

# Master Thesis

“Fluctuation in income and health behaviour in different SES groups and the role of financial strain”

June 2020



Course Key Issues

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Word count: 7307

### *Abstract*

In view of the increasing flexibility in the labour market, there is increasing number of people experiencing economic uncertainty and fluctuation in their household income. This has consequences for people's health. Goal of this research was to examine the relationship between fluctuation in income and health behaviour between different SES groups and the role of financial strain. Therefore, a binary logistic regression was performed, including three health-behaviour outcome measures, i.e. smoking, alcohol consumption and physical activity. The Globe 2014 questionnaire was used to conduct this research. A total of three analyses were performed; the first one investigated the relationship between fluctuation in income and health behaviours. In the second analyses two interaction terms were tested to investigate fluctuation in income in different SES groups. The third and final analysis added financial strain as an assumed mediating factor. The analyses showed that an increasing income is associated with a greater likelihood of alcohol consumption. A decreasing income appeared to be associated with a greater likelihood to smoke and to comply with the exercise guidelines. Participants with an increasing high income appeared to have twice as much chance of consuming alcohol as participants with a high stable income. Financial strain appeared as a mediating factor between fluctuation in income and smoking and alcohol consumption as health behaviour outcomes. This study confirms already known results from scientific research on health behaviour among SES groups, however it provides novel theoretical insights into the role of fluctuation in income. In addition, regarding to physical activity some striking results have been presented. This study shows that in light of the increase in flexible labour contracts, it is important for employers to balance the costs and benefits of flexible labour contracts against the costs of potential health risks of employees.

*Keywords; fluctuation in income, SES groups, financial strain, health behaviour, smoking, alcohol consumption, physical activity.*

## 1. Introduction

With the emergence of flexible labour contracts, there is an increasing number of people finding themselves in an economically uncertain situation. In 2019, 1.9 million employees had a flexible employment contract, consisting of a fixed-term contract or a flexible number of hours per week. Their number increased by 831 thousand in the period of 2003 till 2019. The number of flexworkers has grown by three-quarters in 15 years (Smits, 2012). Flexibilization of the labour market is greatest among the lowest occupational levels. This change in the labour market has consequences for people's health. For example, unemployment has been repeatedly associated with negative changes in mental and physical health (Murphy & Athanasou, 1999; Paul & Moser, 2009; Wanberg, 2012). Job insecurity has similar negative effects on health (Kim & Von dem Knesebeck, 2015). Consequences of income and job insecurity, such as lack of education, career growth and an unstable income, are regularly seen as mechanisms in the relationship between flexible labour and poorer health (Benach et al., 2000; Benach et al., 2014; Ferrie, 2001; Siegrist, 2002;). Other commonly cited mechanisms between job loss and poorer health include unhealthy eating patterns, smoking, drug and drink use (Catalano et al., 2011; Eliason & Storrie, 2009; Mandemakers & Kalmijn, 2018).

In addition, loss of income can also lead to stress. Chronical stress and financial strain can be harmful to health and making it more difficult to return to work (Chandola et al., 2008; Rosmond, 2005). In this way, the risk of a negative vicious circle increases.

In the Netherlands there are some studies in which the correlation between mental health and labour contract type has been investigated. A prospective study showed a negative correlation between temporary workers and mental health (Kompier et al., 2009). Another study, based on the Nationale Enquête Arbeidsomstandigheden, showed that people with a permanent contract and poor health are more likely to become unemployed (Wagenaar, 2013). It is conceivable that unemployment and flexible labour go hand in hand with economic uncertainty. Research shows that permanent employees do have a 97% chance of still having paid work two years later. For people with a temporary contract, it is 87%. For this group it is four times more likely that they become employed compared to permanent employees (Smits, 2012). However, the direct effect of fluctuating income has not yet been investigated when it comes to health behaviour.

In view of the increasing flexibility in the labour market, it is relevant from a policy perspective to map the consequences of economic uncertainty, in terms of a stable, a rising or a decreasing income. It is also interesting to investigate how this works out for both low- and high educated groups, since we know low socioeconomic groups act more unhealthy (e.g. Beenackers et al. 2018; Buck, 2012; van Lenthe et al. 2009) and the role of financial strain in this, since we know this affects health.

This study will use data from the Globe study to examine the relationship between fluctuation in income and health behaviour between different SES groups and the role of financial strain. Therefore, three health-behaviour outcome measures will be included; smoking, alcohol consumption and physical activity.

### *Fluctuation in income and health behaviour*

Several studies conducted in different countries show a non-linear relationship between income and health (Ecob & Smith, 1999; Ettner, 1996; Backlund, 1996), including the Netherlands (Stronks, 1998). An increase income leads to health gain, however, these extra yields will decrease when the income increases. In other words, at a higher income level, the positive impact of additional income on health will decrease (Beck, 2001). The reverse turned out to be the same; a declining income leads to increasing health loss. The health gain from a certain income increase is greatest at relatively low income levels. Health economists explain this by the so-called *health production function*; the relationship between health (care) efforts and improving health (van Doorslaer, 1997). In comparison with high income levels, for low income levels relatively more health gain can be achieved to attain the same level of health.

A Dutch study into (un)healthy dietary patterns among people who have trouble making ends meet, showed that a drop in income due to unforeseen financial expenditure made it more difficult to purchase healthy products (Scherpenzeel, 2018). From this study, it was also concluded that an increase in income had a direct positive effect on the diet, however this appeared to apply only for a small proportion of the participants.

#### *Health behaviour among low-SES groups and a changing income*

Several studies have found that low-SES groups generally act more unhealthy (Lantz et al., 1998; Rogers et al., 2000; Beenackers, 2018). Research shows that these groups have more difficulty in realizing goals in achieving healthy behaviour, which can be attributed to different aspects such as access to aids and community opportunities (Pampel et al. 2010). Low-educated people with at-risk debts more often eat too little fruit, smoke more often, exercise less and eat unhealthy breakfast compared to low-educated people without at-risk debts. High-educated people in debt also act more unhealthy than highly-educated without debts, but the differences are smaller for them (Rijnsoever et al. 2012).

Droomers et al. (2015) conducted a systematic review on health effects of changes in various social determinants of health, including income. They concluded that there is sufficient evidence that gaining a paid job or increasing the income of low SES groups is associated with positive health developments (Droomers et al., 2015). Most (quasi) experimental studies showed that an increase in income is associated with better general perceived health and less depressive symptoms, but also with unhealthier behavior. Conversely, loss of income leads to poorer mental health. The effect of an actual increase in income on health appears to be less than suggested on the basis of previous cross-sectional results (Gunasekara et al., 2011).

