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# **Solidarity Preferences Towards Lifestyle-Related Diseases: The Influence of Cost Framing, Social Value Orientation and Lifestyle Factors**

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*Statement:* Generative AI tools (e.g., ChatGPT, Copilot) were used to assist the refining the language and to assist the data analysis of this thesis. Appendix F of this thesis provides a detailed account of the use of Generative AI tools during the development of this thesis. By submitting this thesis, I declare that I am fully responsible for the accuracy and completeness of its content.

## **Abstract**

The increasing prevalence of lifestyle related diseases presents a common pool problem. Although the annual healthcare costs of smokers/people who are obese are higher, the lifetime healthcare costs of smokers/people who are obese are lower. This thesis investigates to which extent the Dutch population support various forms of healthcare differentiation between smokers/people who are obese and healthy individuals via a vignette experimental study. Participants who are presented with information of the lifetime healthcare costs are less in favour of healthcare differentiation than participants who are presented with the annual healthcare costs. The solidarity preferences among inequality averse participants align with their social value orientation and are mostly driven by an aversion against disadvantageous outcomes. However, participants with a joint maximizing social value orientation in the annual healthcare perspective group act in contrast with their social value orientation. Individualistic participants who engage in 2 or less health behaviours are acting according to their social value orientation. However, individualistic participants who engage in 3 or more health behaviours are acting against their social value orientation. Furthermore, more support for differentiation is found for smoking and for insurance premium discount. Females, older participants and smokers are less supportive of healthcare differentiation.

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## 1. Introduction/motivation of the research problem

The Dutch healthcare system faces several challenges these days such as staff shortages, rising costs and an aging population (Vonk et al., 2020). It is estimated that the healthcare costs in 2022 will double by 2050 (van der Lucht et al., 2024). This rise in healthcare costs is brought about by demographic shifts (i.e. aging population and population growth), advancement of medical technology and changes in diseases patterns (van der Lucht et al., 2024).

Simultaneously, the occurrence of life-style related diseases such as cardiovascular diseases, diabetes and certain cancers is more prevalent. This occurrence is associated with obesity, smoking, alcohol consumption and physical inactivity (Traina et al., 2019). In 2024, 18.2% of the Dutch citizens smoked and 15.7% of the Dutch citizens were obese (VZinfo.nl, 2025a; VZinfo.nl, 2025c). While the number of smokers in the Netherlands is expected to decline to 11%, the number of people who are overweight is expected to rise to 64% in 2050 (van der Lucht et al., 2024).

Like in most other European countries, the access to healthcare in the Netherlands is based on solidarity (Bonnie et al., 2010; Kroneman et al., 2023). Every Dutch citizen is obliged by law to have health insurance regardless of their healthcare usage to ensure equal access to healthcare for everyone (Stegeman et al., 2014). Currently, no differentiation based on individual health behaviour is made when it comes to healthcare resources.

However, this could lead to moral hazard (Dave & Kaestner, 2009). Health insurance lowers individual healthcare expenditures which decrease the individual's financial and health consequences when an individual becomes ill (Dave & Kaestner, 2009). This might not incentivize individuals to adopt healthy behaviours. As a result, there is a debate to what extent individuals should be held responsible for engaging in unhealthy behaviour (Cappelen & Norheim, 2005).

This debate could be considered a social dilemma. Within social dilemmas, the individual interests outweigh the community's interests (Van Lange et al., 2013). Prior studies on social dilemmas show that people value equal outcomes and disapprove when individuals prioritize their own interests at the expense of collective interests (Fehr & Charness, 2025; Fischbacher & Gächter, 2010). Within this debate, smokers and people who are obese extract more resources from the common pool. This could be considered as prioritizing their own interests over societal interests. Consequently, people might differ in their solidarity preferences regarding smokers and people who are obese.

An important argument in this debate is that the healthcare costs rise because of individuals engaging in unhealthy behaviours (Scarborough et al., 2011). However, there is a difference between the annual and lifetime medical costs of smokers, people who are obese and non-smokers with a normal BMI (van Baal et al., 2008). Some studies show that the lifetime medical costs of people who smoke or are obese are lower in comparison with people who don't smoke and have a normal BMI (van Baal et al., 2008; Rezayatmand et al., 2017). These differences arise, because obese people and smokers have a shorter life expectancy than healthy-living individuals even though they make more use of healthcare per year (van Baal et al., 2008).

Prior studies such as Bonnie et al. (2010), Nivel Barometer (2010) and Stegeman et al. (2014) have investigated the views on healthcare differentiation based on lifestyle in the Netherlands, but those studies do not take the differences in lifespan medical costs into account. It is therefore unknown whether the views of the Dutch population on healthcare differentiation differ when they are made aware of the lower lifetime medical costs of smokers and obese/overweight patients.

This leads to the following research question which this thesis aims to answer: *'What are the solidarity preferences towards different forms of healthcare differentiation based on lifestyle of the Dutch population, and to what extent are these preferences influenced by receiving information about the lifespan costs or the annual costs of smokers, obese/overweight people, and healthy-living persons?'*

This thesis will make several contributions. Firstly, this thesis can contribute to the existing knowledge of solidarity preferences among Dutch citizens by showing whether solidarity preferences differ among participants who are presented with annual or lifetime healthcare costs. Moreover, this thesis aims to identify the level of support for various forms of healthcare differentiation for obesity and smoking which goes beyond the studies of Bonnie et al. (2010) and Stegeman et al., (2014). Finally, this thesis aims to provide policymakers with insights into which forms of healthcare differentiation are supported by the Dutch population regarding two types of health risk factors: smoking and obesity. These insights can help policymakers with designing healthcare policies regarding these risk factors.

This thesis is structured in the following way. Firstly, the most relevant literature on social dilemmas, social value orientation and the relation to differentiation in healthcare is discussed in

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the literature review. In this section, the hypotheses this thesis aims to test are discussed as well. Then, the methodological approach is described. Next, the results of the experiment are presented in the results chapter and are further discussed in the discussion chapter. In the discussion chapter, the limitations and directions for future research are discussed as well which is followed by the conclusion of the thesis.

## 2. Literature review

### 2.1 Dutch healthcare system as a common pooled resource

The Dutch healthcare system, like many other European healthcare systems, is based on solidarity which could represent a social dilemma (Kroneman et al., 2023). In social dilemmas, individual's short-term interests outweigh the collective's long-term interests (Van Lange et al., 2013). These short-term interests can prevent individuals from contributing resources towards the collective goal. This results in free-riding and might lead to worse outcomes for all group members than if other group members contribute to the collective goal (Kurzban & Houser, 2001). If other participants are aware of free-riders, they will reduce their contribution towards the collective fund, because people dislike the idea of cooperating while other people prioritize their own interests at the expense of the public's interests (Fischbacher & Gächter, 2010).

A specific form of a social dilemma is a common pooled resource dilemma (Van Lange et al., 2013). A common pooled resource has two main characteristics (Gardner et al., 1990). Firstly, it is expensive to exclude people from accessing the resource (Gardner et al., 1990). Secondly, a common pooled resource cannot be used by an individual once it is used by another individual, the so-called resource unit subtractability condition (Gardner et al., 1990). With these resources, there is a risk of rational utility-maximizing individuals depleting a shared resource even though this is not the interest of the collective. This phenomenon is known as the 'Tragedy of the Commons' (Hardin, 1968; Ostrom, 2008).

The Dutch healthcare sector could be considered as a common pooled resource. Healthcare services are subtractable in consumption, since the amount of healthcare resources available decreases once an individual makes use of a healthcare resource (Palumbo, 2017; Sanderson et al., 2020). Additionally, an important aspect of the healthcare system is ensuring that each citizen has equal access to it via obligatory healthcare insurance. This aligns with the characteristic of the difficulty of excluding people from accessing a common pooled resource (Bonnie et al., 2010; Gardner et al., 1990).

The support for differentiation in the allocation of healthcare resources could increase because of the rise in healthcare costs due to lifestyle behaviour (Stegeman et al., 2014). Currently, individuals who engage in unhealthy lifestyle behaviour are insured under the same conditions of individuals who don't, but extracting more healthcare resources (Stegeman et al., 2014).

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Consequently, this could be considered as prioritizing their own lifestyle over a sustainable healthcare system. Since people dislike free-riders, they could support healthcare differentiation to hold individuals who engage in unhealthy lifestyle behaviours accountable for harming the system (Stegeman et al., 2014).

However, the question arises of who extracts more healthcare resources. On the one hand, more healthcare resources are extracted by individuals who smoke or are obese per year, since smoking and obesity increase the risks of illnesses (van Baal et al., 2008). On the other hand, individuals who don't smoke and have a normal BMI incur higher medical costs during their lives, because these individuals suffer from other illnesses despite the increase in their life expectancy (van Baal et al., 2008).

## **2.2 Social value orientation**

Besides individual pay-off, people take fairness and outcomes for others into account in the division of scarce resources (Fehr & Charness, 2025). An important predictor of how people behave in social dilemmas is people's social value orientation (Van Lange et al., 2013). The social value orientation can be considered as a characteristic which shows how people assess outcomes for themselves and others (Bogaert et al., 2008). It can be used to explain and understand why people vary in their preferences to support the collective goal and it is an important element of cooperative motives, strategies and choice behaviour (Bogaert et al., 2008).

Individuals can have different motivations for a preferred resource allocation between themselves and the other person (Murphy et al., 2011). The three social value orientations which are the most common are individualistic, competitive and pro-social (Bogaert et al., 2008; Deutsch, 1960). For starters, an individual might prefer to maximize their own payoff regardless of the other's pay-off (Pletzer et al., 2018). This is known as the individualistic motivation. In addition, competitiveness refers to an individual maximizing their own outcome relative to the other's outcome (Van Lange et al., 1997).

However, an individual can decide to take the interests of others into account which is a pro-social motivation. This can be divided into altruism, joint maximization and inequality averse (Bogaert et al., 2008). Individuals can strive for maximizing the others' outcomes, which is referred to as altruism (Bogaert et al., 2008). These individuals are more likely to cooperate even when the

other does not. Individuals with a joint maximizing social value orientation prefer to select the outcome in which both parties are better off (Bogaert et al., 2008).

Lastly, individuals can prefer minimizing the distance between the individual's and the other's person payoff. This is considered as inequality averse (Murphy et al., 2011). This is similar to the idea of inequity aversion in social dilemmas in which players dislike outcomes in which they are worse off (i.e. disadvantageous inequality) and outcomes in which they are better off than the other (i.e. advantageous inequality) (Charness & Rabin, 2002; Fehr & Schmidt, 1999). People experience stronger aversion against disadvantageous inequality than advantageous inequality (Fehr & Schmidt, 1999).

Individuals with a pro-social orientation are more likely to cooperate than individuals with a pro-self-orientation within a social dilemma (Gärling, 1999). Pro-socials evaluate outcomes in terms of collective rationality whereas pro-self-individuals do this in terms of individual rationality. Moreover, several studies show that pro-socials tend to show more cooperative behaviour in resource dilemma games (Bogaert et al., 2008; Kramer et al., 1986). For example, the study of Kramer et al. (1986) demonstrates that cooperatively oriented participants prefer outcomes in which the public resource is preserved.

### *2.2.1 Pro-social social value orientation and healthcare differentiation*

The solidarity preference of an individual with an inequality aversion social value orientation can depend on the cost frame. Inequality averse smokers/people who are obese dislike harvesting more resources than people who don't. Healthcare differentiation can encourage them to harvest less healthcare resources. Inequality averse people who neither smoke nor are obese dislike that smokers/obese people require more healthcare resources per year even though these people are insured under the same conditions as non-smokers and normal weight individuals (Bonnie et al., 2010). Consequently, they support healthcare differentiation to punish smokers and people who are obese for extracting more resources.

However, the solidarity preferences of inequality averse individuals towards smokers and obese people can shift when presented with the life-time medical costs, because smokers and obese people make less use of medical resources in this perspective (van Baal et al., 2008). Since individuals who smoke/are obese could dislike that people who don't harvest more resources, they would not support healthcare differentiation in favour of non-smokers/people with a normal BMI.

Individuals who don't smoke/are not obese dislike that they harvest more resources than smokers and people who are obese. As a result, they would not favour healthcare differentiation in favour of non-smokers/people with a normal BMI.

The solidarity preferences of individuals with a joint maximization social value orientation could depend on the cost frame as well. Within the lifetime healthcare cost perspective, more healthcare resources are used by individuals who do not smoke or are obese. Therefore, an individual with a joint maximizing social value orientation would not support healthcare differentiation in favour of the healthy individual, because these individuals incur higher healthcare costs in their lifetime. However, an individual with a joint maximizing social value orientation might support healthcare differentiation in the annual healthcare cost perspective, because healthy individuals can gain from healthcare differentiation.

