_$ 'NMISS(Educ, PhysLim, Diet, ExSportFinal, Smoking) AND
v255 '+
    '>= 65). (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.

CORRELATIONS
  /VARIABLES=Educ PhysLim v255 v254 Country Partner ExSportFinal Lifestyle Diet
Smoking
  /PRINT=TWOTAIL NOSIG FULL
  /MISSING=PAIRWISE.

FREQUENCIES VARIABLES=Educ
  /STATISTICS=MINIMUM MAXIMUM MEDIAN
  /ORDER=ANALYSIS.

CROSSTABS
  /TABLES=Educ BY v254
  /FORMAT=AVALUE TABLES
  /CELLS=COUNT ROW COLUMN TOTAL
  /COUNT ROUND CELL.
```

```
MEANS TABLES=v255 BY Educ
  /CELLS=MEAN COUNT STDDEV.

CROSSTABS
  /TABLES=Educ BY Country
  /FORMAT=AVALUE TABLES
  /CELLS=COUNT ROW COLUMN TOTAL
  /COUNT ROUND CELL.

CROSSTABS
  /TABLES=Educ BY Lifestyle
  /FORMAT=AVALUE TABLES
  /CELLS=COUNT ROW COLUMN TOTAL
  /COUNT ROUND CELL.

MEANS TABLES=Diet ExSportFinal Smoking BY Educ
  /CELLS=MEAN COUNT STDDEV.

MEANS TABLES=PhysLim BY Educ
  /CELLS=MEAN COUNT STDDEV.

RELIABILITY
  /VARIABLES=v017 v018 v019 v020 v021 v022 v023 v024 v025 v026 v027 v028
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.

CROSSTABS
  /TABLES=smoking BY Educ
  /FORMAT=AVALUE TABLES
  /CELLS=COUNT ROW COLUMN TOTAL
  /COUNT ROUND CELL.

CROSSTABS
  /TABLES=Diet BY Educ
  /FORMAT=AVALUE TABLES
  /CELLS=COUNT ROW COLUMN TOTAL
  /COUNT ROUND CELL.

CROSSTABS
  /TABLES=ExSportFinal BY Educ
  /FORMAT=AVALUE TABLES
  /CELLS=COUNT ROW COLUMN TOTAL
  /COUNT ROUND CELL.

DATASET ACTIVATE DataSet1.
CROSSTABS
  /TABLES=Educ BY Partner
  /FORMAT=AVALUE TABLES
  /CELLS=COUNT ROW COLUMN TOTAL
```

```
  /COUNT ROUND CELL.

REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT PhysLim
  /METHOD=ENTER Educ v254 Partner
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).

REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT Diet
  /METHOD=ENTER Educ v254 Partner
  /SCATTERPLOT=(*ZRESID ,*ZPRED).

REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT PhysLim
  /METHOD=ENTER Diet v254 Partner
  /SCATTERPLOT=(*ZRESID ,*ZPRED).

REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT PhysLim
  /METHOD=ENTER ExSportFinal v254 Partner
  /SCATTERPLOT=(*ZRESID ,*ZPRED).

REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT ExSportFinal
```

```
  /METHOD=ENTER Educ v254 Partner
  /SCATTERPLOT=(*ZRESID ,*ZPRED).

REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT smoking
  /METHOD=ENTER Educ v254 Partner
  /SCATTERPLOT=(*ZRESID ,*ZPRED).

REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT PhysLim
  /METHOD=ENTER smoking v254 Partner
  /SCATTERPLOT=(*ZRESID ,*ZPRED).
```