#### *Theoretical insights into health behaviour among low SES groups*

A dominant perspective on social and economic factors that influence the personal choices of low-SES groups is 'the human capital view'. According to this perspective, the SES lacks the education, skills and work experience to be productive and earn wages sufficient to meet their basic consumption needs and still save money (Besharov & Call, 2009; Haskins & Sawhill, 2010). A variety of social science approaches expand on the human capital perspective by incorporating sociological, cultural, and environmental features that affect personal choice (e.g., Jencks & Mayer, 1990). According to this 'personal choices' theory, low-SES groups remain poor because of their choices, in full or in part due to their environment (e.g., Jencks & Mayer, 1990). The 'human capital' and 'personal choices' approaches both share a common assumption; it is needed to work on the behaviours of low-income people to consistently and strategically address long-term poverty.

Gennetian & Shafir provided an alternative approach, grounded in human cognition and behaviour. Recent insights from behavioral research on economic scarcity and financial instability showed it impose persistent demands on people's cognitive load, executive functions, and attention. When challenges are great and persistent, people tend to become preoccupied or overwhelmed. Intellectual resources become scarce, self-control depleted, and choices compromised. Income instability is a persistent complication, requiring constant juggling, and making life at the edge even harder to manage. Gennetian & Shafir argue that the 'human capital view' needs to be reinterpreted by this novel approach; investing in human capital itself becomes more difficult when people experience income instability and financial scarcity.

As a result of a lack in this so-called 'human capital', people who experience financial instability are more likely to suffer from financial strain (Gennetian & Shafir, 2015). Financial strain can be described as a constant stressor that forces daily difficult financial decision making on basic matters such as paying bills and meeting unexpected expenses (Lyons, 2005). This can be related to the 'scarcity theory', which suggests it takes up 'cognitive bandwidth' to deal with scarcity. This 'cognitive bandwidth' entails computational capacity, ability to pay attention, to make good decisions, to stick with plans, and to resist temptations (Mani, 2013; Mullainathan, 2014).

### *The role of financial strain in making healthy choices*

As a result of experiencing financial strain, little self-control will be left aside for people's decision-making process on a daily basis. In turn, this will affect people's choice-making, i.e. the tendency to prefer unhealthy choices rather than healthy choices. Research has shown that low-SES groups are at greater risk to choose for the easy, but often unhealthy choice in current obesogenic environments (Beenackers et al. 2018). Experiencing low self-control due to financial strain stress may more easily trigger unhealthy coping responses. This may explain why smoking, which actually costs money, is more prevalent in lower SES groups. This seems to be supported from previous studies on smoking, overeating, and inactivity as coping strategies among these groups (Lanz et al. 2005, Layte & Whelan, 2009; Wilkinson, 1996).

Further, resisting social pressure and unhealthy social modelling steering towards an unhealthy lifestyle is more difficult when someone experiences low self-control. When self-control is low by depletion due to dealing with financial difficulties and the obesogenic environment is tempting, choices will be made more impulsive. This likely results in unhealthy rather than healthy behaviours, since it is known that health-behaviour decisions are largely made unconsciously (Strack et al. 2014). In addition, Many of the coping strategies around financed adopted by low-SES groups prove effective and satisfactory in the short term, but risk creating deeper poverty soon thereafter. Investigating these long-term effects of coping strategies on the long-term, some low-income families fall back on basic but less essential needs, such as certain foods, or ignoring bills having the least direct consequences (Barr, 2009). These unfavourable circumstances together, which low-SES groups are exposed to on a daily basis, places large demands on self-control with respect to health behaviour decision-making.

Based on the GLOBE study, Beenackers et al. (2018) demonstrated that interventions aimed at relieving financial strain may improve health behaviours. They argue this may not solely be achieved by increasing income, since the association between financial strain and a healthy lifestyle was independent of income. Therefore, improving financial management or easing the financial choices that have to be made on a daily basis are needed. However, it remains unclear to what extent income instability affects financial strain and subsequently healthy decision-making.

### *Research question and hypotheses*

The current study will extend the existing literature in several ways. First, it will examine to what extent fluctuating incomes affect health behaviour. Second, it will measure if this effect is stronger among low-income and low-education groups. Third, it aims to measure whether this effect is roughly equal regarding to three outcome measures of health-behaviour (i.e. smoking, alcohol consumption and physical activity).

In operationalizing the construct 'healthy behaviour', three outcome measures have been included; smoking, alcohol consumption and physical activity. Health behaviour is related to income characteristics (SCP, 2018), therefore the first hypotheses that was tested is formulated as follows;

***Hypothesis 1:*** The degree of fluctuation in income is related to health behaviour, i.e.

- (a) participants with a decrease in income are more likely to smoke and to consume alcohol in comparison with participants with no change in income.
- (b) Participants with an increase in income are more likely to comply with the exercise guidelines in comparison with participants with no change in income.

Previous studies have shown low-income and low-education groups are more likely to experience fluctuations in income (CBS, 2015; SCP, 2016; Kösters & van den Brakel, 2015) and smoking and physical inactivity are more common among low-SES groups (Lanz et al. 2005, Layte & Whelan, 2009; Wilkinson, 1996). Therefore, it is expected that the effect of fluctuating income on healthy behaviour is stronger among low-income and low-education groups compared to high-income and high-education groups. So, an interaction-effect is expected, which has been formulated in the second hypothesis;

***Hypothesis 2:*** The relation between a fluctuating income and health behaviour differs per education and income level, i.e.

- (a) smoking and alcohol consumption is more presented among low education and income groups with a decrease in income,
- (b) whereas physical activity is more presented among high education and income groups with an increase in income.

Based on previous research, it is expected that fluctuations in income increases the likelihood of experiencing financial strain (Gennetian & Shafir, 2015) and unhealthy behaviour is partly due to financial strain (Beenackers et al., 2018). In the current research, it will be examined whether financial strain affects the relation between fluctuating income and health behaviour. By this, a mediation effect will be tested leading to the third hypothesis;

***Hypothesis 3:*** The relation between fluctuating income and health behaviour is mediated by the experienced financial strain.

### 3. Methods

#### Design and procedures

The current research is based on secondary data from the GLOBE-study (Dutch acronym for ‘Health and Living Conditions of the Population of Eindhoven and surroundings’). This study started in 1991 as the first large-scale longitudinal study of the explanation of socio-economic inequalities in health in the Netherlands and is still ongoing. The study is designed to assess mechanisms and factors explaining socio-economic inequalities in health in the Netherlands and was inspired by the publication of the Black Report in the UK on socio-economic inequalities in health. From 2004 onwards, special emphasis was given to the identification of physical, social, and cultural environmental factors in the explanation of socio-economic inequalities in health behaviours. The study is conducted by the Department of Public Health of the Erasmus MC in Rotterdam, the Netherlands in close collaboration with the Municipal Public Health Service in the study region (GGD Brabant-Zuidoost). Currently, the team consists of a project leader, two professors and two researchers.