*Hypothesis 1: (Pro-social) participants show more solidarity towards smokers or people who are obese when provided with lifespan healthcare costs than when provided with the annual healthcare costs.*

### 2.2.2 Pro-self Social Value Orientation and healthcare differentiation

In contrast to pro-social individuals, those with a pro-self Social Value Orientation would support healthcare differentiation depending on whether they would benefit from it. This works in two directions. On the one hand, individuals who do not engage in unhealthy lifestyle behaviours can support healthcare differentiation, since they can benefit from for instance receiving earlier treatment or receiving an insurance premium discount. On the other hand, individuals who engage in unhealthy behaviours will not support healthcare differentiation, since they would be worse off.

Prior studies on healthcare differentiation report that the solidarity preferences are related to individuals own interests when the individual engages in healthy behaviour. For example, the study of Bonnie et al. (2010) indicates that people show less solidarity towards lifestyle diseases when they engage in exercise regularly. In addition, non-smokers in the study of Stegeman et al. (2014) are more in favour of health care differentiation based on health behaviour whereas smokers are less in favour. Similarly, the results of Rogge and Kittel (2016) indicate that the smoking behaviour of the participants is an important factor in explaining the different levels of support towards prioritizing patients on smoking habits.

Additionally, prior research shows that individuals who engage in unhealthy behaviours are less supportive of healthcare differentiation. For example, the study of Traina et al. (2019) states that respondents who consider their health as poor are less supportive of higher co-payments for people whose illnesses are lifestyle related. Similar results are reported in the study of Miraldo et al. (2014) in which smokers are more in favour of the NHS covering the costs of smoking-related diseases.

Furthermore, the studies of Stegeman et al. (2014) and Furnham et al. (200) show that smokers show in-group favouritism, e.g. smokers showing more solidarity towards smokers. The results of Anderson et al. (2011) shows that smokers are less in favour of prioritising non-smokers for medical treatment in comparison with non-smokers. Similarly, the study of Diederich et al. (2014) reports that participants with a higher BMI support co-payments for unhealthy lifestyle behaviours which are not directly connected to body weight.

*Hypothesis 2: Participants who engage in unhealthy behaviours show more solidarity towards smokers and people who are obese than those who engage in healthy behaviours*

### **2.3 Healthcare differentiation types and solidarity preferences towards smokers and obesity**

Differentiation in healthcare based on lifestyle can have various forms. The most common forms are differences in insurance premia, copayments or waitlist ordering (Stegeman et al., 2014). Differences in insurance premia entails giving a premium discount to those not engaging in unhealthy behaviour. The second form, copayments, refers to a financial penalty when a disease is caused by unhealthy behaviour. Lastly, waitlist ordering involves prioritising patients who do not engage in unhealthy behaviours over patients who do (Stegeman et al., 2014).

Furthermore, a distinction can be made between rewarding and penalising healthcare differentiation forms (Stegeman et al., 2014). A rewarding healthcare differentiation form is about providing a discount or a higher place on the waiting list when the individual does not engage in unhealthy behaviour whereas a penalising healthcare differentiation form is punishing the individual when they engage in unhealthy behaviour by means of a co-payment (Stegeman et al., 2014).

Prior research on healthcare differentiation for lifestyle related diseases show that positive healthcare differentiation types generate more support than negative healthcare differentiation types. The study of Schmidt (2013) for example shows that participants are more supportive of rewarding people with a normal BMI rather with an insurance premium rebate than penalising the people who do not have a normal BMI with a surcharge. A similar result is found in the study of Stegeman et al. (2014) in which more participants supported providing insurance premium discounts for positive health behaviour than charging co-payments for negative health behaviours.

*Hypothesis 3a: Participants are more supportive of rewarding individuals who don't smoke/are not obese in comparison with punishing the individuals who smoke or are obese.*

Some studies have shown that respondents show less solidarity towards smokers than non-smokers. For example, the study of Björk et al. (2015) shows that physicians are more likely to offer a treatment to a non-smoking patient in comparison to a smoking patient. In addition, the study of Diederich et al. (2014) suggests that a large share of the respondents is in favour of co-payments for smokers. Lastly, the study of van der Star and van den Berg (2011) indicates that the willingness to pay of Dutch inhabitants for an inclusion of a treatment in basic health insurance of a smoking related health problem is lower than of a chronic disease.

When looking at the solidarity preferences regarding obesity, there are some mixed results. On the one hand, the study of Bonnie et al. (2010) reports that respondents generally support the idea that people who are overweight should pay a higher basic health insurance premium. The paper of Miraldo et al. (2014) suggests that less than half of the participants agree that the NHS should cover the healthcare costs related to overeating and unhealthy diets. The results of Schmidt, (2013) indicate that participants favour an insurance premium rebate for people with a normal BMI over punishing people who do not meet the normal BMI. On the other hand, the study of Diederich et al. (2014) reports that most of the respondents are not in favour of co-payments for patients who do not engage in physical activity, but respondents are divided when it comes to co-payments for patients with unhealthy diets.

*Hypothesis 3b: Participants show more solidarity towards patients or people who are overweight/obese than towards smokers*

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## **2.4 Demographic factors that influence solidarity preferences**

Several studies show how demographic features could influence people's solidarity preferences as well. Socio-demographic characteristics include age, gender, level of income, level of education. For instance, it has been reported that women show more solidarity towards smokers than men. The studies of Diederich et al. (2014) and Stegeman et al. (2014) confirm that men are more in favour of co-payments than women. Furthermore, the study of Bonnie et al. (2010) indicates that lower and intermediate educated participants show more solidarity towards smokers and overweight people than highly educated participants.

Regarding the relationship between solidarity preferences and age, there are mixed results. The studies of Bonnie et al. (2010) and Martinussen (2022) find that older participants are less in favour of higher premiums. However, the study of Diederich et al. (2014) reports that older participants are more in favour of co-payments for patients with risky health behaviours. The study of Stegeman et al., (2014) does not find a significant effect of age, but the participants in this study are older in comparison with the studies of Bonnie et al. (2010), Diederich et al. (2014) and Martinussen (2022).

### 3. Methodological approach

#### 3.1 Study design

The method that is used to answer the research question is a vignette experimental study. Several studies investigating solidarity preferences regarding individual health behaviours use a vignette study as a research method such as the studies of Stegeman et al. (2014) and van der Star and van den Berg (2011). This method allows participants to express their views on healthcare differentiation based on carefully designed hypothetical scenarios (Aguinis & Bradley, 2014). Furthermore, this method allows for manipulating and controlling the independent variables (Aguinis & Bradley, 2014). In the experiment, the participants evaluated the same scenarios but were randomly assigned to receive the annual or lifetime medical costs. This is useful for isolating the effect of the framing of the costs on the solidarity preferences.

The experiment was designed in the following way and the complete survey procedure can be found in appendix A. Participants were randomly assigned to either the lifetime healthcare costs or to the annual healthcare costs perspective group. The participants in the lifetime healthcare costs were informed about the lower lifetime healthcare costs of smokers and obese people versus healthy individuals who do not smoke and have a normal BMI. They were also informed that the difference in costs arises because of the lower life expectancy of obese people and smokers. The participants in the annual healthcare costs group were informed about the higher annual healthcare costs of obese people/smokers which is caused due the higher risk of certain diseases.

The participants in both groups were informed about the expected healthcare costs in 2040 (RIVM, 2018b). Furthermore, the participants were informed about the percentage of Dutch adults who smoke/are obese in 2024 and what percentage of the Dutch adults are expected to smoke/be obese in 2040 to show which part of the population currently smokes/is obese and how this will change in the future (RIVM, 2018a; VZinfo.nl, 2025a; VZinfo.nl, 2025c). Then, the participants were presented with a check-up question in which they must indicate whose healthcare costs are higher to test whether they understand the presented information.

Afterwards, the participants could indicate their level of solidarity based on hypothetical scenarios which are divided into two parts. The first part focused on scenarios regarding smoking versus non-smoking and the second part focused on scenarios regarding obese versus normal weight. The scenarios focused on three different forms of healthcare differentiation: differentiation

in healthcare insurance premium, waitlist ordering and co-payments. The parts and scenarios within these specific parts were presented to the participants in a random order.

In the second part of the survey, the SVO-slider measure of Murphy et al. (2011) is used to determine the Social Value Orientation of the participants. This measure was chosen because this is an efficient measure to determine the Social Value Orientation (Murphy et al., 2011). In addition, this measurement has a higher test-retest reliability in comparison with the Ring Measure and the Triple Dominance Measure (Bakker & Dijkstra, 2021).

The SVO-slider requires participants to state their preferences for an allocation of money between them and the other. The participants were first presented with the instructions and an example of how an allocation is chosen. Afterwards, the participants were asked to state their preferences for an allocation for 15 items (6 six primary items and 9 secondary items). For each question, the participants were presented with 9 different ways the money can be distributed between the participant and the other. The participant could select one option for each item. The primary and secondary items were presented in a random order.

Finally, the participants were presented with questions about their personal characteristics and their lifestyle behaviours. The questions about personal characteristics included gender, level of education and age. The questions about lifestyle behaviours included questions about smoking, own perception of health, exercise, weight and height, and alcohol consumption habits to determine whether the lifestyle habits of the participants are related to their solidarity preferences.

### **3.2 Data collection**

The experiment was conducted online via Qualtrics in April 2025. In total, 236 participants fully completed the survey. These participants were targeted via LinkedIn and Surveycircle on which the survey link was shared. At the start of the experiment, the participants were informed about the goal of the experiment and what was expected from them. Afterwards, the participants had to indicate whether they wish to participate in the experiment before they could start. If the participant decided not to participate, the survey ended there.

### 3.3 Variables

#### 3.3.1 Dependent variable

The dependent variable is the binary with 0 = not supporting healthcare differentiation in favour of the healthy person and 1 = supporting healthcare differentiation in favour of the healthy person. The coding of the binary variable is based on the participant's slider score which is shown in table 1.

TABLE 1: MEASUREMENT DEPENDENT VARIABLE

Differentiation type		Score Slider	Definition	Binary variable
Insurance discount	premium	0	The person who smokes/is obese should receive a discount.	0 = not supporting healthcare differentiation in favour of the healthy person (slider scores 0 – 50)
		50	Both persons should pay the same amount	
		100	The person who doesn't smoke/isn't obese should receive a discount	
Waitlist ordering		0	The patient who smokes/is obese should be positioned higher on the waiting list for the heart surgery	0 = not supporting healthcare differentiation in favour of the healthy person (slider scores 0 – 50)
		50	No distinction between the patients should be made	
		100	The patient who doesn't smoke/isn't obese should be positioned higher on the waiting list for the heart surgery	
Copayment		0	The person who smokes/is obese should pay a higher copayment for their heart surgery	0 = not supporting healthcare differentiation in favour of the healthy person (slider scores 50 – 100)
		50	Both persons should pay the same copayment for their heart surgery	

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100	The person who doesn't smoke/isn't obese should pay a higher copayment for their heart surgery	1 = supporting healthcare differentiation in favour of the healthy person (slider scores of 0 – 49)
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### 3.3.2 Social Orientation Value Slider

The primary items can determine the social orientation (altruistic, prosocial, individualistic or competitive). This is determined by computing the mean of the money allocated to participants themselves ( $\bar{A}_s$ ) as well as the mean of money allocated to the other ( $\bar{A}_o$ ). Then, 50 is subtracted from each of mean and lastly the inverse tangent of the ratio between these means is calculated which results in an index of a person's social value orientation (Murphy et al., 2011).