#### Participants and sampling

The current study used the data collected by a large-scale postal survey within the 2014 survey of the Dutch population-based Globe study (response = 45.5%). The postal survey provided information about socioeconomic position (SEP), and SEP related-information, health, health behaviours, oral health, material factors, psychosocial factors, cultural factors, sociodemographics and social network characteristics.

A cross-sectional sample of participants (25-75 years) living in Eindhoven and surrounding cities was used in the analysis (N = 2812). There were no specific inclusion and/or exclusion criteria for participation. 55,2% of the participants were female, 44,8% of the participants were male. The average age of the participants was 48,8 years (SD 15,6). 46,8% of the participants were high-educated (higher professional education and university; ISCED 5-8) 17,9% medium (ISCED 3-4) and 28,7% were low-educated (ISCED 1-2). 34,5% of the participants had paid work, fulltime (36 hours or more, N = 969). 22,1% had paid work, part-time as well as 22,1% who were retired. The average household income was 1800-2600 euro per month (SD= 1,23; N=2476).

#### Dependent variables

The analysis included three dependent variables, which are health-behaviour-related outcomes i.e. (i) smoking; (ii) excessive alcohol intake, and (iii) physical activity.

Smokers were identified by the question ‘Do you smoke?’. This includes smokers of cigarettes, pipes, cigars and e-cigarettes. The frequency of smoking was not taken into account and occasional smokers were also grouped into this category. Smoking was dichotomized (coded 1 if yes vs. coded 0 if no). All non-smokers were grouped into the reference category.

Alcohol intake was measured by asking participants if they consumed alcohol beverages. Like smoking, alcohol consumption was dichotomized. Non-drinking behaviour was used as the reference category.

Physical activity was measured by determining whether or not a respondent complies with the exercise guideline (2017), which is moderate or heavy intensity exercise at least 150 minutes per week, spread over several days. A new variable was computed to test physical activity, resulting in a dichotomic variable whether participants complied with the exercise guidelines or not. Therefore, participants who indicated that they exercised at least half an hour five days a week were classified as ‘complies with the exercise guideline’. Participants who did not meet these guidelines were classified as ‘did not comply with the exercise guidelines.’

To test hypothesis 2, two new variables were computed; 1) Fluctuation in income \* education level and 2) Fluctuation in income \* income level. Computing these interaction terms resulted in 9 answer categories for fluctuation for the first variable and 12 answer categories for the second variable.

### Independent variables

Fluctuation in income will be assessed by the question addressing whether the financial situation of the household has changed compared to the situation of the previous year. Participants whose income had increased compared to the previous year were classified with an increased income and participants whose income had decreased were classified with a decreased income. Participants were considered to 'having a stable income' if their financial situation has remained the same compared to the year before.

A mediation effect of financial strain was tested. Financial strain was assessed by two questions addressing (i) whether participants could make ends meet considering their monthly household income and (ii) whether they had experienced any financial difficulties in paying bills for food, rent, electricity and so forth during the preceding year.

Participants were considered to have 'no financial strain' if they could make ends meet fairly easy or easy if they experienced no financial difficulties in the preceding year. If participants could make ends meet with some difficulty or if they experienced some financial in the preceding year, participants were considered to have 'some financial strain'. If they had great difficulty making ends meet or if they experienced large financial difficulties in the preceding year, participants were considered to have 'great financial strain.'

### Confounders

#### *Gender*

A distinction was made between male and female participants.

#### *Age*

Participants were classified in the following age group categories; 25-35 years, 35-44 years, 45-54 years, 55-65 years and 65-75 years.

#### *Marital status*

Marital status was categorized as follows; married/partnership, unmarried, divorced and widowed.

#### *Income level*

Household income was measured as the level of monthly household income in euros, categorized as follows; highest (>4000), midhigh (2600-4000), midlow (1800-2600) and lowest (0-1800).

#### *Education level*

Education level was based on ISCED 2011 categories; low (ISCED 0-2), medium (ISCED 3-4), high (ISCED 5-8).

#### *Employment status*

To minimize power loss, employment status was reduced to four answer categories; employed (paid), unemployed, retired and otherwise. Long-term disability, housewife/houseman, scholar/student and self-employed were merged into 'otherwise'.

### Data management and analysis

To investigate how fluctuation in income relates to demographic characteristics of participants, first a Cross-Tabulation analysis was conducted. By this analysis, the considered relationships between variables of demographic characteristics was analyzed. Included in this analysis were the following variables; gender, age groups, living together with partner, marital status, educational level, income level, financial strain, and three measures of health behaviour (smoking, alcohol consumption, physical activity). Fluctuation in income (stable, decrease or increase) was included as the dependent variable. The Pearson chi-square test was used to test whether each dependent variable was statistically significant related to fluctuation in income.



To test the first hypothesis that fluctuation in income is related to health behaviour, a binary logistic regression was performed. For each health outcome measure a separate model was conducted. Important confounders were included in each model. The first model predicted the odds of smoking versus non-smoking based on fluctuation in income. The second model predicted the odds for alcohol consumption as the dependent variable and the third for compliance with the exercise guidelines. To test the second hypothesis that the relation between a fluctuating income and health behaviour differs per education and income level, a second binary logistic regression was performed. First, an interaction effect of fluctuation in income and educational level was tested for the three health behaviour outcomes. The interaction term fluctuation in income \* educational level was used to predict the odds of smoking versus non-smoking (model 1), alcohol consumption versus non-alcohol consumption (2) and compliance with the exercise guidelines (model 3). Second, the same procedure was used to test the interaction term fluctuation in income \* income level. To test the third hypothesis, a mediation effect between financial strain and fluctuation in income will be tested. The odds ratios of this effect will be compared with the model in which only fluctuation in income was included as a predictor to investigate whether the mediation effect changes the odds ratio for the health behaviour outcomes.

#### *Preliminary analyses and data preparation*

Prior to the main analyses a few checks concerning assumption regarding to binary logistic regression were conducted (Linearity of the logit and Multicollinearity).

#### 4. Results

To investigate how fluctuation in income relates to demographic characteristics of participants, descriptive statistics are presented in table 1 by means of a crosstab. In total, 42,5% of the participants experienced no change in their monthly income compared to the year before, whereas 19,5% experienced an increase and 25,8% a decrease. Gender, age, marital status, income level, education level, financial strain and three outcome measures of health behaviour were found to be significant related to fluctuation in income. Therefore, these variables, except of the health behaviour variables, were included as control variables in further analyses.

*Table 1 Percentages of fluctuation in income for personal characteristics and health behaviour outcomes*

	Total sample	Fluctuation in income			Pearson square
		Increase	No change	Decrease	
Total	(N=2812 100 %)	(N=543) 19,4 %	(N=1195) 42,5 %	(N=1006) 35,8 %	
Gender					.022*
Men	44,9%	50,1%	43,1%	44,3%	
Woman	55,1%	49,9%	56,9%	55,7%	
Age groups					.000**
25-35 years	26,0%	48,8%	24,5%	15,4%	
35-44 years	19,7%	25,2%	20,4%	15,8%	
45-54 years	14,5%	10,9%	16,6%	13,9%	
55-64 years	16,0%	9,6%	18,5%	16,4%	
65-75 years	23,9%	5,5%	20,0%	38,5%	
Living together with partner					.470
No	26,0%	23,9%	26,5%	26,6%	
Yes	74,0%	76,1%	73,5%	73,4%	
Educational level					.000**
High	47,7%	66,7%	48,4%	36,5%	
Mid	24,7%	21,9%	24,9%	25,9%	
Low	27,7%	11,5%	26,6%	37,7%	
Marital status					.000**
Married/partnership	60,4%	48,3%	61,4%	65,8%	
Unmarried	28,0%	44,8%	27,7%	19,2%	
Divorced	8,4%	6,5%	8,0%	10,1%	
Widowed	3,1%	0,4%	2,9%	4,9%	
Employment status					.000**
Employed, paid work	57,7%	80,7%	65,9%	38,2%	
Unemployed, looking for a job	3,7%	1,7%	2,8%	6,2%	
Retired	22,1%	4,8%	17,8%	38,4%	
Otherwise	14,6%	12,8%	13,5%	17,2%	
Income level					.000**
Highest	15,1%	26,7%	16,7%	6,9%	
Midhigh	27,0%	29,7%	29,8%	22,2%	
Midlow	23,3%	19,9%	20,0%	28,9%	
Lowest	24,5%	16,2%	23,2%	30,5%	
Financial strain					.000**
No strain	67,7%	75,7%	75,1%	54,4%	
Some strain	28,9%	22,7%	23,3%	39,1%	

Great strain	3,4%	1,7%	2,3%	6,5%	
Health behaviours					
Smoking					
Yes	17,8%	17,7%	15,5%	20,6%	.009**
No	82,3%	82,3%	84,5%	79,4%	
Alcohol consumption					
Yes	82,8%	90,0%	81,6%	80,4%	.000**
No	17,2%	10,0%	18,4%	19,6%	
Compliance with exercise guidelines					
Yes	82,3%	79,0%	81,5%	85,0%	.011*
No	17,7%	21,0%	18,5%	15,0%	

\*p<.05 \*\*p<.01

**Analysis 1:** to test hypotheses 1 that fluctuation in income is related to health behaviour, a binary logistic regression was performed. For each health outcome measure a model has been conducted. The Hosmer and Lemeshow Test proved that the predictions from these models do not differ from observed data (model A:  $\chi^2= 13.321$  p=.101; model B:  $\chi^2= 6.220$  p=.623; model C:  $\chi^2= 4.912$  p=.767), which means these models appears to fit the data reasonably well. Table 2 presents the odds ratios of the degrees of fluctuation in income for each health behaviour outcome. As shown in table 2, participants with a decrease in income are significantly more likely to smoke and to comply with the exercise guidelines. Participants with an increase in income are more likely to consume alcohol than participants with a stable income. Therefore, hypothesis 1a can only be confirmed regarding to smoking. Hypothesis 1b cannot be confirmed.

Table 2 Odds ratios of fluctuation in income on smoking, alcohol consumption and compliance with the exercise guidelines

		95% CI for Odds Ratio	
Smoking	Exp(B)	Lower	Upper
Fluctuation in income			
No (stable)	1.00		
Increase	1.189	.890	1.588
Decrease	1.403**	1.106	1.780
Alcohol consumption			
Fluctuation in income			
No (stable)	1.00		
Increase	1.706**	1.224	2.377
Decrease	1.036	.820	1.308
Compliance with the exercise guidelines			
Fluctuation in income			
No (stable)	1.00		
Increase	.839	.638	1.101
Decrease	1.281*	1.033	1.635

Note: corrected for gender, age, marital status, employment status, household income, and educational level.

\*p<.05 \*\*p<.01

**Analysis 2:** For a better understanding of differences in fluctuation in income regarding to educational and income level, a second binary logistic analyses was performed. Interaction terms between fluctuation in income and educational level are presented in table B1, 2 and 3 (see appendix B). Mid educated with a stable income was used as the reference group.

As presented in table B1, the high educated with a stable or an increase in income are significantly less likely to smoke, whereas the low educated with a stable, increase or decrease in income are significant more likely to smoke. This also applies for the mid educated with an increase in income.

Regarding to alcohol consumption (table B2), the high educated with a stable or increase in income are significantly more likely to consume alcohol, whereas the low educated with a stable or decrease in income are significantly less likely to consume alcohol.

Regarding to physical activity (B3), the low educated with a stable income and the mid educated with a stable income are significantly less likely to comply with the exercise guidelines.

Interaction terms between fluctuation in income and income level are presented in table B4, 5 and 6. A stable, midhigh income was used as the reference group.

As presented in table B4 for smoking as the outcome variable, participants with a decreased high income are significantly more likely to smoke.

Regarding to alcohol consumption (table B5), a stable low income and a low income with a decrease in income are significantly less likely to consume alcohol.

As presented in table B6, there were no significant differences found regarding to compliance with the exercise guidelines.

Overall, hypothesis 2

- (a) is partly correct; smoking is significantly more presented among low education groups with a decrease in income, but this also applies for the low educated with an increased or stable income. Alcohol consumption is not significantly more presented among low education or income groups.
- (b) must be rejected. A high educational level or a high income with an increase in income was not significantly related to a greater likelihood to comply with the exercise guidelines.

**Analysis 3:** to test a supposed mediation between fluctuating in income and health behaviour by financial strain, two models have been compared for each health behaviour outcome (5a, b, c). In the first model, only fluctuation in income and the control variables have been included. In the second model, financial strain was added. Subsequently, the change in the odds ratio of fluctuation in income was examined; when the odds ratio was decreased by adding financial strain as a predictor, then financial strain must be determined as a mediating factor.

As presented in table 3a, for smoking the ORs for fluctuation in income were decreased by adding financial strain as predictor. In addition, the ORs for some and great financial strain were significant in model B. This also applied for alcohol consumption as the outcome variable as presented in table 3b. In table 3c, financial strain was not significant, however by adding financial strain as a predictor, a decrease in income became more significant in comparison with model A (model A;  $p=.026$ , model B  $p=.011$ ).

Therefore, for smoking and alcohol consumption fluctuation in income is mediated by the experienced financial strain. Hypothesis 3 can therefore partially be confirmed.