The following equation is used to calculate the social value orientation:

$$\text{Social Value Orientation} = \arctan \frac{(\bar{A}_o - 50)}{(\bar{A}_s - 50)}$$

FIGURE 1: POSITION OF THE SIX PRIMARY ITEMS IN THE SELF/OTHER ALLOCATION PLANE FROM THE SLIDER MEASUREMENT. FROM MURPHY ET AL. (2011)

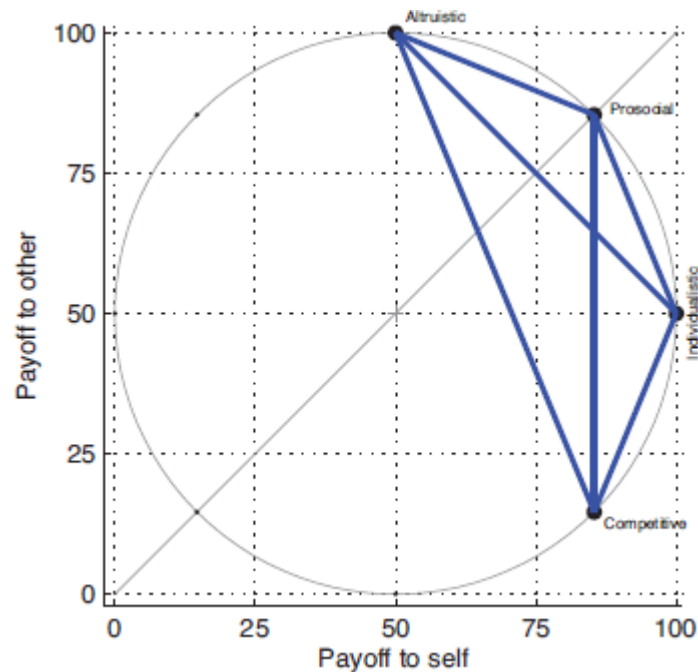


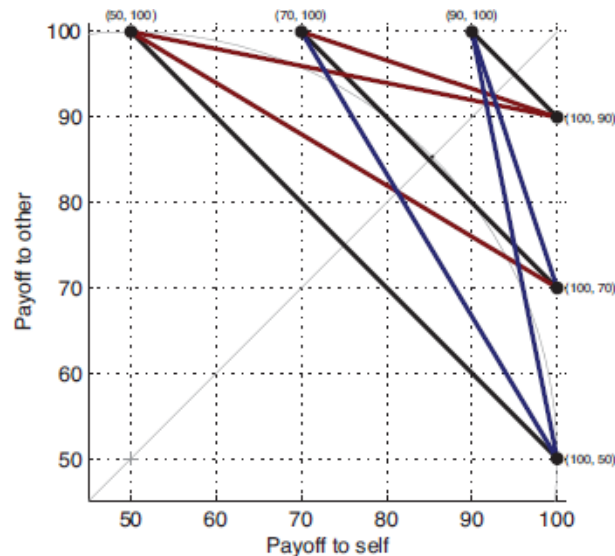
Figure 1 shows how the four common social value orientations are connected to the six primary items and table 2 show the boundaries of the four social value orientations which are used to determine the social value orientation of the participants.

TABLE 2: SOCIAL VALUE ORIENTATION DETERMINATION BASED ON MURPHY ET AL. (2011)

Type of social value orientation	Angle
Altruism	Greater than $57.15^\circ$
Prosocial	Between $22.45^\circ$ and $57.15^\circ$
Individualistic	Between $-12.04^\circ$ and $22.45^\circ$
Competitive	Less than $-12.04^\circ$

The secondary items can determine whether the individual prefers joint maximization or inequality aversion if the individual has a pro-social social value orientation (Murphy, et al. 2011). The items are situated in the prosocial area and the range is between 50 and 100 units which is the same as among the six primary items. In contrast with the primary items, the secondary items are on a diagonal line.

FIGURE 2: LOCATION OF THE NINE SECONDARY ITEMS OF THE SLIDER MEASUREMENT IN THE SELF/OTHER ALLOCATION PLAN. FROM MURPHY ET AL. (2011)



To determine whether a pro-social participant is inequality averse or prefers joint maximization, the Inequality Aversion Index is calculated (Ackermann and Murphy, 2012).. A detailed explanation of how this index is calculated can be found in Appendix B. When the IA-index is closer to 0, the participant is more inequality averse and when the IA-index is closer 1, the participant favours joint maximization.

### 3.3.2 Independent variables

This experiment contains several independent variables. The first independent variable is the assignment of participants to the lifetime healthcare costs perspective group or the annual healthcare costs perspective group. Another independent variable is the setting in which the participant indicated their level of support for differentiation. Finally, the three forms of differentiation are included as an independent variable. The coding of the independent variables can be found in table 3.

TABLE 3: CODING OF THE INDEPENDENT VARIABLES

Variable	Coding
Group assignment	0 = annual healthcare cost perspective group 1 = lifetime healthcare cost perspective group
Setting	0 = smoking versus not smoking 1 = obesity versus normal weight
Differentiation type	1 = insurance premium discount 2 = waitlist ordering 3 = copayment.

### 3.3.3 Explanatory variables

Additionally, several explanatory variables are included to test the hypothesis of self-interest and the role of individual health. First off, the literature shows that smokers are less likely to support differentiation based on smoking behaviour, so the smoking behaviour of the participants is included as an explanatory variable. Furthermore, the study of Traina et al. (2019) shows that the perception of the respondent's own health affects the solidarity preferences. Therefore, this variable

is included in the model. Exercise is included in the model as well, since the study of Bonnie et al. (2010) suggests that participants who regularly engage in exercise show less solidarity. BMI is included in the model, because the study of Diederich et al. (2014) reports that participants with a higher BMI support co-payments for unhealthy lifestyle behaviours which are not directly connected to body weight. Finally, alcohol consumption is included, since the paper of Miraldo et al. (2014) shows that participants who consume more alcohol show more solidarity towards

The coding of the explanatory variables can be found in table 4.

TABLE 4: CODING OF THE EXPLANATORY VARIABLES

Variable	Coding	Based on
Smoking status	1 = Non-smoker 2 = Former smoker 3 = Smoking occasionally 4 = Daily smoker	Current smoker distinction based on definition of VZinfo.nl (2025b).
Perception of health	1 = Excellent 2 = Very good 3 = Good 4 = Fair 5 = Poor.	SF-12 questionnaire from Ware et al. (1996)
Exercise	1 = Meeting both guidelines 2 = Meeting the moderate to intense physical activity only 3 = Meeting the muscle-and bone- strengthening activities guideline only 4 = Meeting neither guideline	Dutch exercise guidelines set by the Gezondheidsraad (2017)
BMI	1 = Underweight (BMI < 18.5) 2 = Normal weight (BMI: 18.5 - 25) 3 = Overweight (BMI: 25 – 30) 4 = Obese (BMI > 30)	Standard BMI cut off-points of the WHO for adults (Weir & Jan, 2025):
Alcohol consumption	1 = No alcohol consumption 2 = Between 1-7 drinks per week 3 = More than 7 drinks per week	Dutch guidelines for alcohol consumption set by the Gezondheidsraad (2015)

### 3.3.2 Control variables

Finally, there are various control variables included in the model. These variables are age, gender and level of education. Prior research shows that there are differences in solidarity preferences between males and females such as in the studies of Stegeman et al. (2014) and Diederich et al. (2014). In addition, age is included in the model, since prior studies found differences in solidarity preferences between different age groups such as in the study of Bonnie et al. (2010). Finally, the level of education is included, since Bonnie et al. (2010) show that support for differentiation can differ between people with different levels of education. The coding of the control variables can be found in table 5.

TABLE 5: CODING OF THE CONTROL VARIABLES

Variable	Coding
Gender	1 = Male
	2 = Female
	3 = Non-binary
	4 = Prefer not to say
Age	1 = 18-24
	2 = 25-34
	3 = 35-44
	4 = 45-54
	5 = 55-64
	6 = 65+
Level of education – based on the Dutch education system (Ministerie van Onderwijs, Cultuur en Wetenschap, 2025).	1 = Primary education
	2 = Vmbo and first three years of havo/vwo;
	3 = Havo, vwo, mbo 2-4
	4 = hbo- or wo-bachelor
	5 = hbo-, wo-master or doctorate

### 3.4 Statistical model

The statistical model that will be used to analyse the results of the surveys, is a logistic hierarchical model. This model is chosen, because the survey's respondents indicate their solidarity preferences within two settings and for three types of differentiation. This means that there is nesting of the data, because each participants gives their opinion on multiple scenarios for the same health risk factor (Hox et al., 2002). Therefore, a multilevel model is more suitable.

Within this model, solidarity preferences is the dependent variable, and the independent variables are the healthcare setting in which the participant indicates their solidarity preferences and the type of differentiation. The model also includes the variables of lifestyle behaviours and demographic features.

This leads to the following regression equation:

$$\begin{aligned} & \text{logit} \left( P(\text{Solidarity preference}_{ij} = 1) \right) \\ &= \gamma_{00} + u_{00} + (\gamma_{10} + u_{10}(\text{Setting})) + (\gamma_{20} + u_{20}(\text{Differentiation type})) \\ &+ \beta_1(\text{Group}) + \beta_2(\text{Health behaviour}) + \beta_3(\text{Demographic variables}) \\ &+ \beta_4(\text{Social Value Orientation}) + e_{ij} \end{aligned}$$

Where:

- $P(\text{Solidarity preference}_{ij} = 1)$  = Chance that the participant  $j$  supports healthcare differentiation in scenario  $i$ .
- $\text{Setting}_{ij}$  = variable indicating which health care risk factor is being evaluated, by participant  $j$  in scenario  $i$ . Since this variable varies on the within participants level, a random slope ( $u_{10}$ ) and intercept ( $\gamma_{10}$ ) are added.
- $\text{Differentiation type}_{ij}$  = variable indicating the differentiation forms by participant  $j$  in scenario  $i$ . Since this variable varies on the within participants level, a random slope, represented by ( $u_{20}$ ) and a random intercept, represented by ( $\gamma_{20}$ ) are added.

- *Lifestyle behaviour* $_{ij}$  = Lifestyle behaviour of participant  $j$  is determined by the smoking habits, perception of health, exercise, BMI category and alcohol consumption of participant  $j$
- *Demographic features* $_{ij}$  = demographic variable of participant  $j$ . Demographic variables consist of gender, age category, and level of education.
- $e_{ij}$  = error term

## 4 Results

### 4.1 Descriptive statistics

In total, 236 participants completed the experiment. Both groups consist of 118 participants. The demographic statistics can be found in the table below.

TABLE 6: DEMOGRAPHIC STATISTICS

Variable		Total Sample		Lifetime Healthcare Cost group		Annual Healthcare Cost group	
		Amount	Percentage	Amount	Percentage	Amount	Percentage
Gender	Male	84	35.6	42	35.6	42	35.6
	Female	150	63.6	76	64.4	74	62.7
	Non-binary	1	0.4	0	0.0	1	0.8
	Prefer not to say	1	0.4	0	0.0	1	0.8
Age	18–24	104	44.1	53	44.9	51	43.2
	25–34	49	20.8	21	17.8	28	23.7
	35–44	16	6.8	10	8.5	6	5.1
	45–54	17	7.2	9	7.6	8	6.8
	55–64	16	6.8	9	7.6	7	5.9
	65+	3	1.3	2	1.7	1	0.8
	Missing	31	13.1	14	11.9	17	14.4
Level of education	Primary education	1	0.4	1	0.8	0	0.0
	Vmbo and first three years of havo/vwo	6	2.5	1	0.8	5	4.2
	Havo, vwo, mbo 2-4	35	14.8	20	16.9	15	12.7
	Hbo- or wo-bachelor	116	49.2	56	47.5	60	50.8
	Hbo-, wo-master or doctorate	78	33.1	40	33.9	38	32.2
Daily smoker	12	5.1	6	5.1	6	5.1	

Variable		Total Sample		Lifetime Healthcare Cost group		Annual Healthcare Cost group	
		Amount	Percentage	Amount	Percentage	Amount	Percentage
Smoking status	Occasional smoker	18	7.6	10	8.5	8	6.8
	Former smoker	32	13.6	20	16.9	12	10.2
	Non-smoker	174	73.7	82	69.5	92	78.0
Perception of health	Excellent	38	16.1	13	11.0	25	21.2
	Very good	94	39.8	52	44.1	42	35.6
	Good	96	40.7	49	41.5	47	39.8
	Fair	8	3.4	4	3.4	4	3.4
Meeting exercise guidelines	Meets both guidelines	105	44.5	49	41.5	56	47.5
	Meets moderate to intense physical activity only	37	15.7	22	18.6	15	12.7
	Meets muscle- and bone strengthening activities guideline only	36	15.3	13	11.0	23	19.5
	Meets neither guideline	28	11.9	20	16.9	8	6.8
	Missing	30	12.7	14	11.9	16	13.6
BMI category	Underweight	4	1.7	4	3.4	0	0.0
	Normal weight	140	59.3	67	56.8	73	61.9
	Overweight	43	18.2	22	18.6	21	17.8
	Obese	15	6.4	9	7.6	6	5.1
	Missing	34	14.4	16	13.6	18	15.3
Alcohol consumption	Non-drinker	77	32.6	40	33.9	37	31.4
	Between 1 and 7 drinks per week	132	55.9	64	54.2	68	57.6
	More than 7 drinks per week	27	11.4	14	11.9	13	11.0
	Individualistic	38	16.1	17	14.4	21	17.8

Variable		Total Sample		Lifetime Healthcare Cost group		Annual Healthcare Cost group	
		Amount	Percentage	Amount	Percentage	Amount	Percentage
Social Value Orientation	Prosocial - Inequality Averse	162	68.6	83	70.3	79	66.9
	Prosocial - Joint Gain Maximizing	36	15.3	18	15.3	18	15.3

FIGURE 3: MEAN SOLIDARITY PREFERENCES FOR EACH DIFFERENTIATION TYPE PER GROUP

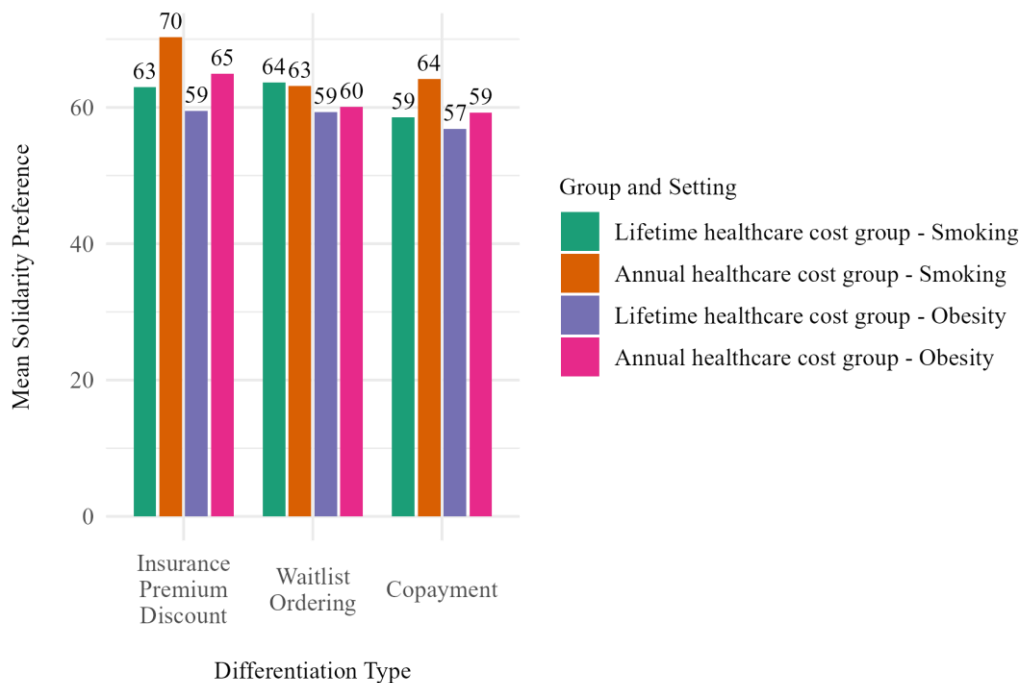


Figure 3 presents the mean scores of the solidarity preferences for each differentiation type per setting for both groups. The scores of co-payments were reversed-coded (*i.e.*  $100 - \text{original slider score}$ ). This adjustment was necessary since this differentiation type is negatively phrased whereas the other differentiation types were positively phrased. By reversing these scores, all differentiation types are on the same scale where 0 represents differentiation in favour of the person who smokes/is obese, 50 represents neutrality and 100 is differentiation in favour of the non-smoker/person with a normal BMI.

This figure shows the following insights. Firstly, it shows that the mean support for all forms of differentiation in both settings in both groups is higher than 50. This means that there is overall

support for differentiation between the individual who smokes/is obese and the individual who neither smokes nor is obese. Secondly, the lifetime healthcare cost group, the participants supported waitlist ordering in the smoking setting the most and copayment in the obesity setting the least. The highest support in the annual cost group is for insurance premium discount in the smoking setting and the lowest support is for co-payment in the obesity setting.

## 4.2 Data imputation

Due to a technical error in Qualtrics, the variables *Age*, *Exercise* and *BMI* are missing for the first 30 participants. Since this data is Missing at Random, single imputation was used to replace the missing values in the analyses (Donders et al., 2006). Although multiple imputation provides more reliable results for handling missing data, single imputation was used in this analysis due to computational constraints (Donders et al., 2006).

The imputation was carried out with the *mice* package in RStudio, and it was done the following way. Predictive mean matching was chosen as the imputation method given that the missing values are all numeric and this method is regarded as an overall good imputation method (Buuren & Groothuis-Oudshoorn, 2011). Secondly, the imputation was done per group (i.e. lifetime healthcare cost group and annual healthcare cost group) to account for the treatment effect, and all other variables were included as predictors in the imputation process to obtain reliable values (Buuren & Groothuis-Oudshoorn, 2011). For the single imputation, 5 iterations were used.

To test the robustness of the model using imputed data, a logistic regression analysis was conducted using only participants with complete cases as a sensitivity analysis. The results of this analysis can be found in appendix C. Most predictors are consistent with the regression results with data imputation, but some predictors yield different results. For example, the result for the BMI category Overweight is significant at the 5% significance level and the odds ratio is larger in the complete case model. Furthermore, the result for waitlist ordering is only significant in the model with data imputation whereas the result for non-drinkers is only significant in the complete case model. Lastly, the results for the age categories show stronger effects with higher significance levels in the complete case model.

### **4.3 Regression assumptions**

To run the logistic regression, several assumptions were tested. These assumptions consist of linearity in the logit of continuous variables, no influential outliers and the absence of multicollinearity (Stoltzfus, 2011). The results of the tests and the plots can be found in appendix D. The linearity assumption is met, since the model does not contain continuous variables, but only categorical variables. Additionally, the presence of outliers is detected via Pearson and deviance residuals. An observation can be considered as an outlier when the Pearson and deviance residual is lower than -3 or higher than 3 (Ahmad, 2011). All Pearson and deviance residuals lie within the range of -3 and 3, meaning that no outliers are present. Finally, the Variance Inflation Factor is used to detect multicollinearity. A value of 5 or higher indicates that multicollinearity is present (Yu et al., 2015). No variable has a VIF higher than 5 which means that multicollinearity is not present.

### **4.4 Goodness of fit**

The goodness of fit of the model is determined by the likelihood ratio test. The likelihood ratio test is suitable for comparing a more complex model to the simpler model (Lewis et al., 2011). In this test, a model with a random slope for setting, a model with a random slope for the differentiation type, and a model with random slopes for both the setting and the differentiation type are compared to the model with only a random intercept. The results of this test can be found in Appendix E. The results show that log likelihood is lowest for the model which includes a random slope for the differentiation type and the setting.

Furthermore, the intraclass correlation was calculated. The intraclass correlation is defined as the proportion of the variance explained by the grouping factor (Wu et al., 2012). The formula used to calculate the intraclass correlation can be found in Appendix E. The intraclass correlation is 0.78, indicating that 78% in the log-odds of supporting healthcare differentiation is attributable to individual differences between participants.

## 4.5 Regression results

In table 7, the results of the binary mixed effect regression can be found.

TABLE 7: LOGISTIC REGRESSION RESULTS

Variable	Odds Ratio	SE	95% CI (Lower)	95% CI (Upper)
Intercept	7.075***	0.759	1.597	31.346
<i>Group</i>				
Lifetime Healthcare cost group	0.693	0.407	0.312	1.540
<i>Setting</i>				
Smoking	3.27***	0.258	1.973	5.419
<i>Differentiation type</i>				
Copayment	0.337***	0.330	0.176	0.643
Waitlist ordering	0.414**	0.368	0.201	0.851
<i>Social Value Orientation</i>				
Individualistic	0.652	0.512	0.239	1.777
Joint Gain Maximizing	0.951	0.506	0.353	2.562
<i>Smoking Status</i>				
Current smoker	0.016***	1.071	0.002	0.129
Occasional smoker	0.118***	0.764	0.026	0.530
Former smoker	0.292**	0.600	0.090	0.947
<i>Perception of Health</i>				
Excellent	1.762	0.623	0.520	5.971
Very Good	2.047	0.488	0.786	5.332
Fair	0.411	1.096	0.048	3.521
<i>Alcohol Consumption</i>				
Non drinker	0.565	0.453	0.232	1.373
More than 7 drinks per week	0.298*	0.704	0.075	1.185
<i>Exercise</i>				

Variable	Odds Ratio	SE	95% CI (Lower)	95% CI (Upper)
Meeting Muscle-Bone exercise guideline only	0.894	0.504	0.333	2.398
Meeting moderate to intense exercise guideline only	0.668	0.564	0.221	2.016
Meeting neither exercise guidelines	0.48	0.656	0.133	1.738
<i>BMI Category</i>				
Underweight	0.33	0.899	0.057	1.926
Overweight	1.065	0.460	0.432	2.623
Obese	0.976	0.846	0.186	5.122
<i>Gender</i>				
Female	0.337**	0.431	0.145	0.784
Non-binary	0.91	3.013	0.002	334.135
Prefer not to say	0.086	2.917	0.000	26.161
<i>Age group</i>				
25-34	0.449*	0.480	0.175	1.152
35-44	0.332	0.755	0.076	1.457
45-54	0.179**	0.833	0.035	0.917
55-64	0.107**	0.904	0.018	0.628
65+	2.074	1.699	0.074	57.931
<i>Education Level</i>				
Primary education	0.658	2.634	0.004	115.015
Vmbo and first three years of havo/vwo	0.144	1.317	0.011	1.906
Havo, vwo, mbo 2-4	1.246	0.573	0.405	3.833
hbo-, wo-master or doctorate	1.054	0.427	0.456	2.434

\*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1

#### 4.6 Hypothesis 1: Difference in cost framing

The first hypothesis states that (pro-social) participants in the lifetime perspective healthcare cost group show more solidarity than the (pro-social) participants in the annual healthcare cost group. To check whether the participants understood the difference in healthcare costs, they were

presented with a check-up question. The same regression was run in which only the observations of the setting in which the participants answered the control question correctly were included for testing this hypothesis. Table 8 shows how many observations are included in this regression.

TABLE 8: NUMBER OF PARTICIPANTS INCLUDED IN REGRESSION FOR HYPOTHESIS 1

	Included		Not included	
	Lifetime healthcare cost group n (%)	Annual healthcare cost group n (%)	Lifetime healthcare cost group n (%)	Annual healthcare cost group n (%)
Smoking	89 (75.4%)	116 (98.3%)	29 (24.6%)	2 (1.7%)
Obesity	73 (61.9%)	116 (98.3%)	45 (38.1%)	2 (1.7%)

The results for the group effect of this regression are shown in table 9. They indicate that participants in the lifetime healthcare cost perspective group are less likely to support healthcare differentiation compared to those in the annual healthcare cost perspective group (OR = 0.59, CI = 0.187; 1.861). However, this effect is not statistically significant, and the confidence intervals are wide and include 1. This suggests that this effect could be due to chance.

TABLE 9: REGRESSION RESULTS GROUP EFFECT OF PARTICIPANTS WHO ANSWERED CONTROL QUESTION CORRECTLY

Variable	Odds Ratio	SE	95% CI (Lower)	95% CI (Upper)
Lifetime healthcare cost perspective	0.59	0.586	0.187	1.861

\*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1

#### 4.6.1 Interaction between setting and cost frame

To see whether the solidarity preferences differ between the groups for a specific health risk factor, another regression was run with an interaction term between *Group* and *Setting*. This leads to the following regression equation:

$$\begin{aligned} & \text{logit} \left( P(\text{Solidarity preference}_{ij} = 1) \right) \\ &= \gamma_{00} + u_{00} + \beta_1(\text{Setting}) + \beta_2(\text{Differentiation type}) + \beta_3(\text{Group}) \\ &+ \beta_4(\text{Setting} \times \text{Group}) + \beta_5(\text{Health behaviour}) + \beta_6(\text{Demographic variables}) \\ &+ \beta_7(\text{Social Value Orientation}) + e_{ij} \end{aligned}$$

Afterwards, a pairwise comparison is conducted. These results can be found in table 10. The results show that participants in the annual healthcare cost perspective in both settings are more likely to support healthcare differentiation. However, these results are not significant, and the confidence intervals are wide and include 1.

TABLE 10: PAIRWISE GROUP COMPARISONS WITHIN SETTING

Setting	Group Comparison	Odds Ratio	SE	95% CI (Lower)	95% CI (Upper)
Obesity	Annual healthcare cost perspective vs.	1.157	0.394	0.593	2.254
	Lifetime healthcare cost perspective				
Smoking	Annual healthcare cost perspective vs.	1.221	0.401	0.641	2.324
	Lifetime healthcare cost perspective				

\*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1

#### 4.6.2 Interaction between cost frame and Pro-Social Social Value Orientation

Furthermore, a regression including an interaction between *Group* and *Social Value Orientation* was run to test see whether solidarity preferences among pro-social individuals (Inequality Averse and Joint Maximizing) differ between the two groups. This leads to the following regression equation:

$$\begin{aligned}
& \text{logit} \left( P(\text{Solidarity preference}_{ij} = 1) \right) \\
& = \gamma_{00} + u_{00} + \beta_1(\text{Setting}) + \beta_2(\text{Differentiation type}) + \beta_3(\text{Group}) \\
& + \beta_4(\text{Group} \times \text{Social Value Orientation}) + \beta_5(\text{Health behaviour}) \\
& + \beta_6(\text{Demographic variables}) + \beta_7(\text{Social Value Orientation}) + e_{ij}
\end{aligned}$$

Then, a pairwise comparison was conducted. These results can be found in table 11. The results suggest that inequality averse participants in the annual healthcare cost perspective group are more likely to support healthcare differentiation than those with the similar social value orientation in the lifetime healthcare cost perspective group (OR = 1.221, CI = 0.530; 2.815). In addition, joint maximizing participants in the annual healthcare cost group are less likely to show support healthcare differentiation than their counterparts in the lifetime healthcare cost group (OR = 0.517, CI = 0.255; 1.048). However, both effects are not significant and the confidence interval for the comparison between inequality averse participants include 1.