Table 3a: Odds ratios for financial strain as mediator on *smoking*

	Exp(B)	95% CI for Odds Ratio	
		Lower	Upper
Model A: Fluctuation in income			
Stable	1.00		
Increase	1.189	.890	1.588
Decrease	1.403**	1.106	1.780
Model B: Fluctuation in income			
Stable	1.00		
Increase	1.196	.894	1.599
Decrease	1.221	.956	1.559
Financial strain			
None	1.00		
Some	1.768**	1.407	2.221
Great	3.123**	1.926	5.063

Note: corrected for gender, age, marital status, employment status, household income and educational level

\* $p < .05$  \*\* $p < .01$

Table 4b: Odds ratios for financial strain as mediator on *alcohol consumption*

	Exp(B)	95% CI for Odds Ratio	
		Lower	Upper
Model A: Fluctuation in income			
Stable	1.00		
Increase	1.706**	1.224	2.377
Decrease	1.036	.820	1.308
Model B: Fluctuation in income			
Stable	1.00		
Increase	1.715**	1.230	2.393
Decrease	1.149	.904	1.460
Financial strain			
None	1.00		
Some	.627**	.497	.793
Great	.507**	.303	.848

Note: corrected for gender, age, marital status, employment status, household income and educational level

\* $p < .05$  \*\* $p < .01$

Table 4c: Odds ratios for financial strain as mediator on *compliance with the exercise guidelines*

	Exp(B)	95% CI for Odds Ratio	
		Lower	Upper
Model A: Fluctuation in income			
Stable	1.00		
Increase	.839	.638	1.101
Decrease	1.281*	1.003	1.635
Model B: Fluctuation in income			
Stable	1.00		
Increase	.840	.640	1.103
Decrease	1.344*	1.047	1.727
Financial strain			
None	1.00		
Some	.853	.672	1.083
Great	.669	.378	1.185

Note: corrected for gender, age, marital status, employment status, household income and educational level

\* $p < .05$  \*\* $p < .01$

## 5. Discussion

The goal of this research was to investigate the relationship between fluctuation in income and health behaviour between different SES groups and the role of financial strain. Therefore, three health behaviour outcome measures have been studied; smoking, alcohol consumption and physical activity. The research showed that participants with a decrease in income are more likely to smoke and to comply with the exercise guidelines in comparison with participants with no change in income. Alcohol consumption is significantly more common among participants with an increase in income. When distinguishing fluctuation in income, participants with an increasing high income appeared to have twice as much chance of consuming alcohol as participants with a high stable income. For smoking and alcohol consumption fluctuation in income is mediated by the experienced financial strain.

On the basis of this research, it appears to be complicated to distinguish a clear line in the relationship between income, education and fluctuation in income and how this affects health behaviour. Some methodological reflections and limitations are in place for the interpretation of the findings of this study.

### *Fluctuation in income and health behaviour*

We found that participants with a decrease in income are more likely to smoke. This may be explained by the assumed role of financial strain, for which no correction was made in the model being tested. This assumption was also confirmed in the final analysis. Previous studies also showed a correlation between smoking and financial strain (Beenackers, 2018; Grafova, 2011; Hernandez; 2017).

In addition, an increasing income was found to be associated with a greater likelihood to consume alcohol. This may be explained by a higher affordability when experiencing a decreasing income. This is in line with earlier Dutch research, founding that an increasing GDP (in Dutch *bbp*) was associated with an increase in alcohol consumption (SCP, 2018). In particular, the high educated were associated with an increase in alcohol consumption. However, this study did not pay attention to individual income growth as was performed in the current study, so caution is warranted when comparing those results.

In our study, participants with a decrease in income were found to be more likely to comply with the exercise guidelines in comparison with participants with no change in income. This is difficult to reconcile with previous studies regarding to physical activity (Milder, 2013; Vancampfort et al.; 2017). However, research showed that the Dutch population who practices sports, prefer to cut back their expenses on other leisure activities (going out and having dinner) than sports, when they experience a drop in their income. Membership of a sports association was also spared from cutbacks in sports compared to other sport spending. For example, people would rather cut back on the purchase of new sports equipment. More than a fifth of them would also choose a different sport when experiencing a drop in income and their financial situation still allows this (NSO, 2018). Compliance with the exercise guidelines would therefore not be jeopardized easily, but our result that an increase in income was associated with a greater likelihood to comply with the exercise guidelines remains difficult to explain. In addition, our founding result was slightly significant, so caution is warranted interpreting these result.

### *Fluctuation in income in different SES groups*

In the second analysis, we tested how fluctuation in income affects health behaviour in different SES groups. The results showed smoking is significantly more common among low education groups with a stable, increase or decrease in income. This is in line with earlier studies showing regular smokers are mainly among the lower educated (Monshouwer, 2018; SCP, 2018). Despite the fact smoking has become very expensive, financial considerations for smoking seem to play a less important role. Alcohol consumption was found to be less common among low educated participants with a stable or decreased income. It appeared that high educated participants with an increased income were almost

twice as likely to consume alcohol than participants with a stable high income. Participants with a low stable or low increased income were significantly less likely to consume alcohol.

Alcohol consumption is regularly considered as an unhealthy behaviour, and therefore expected to be more common among low income- and education groups. However, studies have shown that highly educated people consume alcohol more and more often than low educated people (SCP, 2018; Trimbos, 2018). Results have shown that regular alcohol consumption is more in line with the lifestyle of higher educated and is a means to distinguish themselves from the low educated. Here there seems to be a group-specific lifestyle behaviour that gives people identity and strengthen the feeling of belonging to a group (SCP, 2018).

Regarding to physical activity, we found that the low-educated with a stable income were significantly less likely to meet the exercise guideline than mid-educated with a stable income. This is in line with the SCP (2018) study founding that people with a lower level of education are less likely to exercise. Free time physical activity is most common among academics; 92.5% of them exercise sufficiently. We found no significant differences compared to the level of income. A possible explanation for this may be the lower educated often do more physically active work (Humbert, 2006), which makes them more likely to meet the exercise guidelines. To investigate this further, research is needed into different forms of physical activity and to what extend these are work-related.

#### *Considering financial strain as a mediating factor*

In the fourth analysis, a supposed mediation effect for financial strain was tested. The results showed financial strain as a mediating factor for smoking and alcohol consumption. This is in line with earlier studies on smoking behaviour and the relationship with financial strain (Benson, 2015; Kulhánová, 2014; Schaap, 2008). These studies show that smoking among low ses-groups is almost not an isolated problem, but influenced by other factors such as stress, poverty and psychological problems. Several studies showed that financial stress increases alcohol and tobacco use, however, there is also evidence that these behaviours contribute to financial difficulties due to the costs involved with these behaviours (Peirce, 1994; Shaw, 2007; Siahpush, 2007). A Dutch study found that financial strain was associated with less good health but had no (smoking and overweight) or only limited (heavy drinking) influence on health behaviours (Prentice, 2017). In the previous analyses, the results showed that non-compliance with the exercise guidelines are not significantly more common among low SES groups. As a result, a possible mediation effect for this health behaviour outcome is almost completely excluded.