TABLE 11: PAIRWISE COMPARISON OF SOCIAL VALUE ORIENTATION PER GROUP

Social Value Orientation	Contrast	Odds Ratio	SE	95% CI (Lower)	95% CI (Upper)
Prosocial / Inequality Averse	Annual Healthcare Cost Group / Lifetime Healthcare Cost Group	1.221	0.426	0.530	2.815
Prosocial / Joint Gain Maximizing	Annual Healthcare Cost Group / Lifetime Healthcare Cost Group	0.517	0.361	0.255	1.048

\*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1

#### 4.6.3 Disadvantageous Inequity aversion versus advantageous inequity aversion

To discover whether the support for differentiation of inequality averse participants is driven by disadvantageous inequity aversion or by advantageous inequity aversion, an interaction term is created between *Social Value Orientation*, *Group* and *Health score*.

The variable *Health score* is created in the following way. Firstly, binary variables of the health variables were created which are coded as 0 = engaging in unhealthy behaviour and 1 = engaging in healthy behaviour. The recoding of the variables is displayed in table 12.

TABLE 12: RECODING OF HEALTH VARIABLES

Variable	Binary variable
Perception of health	0 = poor, fair, 1 = good, very good and excellent
Smoking status	0 = daily smoker, occasional smoker 1 = former smoker, non-smoker
Exercise	0 = meeting one or neither guideline 1 = meeting both guidelines
BMI	0 = BMI above 25 1 = BMI below 25
Alcohol consumption	0 = Between 1-7 drinks per, more than 7 drinks per week 1 = Non-drinker

Afterwards, these binary variables were combined into a numerical variable which is the sum of the healthy behaviours. Then it was determined whether participants engage in two or less health behaviours or in three or more health behaviours. Lastly, this variable is included as an interaction term with *Group* and *Social Value Orientation*. This leads to the following equation:

$$\begin{aligned}
 & \text{logit} \left( P(\text{Solidarity preference}_{ij} = 1) \right) \\
 &= \gamma_{00} + u_{00} + \beta_1(\text{Setting}) + \beta_2(\text{Differentiation type}) + \beta_3(\text{Group}) \\
 &+ \beta_4(\text{Health behaviour}) + \beta_5(\text{Social Value Orientation}) \\
 &+ \beta_6(\text{Health behaviour score} \times \text{Social Value Orientation} \times \text{Group}) \\
 &+ \beta_7(\text{Demographic variables}) + e_{ij}
 \end{aligned}$$

TABLE 13: PAIRWISE COMPARISON OF HEALTH BEHAVIOUR FOR INEQUALITY AVERSE PARTICIPANTS (PER GROUP)

Group	Contrast	Odds Ratio	SE	95% CI (Lower)	95% CI (Upper)
Annual Healthcare Cost Group	2 or fewer vs. 3 or more Health Behaviours	0.859	0.600	0.265	2.784
Lifetime Healthcare Cost Group	2 or fewer vs. 3 or more Health Behaviours	0.776	0.633	0.224	2.682

Table 13 presents pairwise comparisons within each cost frame between inequality-averse participants engaging in two or fewer versus three or more health behaviours. These results suggest that the inequality averse participants in the annual cost group who engage in two or less health behaviours are less likely to support healthcare differentiation than participants with a similar social value orientation in the same group (OR = 0.859, CI = 0.265; 2.784). However, these results are not significant, and the confidence intervals are wide and include 1.

Furthermore, the inequality averse participants in the lifetime healthcare cost group who engage in 2 or less health behaviours are less likely to support healthcare differentiation in comparison with inequality averse participants in the lifetime healthcare cost group who engage in 3 or more health behaviours (OR = 0.776, CI = 0.224; 2.682). However, these results are not statistically significant, and the confidence intervals are wide and include 1 as well.

## 4.7 Hypothesis 2: Individual health and self-interest

### 4.7.1 Individual health

The second hypothesis states that participants who engage in unhealthy behaviours show more solidarity than participants who don't. The regression results show that there is a significant effect at the 1% significance level for current smokers (OR = 0.016, CI = 0.002; 0.129) and for occasional smokers (OR = 0.118, CI = 0.026; 0.530). Additionally, a significant effect at the 5% significance level is found for former smokers (OR = 0.292, CI = 0.090; 0.947). These results indicate that current smokers, former smokers and occasional smokers are less likely to support healthcare differentiation than non-smokers.

Furthermore, the regression results of table 7 show that participants who consider their health as very good or excellent are more likely to support healthcare differentiation in comparison with

participants who consider their health as good (OR = 1.762, CI = 0.520; 5.971 and OR = 2.047, CI = 0.786; 5.332). Participants who consider their health as fair are less likely to support healthcare differentiation (OR = 0.411, CI = 0.048; 3.521). The regression results also show that participants who meet one or neither exercise guidelines are less likely to support healthcare differentiation in comparison with participants who meet the guidelines, but these results are not significant as well.

The participants who are in the BMI category underweight are less in favour of healthcare differentiation than participants who have a higher BMI (OR = 0.33, CI = 0.057; 1.926). Participants whose BMI is in the overweight category show more support for healthcare differentiation than participants whose BMI is in the normal weight or obese category (OR = 1.065, CI = 0.432; 2.623). However, these effects are not significant. Finally, a marginal significant effect is found that participants who consume more than 7 drinks per week are less likely to support healthcare differentiation than people who consume between 1-7 drinks per week (OR = 0.298, CI = 0.075; 1.185).

#### 4.7.2 Interaction smoking status, BMI and setting

To investigate if smokers show more solidarity in the smoking setting, an interaction term is added to the regression between *Smoking status* and *Setting*. The results can be found in table 14 below. The results show significant effects for daily smokers being less in favour of healthcare differentiation in the smoking setting (OR = 0.06; CI = 0.012; 0.287). Additionally, occasional smokers disfavour healthcare differentiation based on smoking status (OR = 0.241, CI = 0.086; 0.675). Finally, former smokers are less in favour of healthcare differentiation in the smoking setting as well (OR = 0.464, CI = 0.206; 1.049).

TABLE 14: INTERACTION OF SMOKING STATUS AND SETTING

Variable	Odds Ratio	SE	95% CI (Lower)	95% CI (Upper)
Smoking setting × Daily smoker	0.06***	0.801	0.012	0.287
Smoking setting × Occasional smoker	0.241***	0.525	0.086	0.675
Smoking setting × Former smoker	0.464*	0.416	0.206	1.049

\*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1

Then, an interaction term between *Setting* and *BMI category* is added to the regression to investigate if participants who have a BMI larger than 25 show more solidarity in the obesity setting than participants who have a BMI smaller than 25. The results can be found in table 15 below. The results show that participants with a BMI > 25 show more solidarity than participants with a BMI < 25, but this effect is not significant.

TABLE 15: OBESITY SETTING × BMI ABOVE 25

Variable	Odds Ratio	SE	95% CI (Lower)	95% CI (Upper)
Obesity setting × BMI > 25	0.902	0.332	0.47	1.73

\*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1

#### 4.7.3 Solidarity preferences of individuals with an Individualistic Social Value Orientation

To test whether the solidarity preferences of participants with an individualistic Social Value Orientation align with their own health behaviours, an interaction term between *Social Value Orientation* and *Health behaviour score* is included in the regression. For *Health behaviour score*, the same distinction is used as before. Individualistic participants will not support healthcare differentiation since they will be worse off when they engage in two or less health behaviours. Individualistic participants who engage in 3 or more health behaviours will support healthcare differentiation, because they can benefit from it. This leads to the following regression equation:

$$\begin{aligned}
 & \text{logit} \left( P(\text{Solidarity preference}_{ij} = 1) \right) \\
 &= \gamma_{00} + u_{00} + (\gamma_{10} + u_{10}(\text{Setting})) + (\gamma_{20} + u_{20}(\text{Differentiation type})) \\
 &+ \beta_1(\text{Group}) + \beta_2(\text{Health behaviour}) + \beta_3(\text{Social Value Orientation}) \\
 &+ \beta_4(\text{Health behaviour score} \times \text{Social Value Orientation}) \\
 &+ \beta_5(\text{Demographic variables}) + e_{ij}
 \end{aligned}$$

TABLE 16: INTERACTION WITH INDIVIDUALISTIC SOCIAL VALUE ORIENTATION AND INDIVIDUAL HEALTH

Variable	Odds Ratio	SE	95% CI (Lower)	95% CI (Upper)
Individualistic × engaging in 2 or less health behaviours	0.645	0.876	0.116	3.591
Individualistic × engaging in 3 or more health behaviours	0.732	0.359	0.362	1.480

\*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1

Table 16 shows the results of the social value orientation as a moderator for the health behaviour. The results show that participants with an individualistic social value orientation who engage in 2 or less health behaviours are less likely to support healthcare differentiation in comparison with the individualistic participants who engage in 3 or more health behaviours. However, these results are not significant, and the confidence intervals are wide and include 1. Consequently, it cannot be said with certainty whether the solidarity preference differ between the health behaviours of individuals with an individualistic social value orientation.

#### **4.8 Hypothesis 3: Obesity versus smoking and positive versus negative healthcare differentiation types**

Hypothesis 3a states that participants show more solidarity towards people who are obese in comparison with people who smoke. The regression results confirm this hypothesis by showing that being in the smoking setting has a significant effect at the significance level of 1% (OR = 3.27, CI = 1.973; 5.419). This suggests that participants are more supportive of healthcare differentiation based on smoking than on obesity.

In addition, hypothesis 3b states that people prefer positive over negative healthcare differentiation types. The regression results show that people vary in their solidarity preferences for different differentiation types. A significant effect is found at the 1% significance level that participants are less likely to support co-payments in comparison with insurance premium discount (OR = 0.337; CI = 0.176; 0.643). Furthermore, a significant effect at the 5% significance level is found for the waitlist ordering (OR = 0.414, CI = 0.201; 0.851) which shows that participants are less in favour of a higher placement on the waiting list than providing insurance premium discount

for someone who does not smoke/is not obese. Since the lowest support is found for the co-payment, hypothesis 3b is confirmed.

#### **4.9 Control variables**

Several control variables are included in the model. The results show a significant effect for differentiation at the 5% significance level for females (OR = 0.337, CI = 0.145; 0.784). This suggests that females are less in favour of differentiation in comparison with males. Furthermore, the results show significant effects for the age groups 25-34 at the 10% level (OR = 0.449, CI = 0.175; 1.152), 45-54 at the 5% significance level (OR = 0.179, CI = 0.035; 0.917) and 55-64 at the 5% significance level (OR = 0.107, CI = 0.018; 0.628). No significant effects are found for level of education.

## 5 Discussion

### 5.1 Key results

The goal of this thesis is to gain insights into the solidarity preferences of Dutch citizens towards lifestyle related diseases and whether this is influenced by receiving information about the lifetime or annual healthcare cost of smokers, people who are obese and non-smokers with a normal BMI. Within a vignette experimental study, the participants were asked to which extent they supported differentiation in healthcare based on lifestyle.

The results show that the participants who received information about the lifetime healthcare costs are less likely to support healthcare differentiation than the participants who received information about the annual costs. Moreover, the pairwise comparison shows that participants in the annual healthcare cost perspective group are more likely to support healthcare differentiation for both obesity and for smoking than the participants in the lifetime healthcare cost perspective group. However, these results are not significant. Consequently, it cannot be said with certainty that the participants in the lifetime healthcare cost show more solidarity.

Furthermore, inequality averse participants in the annual healthcare cost group show less solidarity than the inequality averse participants in the lifetime healthcare cost group. Additionally, joint maximizing participants in the lifetime healthcare cost group are more likely to support healthcare differentiation than joint maximizing in the annual healthcare cost group. Moreover, the inequality averse participants in both groups who engage in 2 or less health behaviours are less supportive of healthcare differentiation.

Then, it was determined to what extent the participants' solidarity preferences are influenced by their own health. The smoking status of the participants seems to significantly affect the solidarity preferences, since daily smokers, former smokers and occasional smokers are less supportive of healthcare differentiation than non-smokers. Additionally, a marginal significant effect was found that participants who consume more than 7 drinks per week are less likely to support healthcare differentiation in comparison with participants who consume between 1-7 drinks per week.

Moreover, insignificant effects were found for the health variables *Perception of health*, *Exercise* and *BMI*. Participants who consider their health as very good or excellent are more likely to support healthcare differentiation than participants who consider their health as fair. Participants who meet one or neither Dutch exercise guidelines are less likely to support healthcare

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differentiation as well. Lastly, participants whose BMI is in the underweight category are less likely to support healthcare differentiation whereas participants whose BMI is in the overweight category show more support for healthcare differentiation.

Afterwards, two regressions were run to investigate whether smokers show more solidarity to smokers and if people whose BMI is above 25 show more solidarity in the obesity setting. The regression with an interaction between *Smoking Status* and *Setting* reveals that daily smokers show the most solidarity in the smoking setting followed by occasional smokers and then by former smokers. This suggests that there is some in-group favouritism. Furthermore, a regression with an interaction between *BMI category (binary)* and *Setting* shows that there is a small interaction effect of showing more solidarity of participants with a BMI above 25 in the obesity setting, but this result is not significant. When the social value orientation is used as a moderator for the health factors, both individualistic participants who engage in 2 or less health behaviours and those who engage in 3 or more health behaviours are less likely to support healthcare differentiation.

Additionally, the results suggest that the participants are more in favour of healthcare differentiation based on the smoking status than for obesity. Moreover, insurance premium discount has generated the most support and co-payment the least indicating that participants favour rewarding individuals for engaging in healthy behaviour over penalising individuals who engage in unhealthy behaviour. Finally, female participants are less supportive of healthcare differentiation in comparison with males. Furthermore, older participants are less likely to support to healthcare differentiation in comparison with the age-group 18-24. No significant effects are found for the level of education.

## **5.2 Differences in healthcare costs perspectives**

### *5.2.1 Overall effect of lifetime versus annual cost perspectives*

The Dutch healthcare system can be considered a common resource problem in which the question arises of who extracts more resources. Within the lifetime healthcare cost perspective, the individuals who neither smoke nor are obese are taking more healthcare resources from the common pool whereas in the annual healthcare cost perspective, the individuals who smoke or are obese are taking more healthcare resources from the common pool.

The participants who are presented with the annual healthcare costs of smokers/people who are obese are more likely to favour healthcare differentiation in both settings. This result aligns with the literature on social dilemmas, which suggests people dislike the idea of players choosing their own interests at the expense of collective interests and punish free-riders once they are made aware of their presence (Fischbacher & Gächter, 2010). These participants could have disliked the idea of smokers/obese people using more healthcare resources and therefore supporting healthcare differentiation in favour of the healthy individual to punish smokers/people who are obese for extracting more resources.

However, this result is insignificant which means that it cannot be stated with confidence that there is an effect. The absence of a significant effect could be caused by the framing of the cost information. Table 8 shows that more participants who were presented with the lifetime healthcare cost of smokers/people who are obese selected the wrong answer for the control question(s) more often. As a result, the information of the lower healthcare cost frame was not well understood by these participants which makes it more difficult to establish whether the different cost frames influence the solidarity preferences.

### *5.2.2 Pro-Social Social Value Orientation*

The results show that joint maximizing participants in the annual healthcare cost group are less in favour of healthcare differentiation than the joint maximizing participants in the lifetime healthcare cost perspective. This shows that the joint maximizing participants in this healthcare cost group are acting in contrast with their Social Value Orientation, since supporting healthcare differentiation in this cost perspective is considered as the outcome with the highest joint benefits. This result is therefore not in line with the paper of Gärling (1999) who suggest that individuals with a pro-social Social Value Orientation are more likely to cooperate in social dilemmas and evaluate outcome in terms of collective rationality.

Additionally, the result that inequality averse participants in the annual healthcare cost perspective group are more supportive of healthcare differentiation than their counterparts in the lifetime healthcare cost perspective group aligns with the theory of Social Value Orientation and social dilemmas. Participants in the annual healthcare cost group could have disliked the idea of harvesting more/or harvesting less healthcare resources and would therefore support healthcare differentiation.

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Moreover, the insight of inequality averse participants in the annual healthcare cost perspective group who engage in 2 or less health behaviours are less likely to support healthcare differentiation suggests that there is a stronger aversion against disadvantageous outcomes amongst inequality averse participants in this group. This result aligns with the paper of Fehr and Schmidt (1999) who argue that individuals experience a stronger aversion against disadvantageous outcomes. Additionally, in the lifetime healthcare perspective group, inequality averse participants who engage in less health behaviours are less supportive of healthcare differentiation. This suggests there is stronger aversion against disadvantageous outcomes as well which aligns with the paper of Fehr and Schmidt (1999).

### **5.3 Influence of self-interest and individual health**

#### *5.3.1 Individual health behaviour*

Prior studies on healthcare differentiation indicate that solidarity preferences can be driven by individual health (Stegeman et al. 2014). Within this experiment, significant results are found for smoking status, suggesting that non-smokers are more supportive of differentiation than daily smokers. These results align with other studies on this topic such as Anderson et al. (2011), Miraldo et al. (2014) and Stegeman et al. (2014).

Moreover, smokers show in-favouritism whereas this is not the case for participants whose BMI is larger than 25. The result that smokers in the smoking setting are less likely to support healthcare differentiation is in accordance with the studies of Furnham et al. (2000) and Stegeman et al. (2014) who report that smokers show in-group favouritism. However, the absence of in-favouritism of participants with a higher BMI in the obesity setting is contrary to the result of Diederich et al. (2014) in which participants with a higher BMI are less supportive of healthcare differentiation based on body weight.

The participants who perceive their health as good or fair are less likely to support healthcare differentiation than participants who perceive their health as very good or excellent. This result aligns with the results of Traina et al. (2019) who show that participants who consider their health as poor are less supportive of copayment for lifestyle related diseases. However, these effects are not significant. In addition, participants who meet one or neither exercise guidelines are less supportive of healthcare differentiation. This result matches the results of the study of Bonnie et

al. (2010) who find in their study that participants who engage in exercise regularly show less solidarity towards lifestyle related diseases. However, these results are not significant as well.

Finally, participants whose BMI is in the underweight category show more solidarity in comparison to participants whose BMI is in the overweight or obese category. This result is in accordance with the findings of Diederich et al. (2014) in which participants with a higher BMI support co-payment for several unhealthy lifestyle behaviours. Participants who consume more than 7 drinks per week were less likely to support healthcare differentiation in comparison with participants who between 1-7 drinks per week. This result is in line with the study of Miraldo et al. (2014) in which participants who consume less alcohol were less supportive of the NHS covering the costs related to unhealthy diets.

### 5.3.2 *Individualistic Social Value Orientation*

When the Social Value Orientation of the participants is used as a moderator for how health behaviour influences the solidarity preferences, it is expected that participants with an individualistic Social Value Orientation will chose the outcome which aligns best with their own interests. The results show that individualistic participants who engage in 2 or less health behaviours are less likely to support healthcare differentiation. This insight demonstrates that these participants are choosing their own interests which corresponds with their social value orientation (Pletzer et al., 2018).

On the other hand, individualistic participants who engage in more 3 or more healthy behaviours are expected to support healthcare differentiation, since they can benefit from healthcare differentiation. However, the results show that these participants are less likely to support healthcare differentiation as well. Even though these participants have an individualistic social value orientation, they are showing solidarity towards individuals who smoke or are obese. This result is therefore in contrast with the literature on social value orientation, because participants did not maximize their own pay-off (Pletzer et al., 2018).

#### **5.4 Difference between smoking and obesity setting and positive versus negative differentiation types**

The participants in this experiment are more supportive of healthcare differentiation based on smoking status in comparison with being obese. The insight that participants show less solidarity towards smokers is in line with the results of the studies of Diederich et al. (2014) and Stegeman et al. (2014). The study of Stegeman et al. (2014) reports that the highest level of support is for differentiation based on the smoking status. Moreover, this result aligns with the study of Diederich et al. (2014) in which more than two thirds of the participants are supportive of co-payments for smokers whereas less than half supports co-payments for people with unhealthy diets and more than half does not support co-payments for people who do not engage in exercise. However, this result is in contrast with the study of Miraldo et al. (2014) in which participants were more supportive of the NHS covering healthcare costs related to smoking than for overeating and unhealthy diets.

Additionally, the solidarity preferences of the participants differ between the differentiation types. The highest support is found for the insurance premium discount and the lowest support is found for the co-payment. This result suggests that participants prefer to reward the person who does not smoke and has a normal BMI rather than punishing the person who smokes/is obese. This insight aligns with the study of Stegeman et al. (2014) who show that more participants supported a premium discount for the individuals who engage in positive health behaviour than a co-payment for the individuals who engage in negative health behaviour. Furthermore, this insight corresponds with the findings of the study of Schmidt (2013) in which participants favour providing an insurance premium rebate when the person has a normal BMI over surcharging a person who does not have a normal BMI.

#### **5.5 Demographic differences**

The study of Diederich et al. (2014) suggests that solidarity preferences are impacted by several demographic variables. Female participants in this experiment are less in favour of healthcare differentiation in comparison with males. This result is in line with other studies with this topic such as Bonnie et al. (2010), Diederich et al. (2014) and Stegeman et al (2014). Furthermore, older

participants are less supportive of healthcare differentiation in comparison with younger participants. This result is in line with the studies of Bonnie et al. (2010) and Martinussen (2022) which report that younger participants are more in favour of higher premiums/co-payments for lifestyle related diseases. No significant results are found for level of education which does not align with the study of Bonnie et al. (2010) who show that the higher educated participants are more supportive of healthcare differentiation.

## 5.6 Policy implications

It is expected that the healthcare costs in the Netherlands will double by 2050 compared to 2022 due to an aging population, advancement in medical technologies and change in the occurrence of diseases (van der Lucht et al., 2024). The Dutch healthcare system is built on solidarity, to which all citizens contribute regardless of their actual healthcare usage to ensure access to healthcare for each citizen (Bonnie et al., 2010). However, with lifestyle related diseases becoming more prevalent, the question arises to which extent own individual health behaviour should be taken into account in the allocation of healthcare resources.

The findings of this experiment show that there is overall support for healthcare differentiation especially for rewarding healthcare differentiation types. Several studies indicate that financial incentives could encourage individuals to adopt healthy behaviours (Adams et al., 2014; Lipman et al., 2024). This might be an effective method to reduce the healthcare costs of smoking and obesity related diseases.

Although healthcare differentiation can help stimulating healthy behaviour, the study of van Baal et al. (2008) states that the benefits gained from obesity and smoking prevention will not offset the rise in healthcare costs from other diseases. It is expected that the largest increase in healthcare costs is due to an aging population (van der Lucht et al., 2024). Effective obesity, and smoking prevention leads to a higher life expectancy which puts more pressure on the healthcare system (van Baal et al. 2008). Consequently, this is not a method to solve for the rise in healthcare costs in the long run (van Baal et al. 2008).

The results indicate that participants show more solidarity towards smokers and people with obesity when informed about the lifetime healthcare costs. This suggests that their solidarity preferences are affected by the lower lifetime costs of smokers/people who are obese. However, a large share of the participants in the lifetime healthcare perspective group did not answer the control

questions correctly which shows that there is a misconception when it comes to the difference in lifetime and annual healthcare costs. Resolving this misconception could result in another viewpoint in the debate to which extent the individual behaviour should play a role in the allocation of healthcare resources.

### **5.7 Limitations and directions for future research**

This study has some limitations. First off, a large share of the participants in the lifetime healthcare perspective cost group fail to answer the control question correctly, especially in the obesity setting. This indicates that the information presented to the participants of this group was not always clear. Consequently, this influences how the participants in this group perceived the information on the lower healthcare costs of smokers and people who are obese, and it influences how this difference in cost framing impacts the solidarity preferences of the participants in this group. This should be taken into account when interpreting the results of the group effect.

Furthermore, the participants in this experiment were mostly female, high-educated and between 18-35 years old. This sample is therefore not representative for the Dutch population. Thirdly, the health behaviours of the participants are based on the self-reported data which could introduce bias, because participants might be inclined to give the socially desired answer. In addition, the values for age and for exercise and BMI are missing for some participants. Even though data imputation was used to replace the missing data in the analyses, this should be taken into account when interpreting the effects of age, exercise and age on the solidarity preferences.