#### *Limitations and future research*

In this study we only included three behavioural outcome measures; smoking, alcohol consumption and physical activity. Future research can also include measures of mental health, since it has been shown this also plays a role in health behaviour (Reij, 2012; Droomers, 2015). By including more variance of different aspects of health behaviour (physical as well as mental, cultural and social), future research can strive for a greater understanding of factors which influence health behaviours. Future research could also take into account group related characteristics between ses groups. Research has shown that persons in the direct social network can provide each other with psychological and physical support (SCP, 2018). Since we know higher ses groups generally do have a stronger social network (Campbell, 1986; Pinquart, 2000), they generally do have an advantage of the availability of knowledge and resources to live a healthy lifestyle. Because higher educated people are similar in various areas (financially, culturally and in terms of preferences), they often have the tendency to cluster when living in certain neighbourhoods with relatively good conditions. This can also have consequences for dividing lines in risk and health habits (SCP, 2018). Regarding to policy-making it is important to take into account to approach neighbourhoods where low SES groups are clustered differently, for example by providing low-threshold information about health choices or nudging.

In addition, it may be interested to investigate the so-called *selection mechanism*; the assumption that people with a flexible labour contract (and therefore an unstable income) are less healthy, which may



be the reason why they cannot or do not want to obtain a permanent labour contract (selection) and therefore have a greater chance of poorer health (causality). Health could therefore affect the labour market in the sense that unhealthy people are more likely to maintain an unstable income and finding themselves in an economically uncertain situation (Chkalova, 2020). To further investigate this, more insight is needed into the causal relationship between economic uncertainty and health.

Finally, the health-behaviour related outcomes were all self-reported which may have caused some misclassification. Lower socioeconomic groups are more susceptible for misreporting and therefore misclassification of being at risk (Ljungvall, 2015). The socioeconomic inequalities may therefore be underestimated in this study.

Overall, the current study shows an increase, decrease or a stable income has impact on health and that these changes in income differ per education and income group. It therefore contributes to what is already known about scientific insights concerning economic uncertainty, differences between SES groups and health(behaviour).

#### *Recommendations for policy-making*

Concluding, this research showed novel insights into fluctuation in income and how this affects health behaviour among different SES groups. It also investigated the role of financial strain as mediating factor. We found that participants with a decrease in income are more likely to smoke in comparison with participants with no change in income, which also applied for compliance with the exercise guidelines. Regarding to alcohol consumption, participants with an increase in income are more likely to consume alcohol. Alcohol consumption is significantly more presented among low education groups and income groups with a decrease in income, but also among high education groups with an increase in income. Smoking is significantly more presented among low education groups with a decrease in income. For smoking and alcohol consumption fluctuation in income is mediated by the experienced financial strain.

This study is useful for policymakers who develop policy on health behaviour among different SES groups. By knowing and understanding fluctuation in income in different SES groups and how this affects health behaviour, they can adapt policy development to groups who tend to behave less healthily. For example, raising awareness of the consequences of excessive alcohol consumption among the highly educated. Knowing that smoking is more common among the low educated with a decrease in income, it is important to keep prices of smoking cessation courses as low as possible or even to offer them completely free of charge. When offering flexible employment contracts, it is important to take into account that there may be health risks involved due to fluctuation in income. Employee health and vitality promotes productivity at work, which benefits employers. Therefore, employers must carefully consider the costs and benefits of offering a flexible employment contract and the potential health risks this entails.

## 6. Literature

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## Appendix A: Preliminary analyses

Table A1: Linearity of the logit for *alcohol* (assumption partly met)

	B	S.E.	Wald	Df	Sig.	Exp(B)
Gender by LnGender	.497	.083	35.571	1	.000	1.643
AgeGroups by LnAgeGroups	-.041	.179	.052	1	.820	.960
EducationISCED by LnEducationISCED	-1.038	.486	4.553	1	.033	.354
MaritalStatus by LnMaritalStatus	-1.165	.381	9.339	1	.002	.312
IncomeLevel by LnIncomeLevel	.140	.026	27.811	1	.000	1.150
FinancialStrain by LnFinancialStrain	.269	.577	.218	1	.641	1.309

Table A2 Linearity of the logit for *smoking* (assumption partly met)

	B	S.E.	Wald	Df	Sig.	Exp(B)
Gender by LnGender	.217	.077	7.873	1	.005	1.243
AgeGroups by LnAgeGroups	-.161	.173	.862	1	.353	.851
EducationISCED by LnEducationISCED	-3.98	.452	.776	1	.379	.671
MaritalStatus by LnMaritalStatus	-.953	.370	6.621	1	.010	.386
IncomeLevel by LnIncomeLevel	-.044	.024	3.192	1	.074	.957
FinancialStrain by LnFinancialStrain	-.006	.551	.000	1	.991	.994

Table A3: Linearity of the logit for *compliance with the exercise guidelines* (assumption partly met)

	B	S.E.	Wald	Df	Sig.	Exp(B)
Gender by LnGender	-.429	.077	30.967	1	.000	.651
AgeGroups by LnAgeGroups	-.195	.174	1.256	1	.262	.823
EducationISCED by LnEducationISCED	-.412	.478	.743	1	.389	.663
MaritalStatus by LnMaritalStatus	-.274	.378	.526	1	.468	.760
IncomeLevel by LnIncomeLevel	-.001	.024	.002	1	.964	.999
FinancialStrain by LnFinancialStrain	-.126	.649	.038	1	.846	.882

Table A4: Multicollinearity: Tolerance and VIF (assumption partly met)

	Tolerance	VIF
Gender	.972	1.029
Age groups	.736	1.359
Educational level	.750	1.334
Marital status	.963	1.038
Income level	.977	1.023
Financial strain	.878	1.139

1. Outcome variable: *smoking*

	Tolerance	VIF
Gender	.967	1.034
Age groups	.034	29.131
Educational level	.100	10.016
Marital status	.963	1.038
Income level	.977	1.024
Financial strain	.879	1.138

2. Outcome variable: *alcohol consumption*

	Tolerance	VIF
Gender	.971	1.030
Age groups	.741	1.350
Educational level	.750	1.333
Marital status	.960	1.041
Household income	.976	1.025
Financial strain	.880	1.136

2. Outcome variable: *compliance with the exercise guidelines*

## Appendix B: Analysis hypothesis 2

Table B1: Interaction between fluctuation in income and *educational level* on *smoking*

	Exp(B)	95% CI for Odds Ratio	
		Lower	Upper
Fluctuation in income			
Stable	1.00		
Increase	1.157	.537	2.490
Decrease	1.342	.871	2.067
Educational level			
Mid	1.00		
High	1.861	1.204	2.876
Low	3.411	2.272	5.121
Fluctuation in income * education level			
Stable * Mid	1.00		
Stable * High	.473**	.313	.713
Stable * Low	1.683**	1.104	2.566
Increase * High	.450**	.287	.706
Increase * Mid	1.699*	1.026	2.814
Increase * Low	2.061*	1.059	4.013
Decrease * High	.713	.462	1.100
Decrease * Mid	1.269	.817	1.970
Decrease * Low	2.415**	1.599	3.648

Note: corrected for gender, age, marital status, employment status, and household income, .

Table B2: Interaction between fluctuation in income and *educational level* on *alcohol consumption*

	Exp(B)	95% CI for Odds Ratio	
		Lower	Upper
Fluctuation in income			
Stable	1.00		
Increase	1.804	.802	4.056
Decrease	1.185	.742	1.894
Educational level			
Mid	1.00		
High	.998	.628	1.586
Low	.380**	.256	.564
Fluctuation in income * education level			
Stable * Mid	1.00		
Stable * High	1.615*	1.078	2.419
Stable * Low	.445**	.296	.670
Increase * High	3.257**	1.917	5.536
Increase * Mid	1.243	.685	2.258
Increase * Low	.739	.367	1.488
Decrease * High	1.246	.810	1.917
Decrease * Mid	1.260	.779	2.039
Decrease * Low	.509**	.337	.769

Note: corrected for gender, age, marital status, employment status, and household income,

\* $p < .05$  \*\* $p < .01$



Table B3: Interaction between fluctuation in income and *educational level* on *compliance with the exercise guidelines*.

	Exp(B)	95% CI for Odds Ratio	
		Lower	Upper
Fluctuation in income			
Stable	1.00		
Increase	.812	.342	1.929
Decrease	.851	.530	1.368
Educational level			
Mid	1.00		
High	.586*	.364	.943
Low	.473**	.302	.741
Fluctuation in income * education level			
Stable * Mid	1.00		
Stable * Hoog	.946	.631	1.418
Stable * Low	.435**	.280	.676
Increase * High	.808	.524	1.245
Increase * Mid	.567*	.327	.986
Increase * Low	.648	.306	1.373
Decrease * High	1.424	.886	2.289
Decrease * Mid	.819	.507	1.323
Decrease * Low	.654	.414	1.033

Note: corrected for gender, age, marital status, employment status, and household income.

\* $p < .05$  \*\* $p < .01$

Table B4: Interaction between fluctuation in income and *income level* on *smoking*

	Exp(B)	95% CI for Odds Ratio	
		Lower	Upper
Fluctuation in income			
Stable	1.00	.	
Increase	.492	.135	1.795
Decrease	1.749	.888	3.443
Income level			
Midhigh	1.00		
Midlow	2.373	.742	7.776
Highest	2.123	.801	5.629
Lowest	2.741	1.038	7.236
	2.551	.911	7.142
Fluctuation in income * income level			
Stable * Midhigh			
Stable * Midlow	1.00		
Stable * Highest	.190	.736	1.925
Stable * Lowest	.611	.317	1.178
Increase * Highest	1.520	.967	2.391
Increase * Midhigh	1.083	.594	1.973
Increase * Midlow	1.074	.616	1.871
Increase * Lowest	1.583	.897	2.795
Decrease * Highest	2.009*	1.116	3.618
Decrease * Midhigh	.730	.276	1.934
Decrease * Midlow	1.321	.797	2.190
Decrease * Lowest	1.553	.979	2.463
	1.967	1.256	2.081

Note: corrected for gender, age, marital status, employment status, and educational level,

\* $p < .05$  \*\* $p < .01$

Table B5: Interaction between fluctuation in income and *income level* on *alcohol consumption*

	Exp(B)	95% CI for Odds Ratio	
		Lower	Upper
Fluctuation in income			
Stable	1.00		
Increase	4.336*	1.238	15.184
Decrease	1.677	.911	3.089
Income level			
Midhigh	1.00		
Midlow	1.993	.718	5.530
Highest	.748	.330	1.693
Lowest	.474	.210	1.073
Fluctuation in income * income level			
Stable * Midhigh	1.00		
Stable * Midlow	.637	.400	1.041
Stable * Highest	1.443	.762	2.733
Stable * Lowest	.494**	.316	.773
Increase * Highest	1.752	.823	3.731
Increase * Midhigh	1.391	.731	2.645
Increase * Midlow	1.001	.508	1.972
Increase * Lowest	.796	.409	1.548
Decrease * Highest	.810	.358	1.832
Decrease * Midhigh	1.518	.854	2.698
Decrease * Midlow	.639	.407	1.004
Decrease * Lowest	.452**	.541	.710

Note: corrected for gender, age, marital status, employment status, and educational level,

\* $p < .05$  \*\* $p < .01$

Table B6: Interaction between fluctuation in income and *income level* on *physical activity*

	Exp(B)	95% CI for Odds Ratio	
		Lower	Upper
Fluctuation in income			
Stable	1.00		
Increase	.490	.205	1.171
Decrease	1.426	.668	3.044
Income level			
Midhigh	1.00		
Midlow	1.146	.390	3.366
Highest	1.028	.464	2.276
Lowest	.888	.400	1.969
Fluctuation in income * income level			
Stable * Midhigh	1.00		
Stable * Midlow	.926	.597	1.434
Stable * Highest	1.082	.665	1.761
Stable * Lowest	.913	.586	1.424
Increase * Highest	.758	.459	1.253
Increase * Midhigh	.785	.486	1.269
Increase * Midlow	1.161	.642	2.100
Increase * Lowest	.948	.501	1.792
Decrease * Highest	1.259	.586	2.703
Decrease * Midhigh	1.488	.902	2.454
Decrease * Midlow	1.260	.801	1.980
Decrease * Lowest	1.074	.683	1.690

Note: corrected for gender, age, marital status, employment status, and educational level.

## Appendix C: questions used from the Globe 2014

1. Bent u man of vrouw?
2. Wat is uw leeftijd?
3. Wat is uw burgerlijke staat?
4. Woont u momenteel samen met uw partner of echtgenoot?
5. Wat is uw hoogst genoten opleiding?
6. Welke werksituatie is voor u het meest van toepassing?
7. Rookt u?
8. Hoe vaak drinkt u alcoholhoudende drank?
9. Hoeveel glazen alcohol drinkt u op een normale dag wanneer u drinkt?
10. Op gemiddeld hoeveel dagen bent u, alle activiteiten bij elkaar opgeteld, ten minste een half uur bezig met lopen, fietsen, klussen, tuinieren, sporten, huishoudelijk werk en dergelijke?
11. Wilt u aankruisen hoe hoog het netto inkomen van uw huishouden is?
12. Hebt u in het afgelopen jaar moeite gehad om met het inkomen van uw huishouden uw eten, huur, aflossing, elektriciteitsrekening en dergelijke te betalen?
13. Als u het totale maandelijkse inkomen van uw huishouden beschouwt, hoe kan het huishouden dan rondkomen?
14. Vergeleken met een jaar geleden, is de financiële situatie van mijn huishouden er nu...