Finally, this experiment focuses on healthcare differentiation based on two unhealthy behaviours. However, there are other types of unhealthy behaviours which are associated to lifestyle related diseases such as consumption of high amounts of alcohol, sunbathing or frequent usage of a solarium (Diederich et al., 2014). Differentiation based on these behaviours are explored in other countries, but not in prior studies on healthcare differentiation in the Netherlands like Bonnie et al. (2010) and Stegeman et al. (2014). Future research on healthcare differentiation in the Netherlands could explore whether citizens support healthcare differentiation based on these behaviours.

## 6 Conclusion

The allocation of healthcare resources represents a social dilemma in which there is a trade-off between individual and collective interests. Within a social dilemma, individuals can have various preferences for the allocation of resources such as prioritizing their own interests, maximizing joint outcomes or an equal distribution of resources.

In this common pooled resource problem, it can on the one hand be argued that smokers and people who are obese subtract more resources, because the annual healthcare costs of these groups are higher than of people who are neither not obese nor smoke. On the other hand, it can be argued that people who are not obese and don't smoke extract more resources from because these people have higher healthcare costs in their lifetime.

The research question this thesis aims to answer is: 'what are the solidarity preferences of the Dutch citizens when it comes to lifestyle related diseases and is this affected by when provided with the lifetime or annual healthcare costs of smokers, obesity, and healthy individuals?'. To answer this research question, a vignette experiment was conducted in which participants were asked to indicate to which extent they supported three types of healthcare differentiation based on smoking status and obesity.

The participants in the lifetime healthcare cost perspective group show more solidarity towards smokers and people who are obese. Inequality averse participants were less in favour of healthcare differentiation which aligns with their Social Value Orientation whereas joint-maximizing participants acted against their Social Value Orientation. Moreover, the solidarity preferences of inequality averse participants in both the annual and lifetime healthcare cost group are driven by an aversion of disadvantageous outcomes.

The solidarity preferences are partially driven by a form of self-interest, since the smoking status of the participants is related to their level of support of healthcare differentiation. Additionally, participants who have an individualistic social value orientation and engage in less health behaviours are less supportive of healthcare differentiation. However, participants with an individualistic social value orientation who engage in more health behaviours are less supportive of healthcare differentiation as well.

Moreover, the results indicate that participants show more solidarity towards people who are obese than towards smokers. Furthermore, providing an insurance premium discount to the healthy

individual generated the most support. Finally, the female participants and older participants are less supportive of healthcare differentiation in comparison with younger and male participants.

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## 8 Appendices

### 8.1 Appendix A: Experiment

Thank you for taking part in this study for my Master thesis.

In my master thesis, I study the solidarity preferences of people towards genetic and lifestyle related diseases.

Within the Netherlands, citizens are obliged by law to have health insurance and everybody has access to affordable healthcare despite health and income. Currently, no distinction is made between diseases which are genetic and diseases which are lifestyle related.

The goal for this study is to gain insights into the views you have towards various forms of differentiation in healthcare for diseases which are related to unhealthy lifestyles in comparison with diseases which are genetic. The results will be used in my master's thesis.

The questionnaire contains three parts.

1. Within the first part, different scenarios will be described to which you can indicate to which extent you agree with making distinction between two people
2. In the second part, you will be asked to make decisions about allocating imaginary amounts of money between you and another person
3. In the final part, some questions about personal characteristics and your health situation will be asked.

Please note the following

- Please answer the questions truthfully. There are no right or wrong answers, the goal of the study is to explore your views
- Read the instructions carefully
- Your answers will be analysed anonymously
- The study will approximately take 5-10 minutes

Do you agree to participate in this study?

- Yes, I agree
- No, I don't agree

### 8.1.1 Scenarios

This part of the survey will ask you what your opinion is of certain forms of healthcare differentiation. 6 hypothetical scenarios will be presented to you; 3 scenarios are with respect to smoking versus non-smokers and the 3 scenarios are with respect to obesity versus normal weight. In each scenario, you can indicate to what extent you agree with a specific type of differentiation in healthcare by means of a slider.

Please note that there are no right or wrong answers. The goal of this study is to explore views on healthcare differentiation.

After this explanation, the participants are randomly assigned to either the lifetime healthcare costs group or the annual healthcare costs group. Within each group, the participants randomly receive first information about healthcare costs of smoking versus not smoking with normal BMI or obesity and non-smoking versus normal BMI and non-smoking.

TABLE 17: HEALTHCARE COSTS SMOKING VERSUS NOT SMOKING WITH NORMAL BMI

<b>Lifetime healthcare costs group</b>	<b>Annual healthcare costs group</b>
It is estimated that the healthcare costs in 2040 will rise till 174 billion euros. This twice the amount of the healthcare costs of 2015. This rise is partly caused by the increase in the Dutch population and the increasing aging population. Furthermore, the costs rise because of the usage of new medical technology and change in the diseases.	It is estimated that the healthcare costs in 2040 will rise till 174 billion euros. This twice the amount of the healthcare costs of 2015. This rise is partly caused by the increase in the Dutch population and the increasing aging population. Furthermore, the costs rise because of the usage of new medical technology and change in the diseases.
Research has shown that the <b>lifetime healthcare costs of people who smoke are lower than for non-smokers with a normal weight</b> . This difference arises, since smokers have a lower life expectancy. People who don't smoke have a higher chance to get other illnesses later in life which leads to high healthcare costs.	Research has shown that <b>the annual healthcare costs of people who smoke with a normal BMI are higher</b> than for non-smokers with a normal BMI. This difference arises, because smokers have a higher risk of getting cardiovascular diseases, certain types of cancers and lung diseases.

---

In 2024, 18.2% of the Dutch population of 18 years and older smoked. It is estimated that the number of smokers in 2040 will decline to 14% of the Dutch adults.	In 2024, 18.2% of the Dutch population of 18 years and older smoked. It is estimated that the number of smokers in 2040 will decline to 14% of the Dutch adults.
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Afterwards, the participants in each group are presented with a check-up question to test whether they read the information.

Check-up question – lifetime healthcare cost group:

Can you select which group has lower health care costs in their lifetime?

- Smokers with a normal BMI
- Non-smokers with a normal BMI

Check-up question – annual healthcare costs group:

Can you select which group has higher annual healthcare costs?

- Smokers with a normal BMI
- Non-smokers with a normal BMI

After the check-up question, the participants move on to the scenarios. The scenarios are presented in a random order and the slider is in all case first positioned at 50 (no differentiation between the individuals).

### Scenario 1: Healthcare premium discount

There are two people A and B. Person A smokes and person B does not smoke. Both persons are the same age and the same BMI.

Should person A or B receive a healthcare premium discount?

0 = Person A should receive a premium

50 = A and B should both pay the same amount

100 = Person B should receive a premium

---

0 50 100

### Scenario 2: Waitlist position

There are two patients, 1 and 2. Both are on the waitlist for the same heart surgery. Patient 1 smokes, and patient 2 doesn't smoke. Both patients have the same age, the same BMI. Both patients are equally sick.

Should patient 1 or 2 be placed higher on the waiting list?

0 = Patient 1 should be placed  
higher on the waiting list

50 = No distinction should be  
made between patient 1 and 2

100 = Patient 2 should be higher  
on the waiting list

---

0 50 100

### Scenario 3: Co-payments

There are two persons, X and Y. Both person have had the same heart surgery. Person X smokes and person Y doesn't smoke. Both have the same age and a normal BMI.

Should person X or y pay a higher co-payment for this surgery?

0 = Person X should  
pay a higher co-payment

50 = X and Y should both  
pay the same co-payment

100 = Person Y should  
pay a higher co-payment

---

0 50 100

TABLE 18: INFORMATION HEALTHCARE COSTS OBESITY AND NON-SMOKING VERSUS PEOPLE WITH NORMAL BMI WHO DON'T SMOKE

Lifetime healthcare costs group	Annual healthcare costs group
<p>It is estimated that the healthcare costs in 2040 will rise till 174 billion euros. This twice the amount of the healthcare costs of 2015. This rise is partly caused by the increase in the Dutch population and the increasing aging population. Furthermore, the costs rise because of the usage of new medical technology and change in the diseases.</p> <p>Research shows that the <b>lifetime healthcare costs of someone who is obese and doesn't smoke is lower</b> than of someone who has a normal BMI and doesn't smoke. This difference arises because obese people have a lower life expectancy. Obesity has several health risk like type 2 diabetes, certain cancers and cardio vascular diseases.</p> <p>In 2024, 15.7% of the Dutch population of 18 years and above was obese. It is estimated that the percentage of obese Dutch males will rise to 18.6% and the percentage of obese Dutch women will rise to 22% in 2040.</p>	<p>It is estimated that the healthcare costs in 2040 will rise till 174 billion euros. This twice the amount of the healthcare costs of 2015. This rise is partly caused by the increase in the Dutch population and the increasing aging population. Furthermore, the costs rise because of the usage of new medical technology and change in the diseases.</p> <p>Research shows that <b>the annual healthcare costs of someone who is obese and doesn't smoke is higher</b> than of someone who has a normal BMI and doesn't smoke. This difference arises because people who are obese have a higher risk of getting type 2 diabetes, certain cancers and cardio vascular diseases.</p> <p>In 2024, 15.7% of the Dutch population of 18 years and above was obese. It is estimated that the percentage of obese Dutch males will rise to 18.6% and the percentage of obese Dutch women will rise to 22% in 2040.</p>

Afterwards, the participants in each group are presented with a check-up question to test whether they read the information.

Check-up question – lifetime healthcare cost group:

Can you select which group has lower health care costs in their lifetime?

- People who are obese who don't smoke
- People with a normal BMI who don't smoke

Check-up question – annual healthcare costs group:

Can you select which group has higher annual healthcare costs?

- People who are obese who don't smoke

- People with a normal BMI who don't smoke

After the check-up question, the participants move on to the scenarios. The scenarios are presented in a random order and the slider is in all case first positioned at 50 (no differentiation between the individuals).

### Scenario 1: Healthcare premium discount

There are two people A and B. Person A is obese and person B has a normal BMI. Both persons are the same age and don't smoke.

Should person A or B receive a healthcare premium discount?

0 = Person A should  
receive a premium

50 = A and B should both pay  
the same amount

100 = Person B should  
receive a premium

---

0

50

100

### Scenario 2: Waitlist position

There are two patients, 1 and 2. Both are on the waitlist for the same heart surgery. Patient 1 is obese, and patient 2 has a normal BMI. Both patients have the same age and don't smoke. Both patients are equally sick.

Should patient 1 or 2 be placed higher on the waiting list?

0 = Patient 1 should be placed  
higher on the waiting list

50 = No distinction should be  
made between patient 1 and 2

100 = Patient 2 should be higher  
on the waiting list

---

0

50

100

---

### Scenario 3: Co-payments

There are two persons, X and Y. Both person have had the same heart surgery. Person X is obese and person Y has a normal BMI. Both have the same age and don't smoke.

Should person X or y pay a higher co-payment for this surgery?

0 = Person X should  
pay a higher co-payment

50 = X and Y should both  
pay the same co-payment

100 = Person Y should  
pay a higher co-payment

0

50

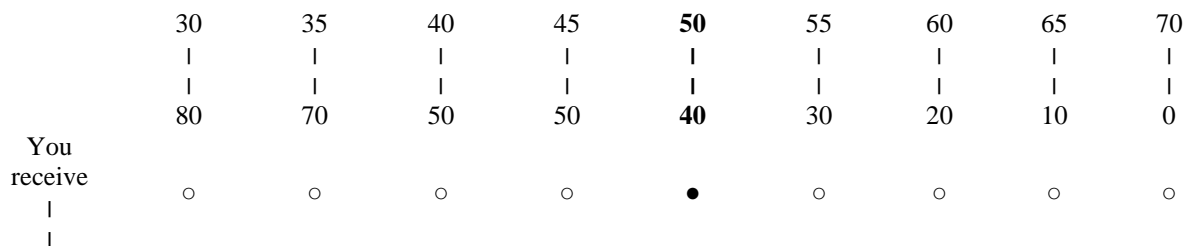
100

#### 8.1.2 Social value orientation slider

In this part of the study, you imagine you are partnered with a random person. This person is called **the other**. You and the other don't know each and you remain **anonymous**. All your choices are completely classified.

In this assignment, you will make a series of decisions about how you wish to allocate an imaginary amount of money between you and the other. You can select for each of the following questions which distribution you prefer by **selecting the button below the distribution**. You can only select one button per question.

Here you see an example. In this example, the person chose for the distribution in which the person gets 50 euros and the other receives 40 euros.



The other  
receives

There are no right or wrong answers in this task; it is about your personal preferences. If you made a decision, select your preferred distribution of the money by selecting the button below your choice. As you can see, your choices influence the amount of money you receive yourself as well as the amount of money the other receives. **All amounts are imaginary** but make your decisions for the distributions as if they were real amount of money.