## Appendix D: used syntaxes

### **Assumption 1: testing for linearity of the logit**

LOGISTIC REGRESSION VARIABLES Roken\_dichotoom

/METHOD=ENTER G14v1 G14v5 Education\_ISCED Fin\_stress income9 Age\_groups Inkomen

Age\_groups\*LnAgeGroups Education\_ISCED\*LnEducation G14v5\*LnMaritalstatus  
LnIncomelevel\*income9

Fin\_stress\*LnFinancialstrain

/CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

### **Assumption 2: testing for multicollinearity**

REGRESSION

/MISSING LISTWISE

/STATISTICS COLLIN TOL

/CRITERIA=PIN(.05) POUT(.10)

/NOORIGIN

/DEPENDENT Roken\_dichotoom

/METHOD=ENTER G14v1 G14v5 Education\_ISCED Fin\_stress income9 Age\_groups Inkomen.

REGRESSION

/MISSING LISTWISE

/STATISTICS COLLIN TOL

/CRITERIA=PIN(.05) POUT(.10)

/NOORIGIN

/DEPENDENT Alcohol\_dichotoom

/METHOD=ENTER G14v1 G14v5 Education\_ISCED Fin\_stress income9 Age\_groups Inkomen.

REGRESSION

/MISSING LISTWISE

/STATISTICS COLLIN TOL

/CRITERIA=PIN(.05) POUT(.10)

/NOORIGIN

/DEPENDENT Beweegrichtlijn

/METHOD=ENTER G14v1 G14v5 Education\_ISCED Fin\_stress income9 Age\_groups Inkomen.

### **Hypothesis 1**

LOGISTIC REGRESSION VARIABLES Roken\_dichotoom

/METHOD=ENTER G14v1 Age\_groups G14v5 income9 Education\_ISCED InkomenRef

/CONTRAST (InkomenRef)=Indicator(1)

/PRINT=GOODFIT CI(95)

/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

LOGISTIC REGRESSION VARIABLES Alcohol\_dichotoom

/METHOD=ENTER G14v1 Age\_groups G14v5 income9 Education\_ISCED InkomenRef

/CONTRAST (InkomenRef)=Indicator(1)

/PRINT=GOODFIT CI(95)

/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

LOGISTIC REGRESSION VARIABLES Beweegrichtlijn

/METHOD=ENTER G14v1 Age\_groups G14v5 income9 Education\_ISCED InkomenRef

/CONTRAST (InkomenRef)=Indicator(1)

/PRINT=GOODFIT CI(95)

/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

### **Hypothesis 2 – interaction fluctuation in income \* educational level**

LOGISTIC REGRESSION VARIABLES Roken\_dichotoom

/METHOD=ENTER G14v1 Age\_groups G14v5 income9 Werk\_4cat Inkomen\_Educ1

/CONTRAST (Inkomen\_Educ1)=Indicator(1)

/PRINT=GOODFIT CI(95)

/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

LOGISTIC REGRESSION VARIABLES Alcohol\_dichotoom

/METHOD=ENTER G14v1 Age\_groups G14v5 income9 Werk\_4cat Inkomen\_Educ1

/CONTRAST (Inkomen\_Educ1)=Indicator(1)

/PRINT=GOODFIT CI(95)

/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

LOGISTIC REGRESSION VARIABLES Beweegrichtlijn

/METHOD=ENTER G14v1 Age\_groups G14v5 income9 Werk\_4cat Inkomen\_Educ1

/CONTRAST (Inkomen\_Educ1)=Indicator(1)

/PRINT=GOODFIT CI(95)

/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

### **Hypothesis 2 – interaction fluctuation in income \* income level**

LOGISTIC REGRESSION VARIABLES Roken\_dichotoom

/METHOD=ENTER G14v1 Age\_groups G14v5 Education\_ISCED Werk\_4cat  
Inkomen\_Incomelevel1

/CONTRAST (Inkomen\_Incomelevel1)=Indicator(1)

/PRINT=GOODFIT CI(95)

/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

LOGISTIC REGRESSION VARIABLES Alcohol\_dichotoom

/METHOD=ENTER G14v1 Age\_groups G14v5 Education\_ISCED Werk\_4cat  
Inkomen\_Incomelevel1

/CONTRAST (Inkomen\_Incomelevel1)=Indicator(1)

/PRINT=GOODFIT CI(95)

/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

LOGISTIC REGRESSION VARIABLES Beweegrichtlijn

/METHOD=ENTER G14v1 Age\_groups G14v5 Education\_ISCED Werk\_4cat  
Inkomen\_Incomelevel1

/CONTRAST (Inkomen\_Incomelevel1)=Indicator(1)

/PRINT=GOODFIT CI(95)

/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).



### Hypothesis 3

LOGISTIC REGRESSION VARIABLES Roken\_dichotoom

```
/METHOD=ENTER G14v1 Age_groups G14v5 income9 Education_ISCED InkomenRef  
/CONTRAST (InkomenRef)=Indicator(1)  
/PRINT=CI(95)  
/CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).
```

LOGISTIC REGRESSION VARIABLES Roken\_dichotoom

```
/METHOD=ENTER G14v1 Age_groups G14v5 income9 Education_ISCED InkomenRef Fin_stress  
/CONTRAST (InkomenRef)=Indicator(1)  
/CONTRAST (Fin_stress)=Indicator(1)  
/PRINT=CI(95)  
/CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).
```

LOGISTIC REGRESSION VARIABLES Alcohol\_dichotoom

```
/METHOD=ENTER G14v1 Age_groups G14v5 income9 Education_ISCED InkomenRef  
/CONTRAST (InkomenRef)=Indicator(1)  
/PRINT=CI(95)  
/CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).
```

LOGISTIC REGRESSION VARIABLES Alcohol\_dichotoom

```
/METHOD=ENTER G14v1 Age_groups G14v5 income9 Education_ISCEDInkomenRef Fin_stress  
/CONTRAST (InkomenRef)=Indicator(1)  
/CONTRAST (Fin_stress)=Indicator(1)  
/PRINT=CI(95)  
/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).
```

LOGISTIC REGRESSION VARIABLES Beweegrichtlijn

```
/METHOD=ENTER G14v1 Age_groups G14v5 Education_ISCED income9 InkomenRef  
/CONTRAST (InkomenRef)=Indicator(1)  
/PRINT=CI(95)
```

/CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Beweegrichtlijn

/METHOD=ENTER G14v1 Age\_groups G14v5 Education\_ISCED income9 InkomenRef Fin\_stress

/CONTRAST (InkomenRef)=Indicator(1)

/CONTRAST (Fin\_stress)=Indicator(1)

/PRINT=CI(95)

/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).