Primary items

Here below you see 9 ways to distribute an imaginary amount of money between you and the other. The upper number is what you receive, and the number below is what the other receives.

Which distribution do you prefer? Select the button with your preferred distribution.

	85	85	85	85	85	85	85	85	85
	85	76	68	59	50	41	33	24	15
You receive									
The other receives									
	○	○	○	○	○	○	○	○	○

Here below you see 9 ways to distribute an imaginary amount of money between you and the other. The upper number is what you receive, and the number below is what the other receives.

Which distribution do you prefer? Select the button with your preferred distribution.

	85	87	89	91	93	94	96	98	100
	15	19	24	28	33	37	41	46	50
You receive									
	○	○	○	○	○	○	○	○	○

The other  
receives

Here below you see 9 ways to distribute an imaginary amount of money between you and the other.  
The upper number is what you receive, and the number below is what the other receives.

Which distribution do you prefer? Select the button with your preferred distribution.

	50	54	59	63	68	72	76	81	85
You receive	100	98	96	94	93	91	89	87	85
The other receives	○	○	○	○	○	○	○	○	○

Here below you see 9 ways to distribute an imaginary amount of money between you and the other.  
The upper number is what you receive, and the number below is what the other receives.

Which distribution do you prefer? Select the button with your preferred distribution.

	50	54	59	63	68	72	76	81	85
You receive	100	89	79	68	58	47	36	26	15
The other receives	○	○	○	○	○	○	○	○	○

Here below you see 9 ways to distribute an imaginary amount of money between you and the other.  
The upper number is what you receive, and the number below is what the other receives.

Which distribution do you prefer? Select the button with your preferred distribution.

	100	94	88	81	75	69	63	56	50
--	-----	----	----	----	----	----	----	----	----

	50	56	63	69	75	81	88	94	100
You receive									
The other receives	○	○	○	○	○	○	○	○	○

Here below you see 9 ways to distribute an imaginary amount of money between you and the other. The upper number is what you receive, and the number below is what the other receives.

Which distribution do you prefer? Select the button with your preferred distribution.

	100	98	96	94	93	91	89	87	85
	50	54	59	63	68	72	76	81	85
You receive									
The other receives	○	○	○	○	○	○	○	○	○

### Secondary items

Here below you see 9 ways to distribute an imaginary amount of money between you and the other. The upper number is what you receive, and the number below is what the other receives.

Which distribution do you prefer? Select the button with your preferred distribution.

	100	96	93	89	85	81	78	74	70
	50	56	63	69	75	81	88	94	100
You receive									
The other receives	○	○	○	○	○	○	○	○	○

Here below you see 9 ways to distribute an imaginary amount of money between you and the other. The upper number is what you receive, and the number below is what the other receives.

Which distribution do you prefer? Select the button with your preferred distribution.

	90	91	93	94	95	96	98	99	100
You receive	100	99	98	96	95	94	93	91	90
The other receives									
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Here below you see 9 ways to distribute an imaginary amount of money between you and the other. The upper number is what you receive, and the number below is what the other receives.

Which distribution do you prefer? Select the button with your preferred distribution.

	100	94	88	81	75	69	63	56	50
You receive	70	74	78	81	85	89	93	96	100
The other receives									
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Here below you see 9 ways to distribute an imaginary amount of money between you and the other. The upper number is what you receive, and the number below is what the other receives.

Which distribution do you prefer? Select the button with your preferred distribution.

	100	99	98	96	95	94	93	91	90
	70	74	78	81	85	89	93	96	100

You receive									
	○	○	○	○	○	○	○	○	○
The other receives									

Here below you see 9 ways to distribute an imaginary amount of money between you and the other. The upper number is what you receive, and the number below is what the other receives.

Which distribution do you prefer? Select the button with your preferred distribution.

	70	74	78	81	85	89	93	96	100
You receive	100	96	93	89	85	81	78	74	70
	○	○	○	○	○	○	○	○	○
The other receives									

Here below you see 9 ways to distribute an imaginary amount of money between you and the other. The upper number is what you receive, and the number below is what the other receives.

Which distribution do you prefer? Select the button with your preferred distribution.

	50	56	63	69	75	81	88	94	100
You receive	100	99	98	96	95	94	93	91	90
	○	○	○	○	○	○	○	○	○
The other receives									

Here below you see 9 ways to distribute an imaginary amount of money between you and the other. The upper number is what you receive, and the number below is what the other receives.

Which distribution do you prefer? Select the button with your preferred distribution.

	50	56	63	69	75	81	88	94	100
You receive	100	94	88	81	75	69	63	56	50
The other receives	○	○	○	○	○	○	○	○	○

Here below you see 9 ways to distribute an imaginary amount of money between you and the other. The upper number is what you receive, and the number below is what the other receives.

Which distribution do you prefer? Select the button with your preferred distribution.

	100	96	93	89	85	81	78	74	70
You receive	90	91	93	94	95	96	98	99	100
The other receives	○	○	○	○	○	○	○	○	○

Here below you see 9 ways to distribute an imaginary amount of money between you and the other. The upper number is what you receive, and the number below is what the other receives.

Which distribution do you prefer? Select the button with your preferred distribution.

	90	91	93	94	95	96	98	99	100
You receive	100	94	88	81	75	69	63	56	50
	○	○	○	○	○	○	○	○	○

The other  
receives

### 8.1.3 Questions about own personal health situation

1. What is your gender?
    - Male
    - Female
    - Non-binary
    - Prefer not to say
  
  2. What is your age?
  
  3. What is the highest level of education you have completed?
    - Primary school
    - Vmbo, first three years of havo or vwo
    - Havo, vwo, mbo 2-4
    - Hbo- or wo-bachelor
    - Hbo-, wo-master, doctorate
  
  4. Do you currently smoke?
    - Yes, I smoke daily
    - Yes, I smoke occasionally
    - No, I did smoke, but don't anymore
    - No, I never smoked
  
  5. How would you consider your health in general?
    - Excellent
    - Very good
    - Good
    - Fair
    - Poor
-

6. How many **minutes per week** do you engage in moderate to vigorous physical activity?

Moderate-intensity physical activities are activities that require some effort but still allow you to talk. Examples of this type of exercise are swimming, walking or cycling.

Vigorous-intensity physical activities are activities that make you out of breath such as playing football, hockey, or cycling at a high speed.

7. **How many times per week** do you engage in muscle or bone strengthening activities?

Muscle-strengthening activities refer to exercises that improve strength, endurance, and size. Examples include muscle strength training exercises, and endurance activity such as cycling and swimming.

Bone-strengthening activities involve strength training and weight-bearing exercises that put pressure on the bones such as jumping, running and dancing

8. What is your height in centimetres?

9. What is your weight in kilos?

10. How much alcohol do you generally consume per week?

- None
- Between 1 -7 drinks
- More than 7 drinks

## 8.2 Appendix B: Inequality Aversion Index

For only the participants which have a pro-social social value orientation based on the six primary items, the secondary items are used to determine whether the participant is inequality averse or prefers joint maximization. This classification is based on Ackermann and Murphy (2012).

To evaluate the secondary items, four different means are calculated:

1. The mean difference from archetypical inequality aversion (DIA)
2. The mean difference from archetypical joint gain maximization (DJG)
3. The mean difference from archetypical altruism (DAL)
4. The mean difference from archetypical individualism/competition (DIC)

Within the secondary items, the option numbers indicate which option is line with one of these archetypical decisionmakers.

TABLE 19: OVERVIEW OF MAXIMIZATION OF ARCHETYPICAL DECISION-MAKERS

Archetypical decision pattern	Secondary items								
	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9
Inequality averse	6	5	4	7	5	8	5	3	2
Joint gains	9	n/a	1	9	n/a	9	n/a	1	1
Other's gains	9	1	9	9	1	1	1	9	1
Own gain	1	9	1	1	9	9	9	1	9

To calculate the means, the absolute distance between the outcomes chosen by the participant and the options for the four decision patterns is first calculated. Then, this distance is divided by 8, because 8 is the maximum distance between the chosen outcome and the outcome which is in line

with the archetypical decision patterns. Afterwards, the four means are determined by dividing the sum of the absolute distance divided by the maximum distance by 9, the total number of items.

Then, the Inequality Index can be determined via the following formula:

$$IA\ index = \frac{DIA}{DIA + DJG}$$

When the IA index is equal to 0, then the participant can be classified as perfect inequality averse. When the IA index is equal to 1, then the participant can be classified as preferring perfect joint maximization.

### 8.3 Appendix C: Logistic Regression with no missing values

TABLE 20: LOGISTIC REGRESSION RESULTS WITH OBSERVATIONS WITHOUT MISSING VALUES

Variable	Odds Ratio	SE	95% CI (Lower)	95% CI (Upper)
Intercept	11.44***	0.942	1.804	72.553
<i>Group</i>				
Lifetime Healthcare cost group	0.487	0.451	0.201	1.180
<i>Setting</i>				
Smoking	4.022***	0.331	2.101	7.699
<i>Differentiation type</i>				
Copayment	0.335***	0.390	0.156	0.719
Waitlist ordering	0.519	0.413	0.231	1.166
<i>Social Value Orientation</i>				
Individualistic	0.757	0.570	0.248	2.312
Joint Gain Maximizing	1.191	0.612	0.359	3.951
<i>Smoking Status</i>				
Current smoker	0.019***	1.168	0.002	0.185
Occasional smoker	0.056***	0.906	0.010	0.333
Former smoker	0.201**	0.697	0.051	0.788
<i>Perception of Health</i>				
Excellent	2.122	0.767	0.472	9.545
Very Good	2.11	0.532	0.743	5.992
Fair	0.523	1.227	0.047	5.788
<i>Alcohol Consumption</i>				
Non drinker	0.323**	0.550	0.110	0.951
More than 7 drinks per week	0.234*	0.765	0.052	1.049
<i>Exercise</i>				
Meeting Muscle-Bone exercise guideline only	0.865	0.616	0.259	2.891

Meeting moderate to intense exercise guideline only	0.688	0.599	0.213	2.226
Meeting neither exercise guidelines	0.387	0.725	0.094	1.602
<i>BMI Category</i>				
Underweight	0.235	1.439	0.014	3.951
Overweight	3.418**	0.590	1.075	10.866
Obese	1.274	0.888	0.224	7.261
<i>Gender</i>				
Female	0.334**	0.491	0.127	0.874
Prefer not to say	0.023	3.111	0.000	10.346
<i>Age group</i>				
25–34	0.315**	0.579	0.101	0.981
35–44	0.1**	0.941	0.016	0.635
45–54	0.099**	0.934	0.016	0.618
55–64	0.038***	1.064	0.005	0.307
65+	2.56	2.237	0.032	205.237
<i>Education Level</i>				
Primary education	0.716	2.733	0.003	151.763
Vmbo and first three years of havo/vwo	0.132	1.490	0.007	2.438
Havo, vwo, mbo 2-4	0.883	0.623	0.260	2.996
hbo-, wo-master or doctorate	0.91	0.495	0.345	2.399

\*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1

## 8.4 Appendix D: Regression assumptions

### 8.4.1 Detection of outliers

Potential outliers are detected via calculating Deviance and Pearson residuals. The table below shows the summary statistics of these calculations. For both types of residuals, no residuals are found lower than -3 or above 3. Furthermore, both residuals are plotted against the fitted values and by ResponseID. These plots can be found below.

TABLE 21: OVERVIEW OF OUTLIER DETECTION METHODS RESULTS

Residual Type	Mean	SD	Median	Min	Max	SE
Deviance	-0.002325358	0.6367581	-0.09422495	-1.712616	1.563127	0.01692166
Pearson	-0.002875194	0.5070416	-0.06670112	-1.825967	1.546898	0.01347448

FIGURE 4: PLOT OF PEARSON RESIDUALS BY RESPONSE ID

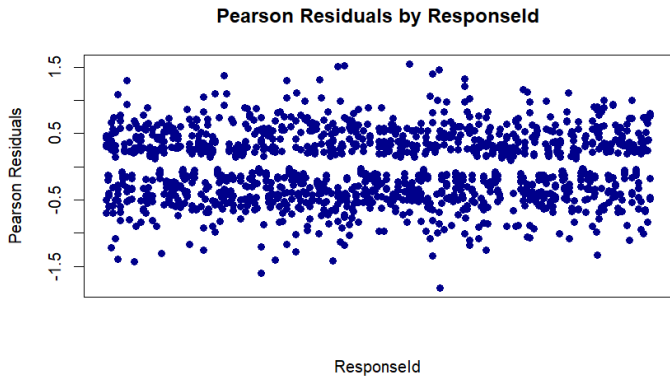


FIGURE 5: PLOT PEARSON RESIDUALS VS FITTED VALUES

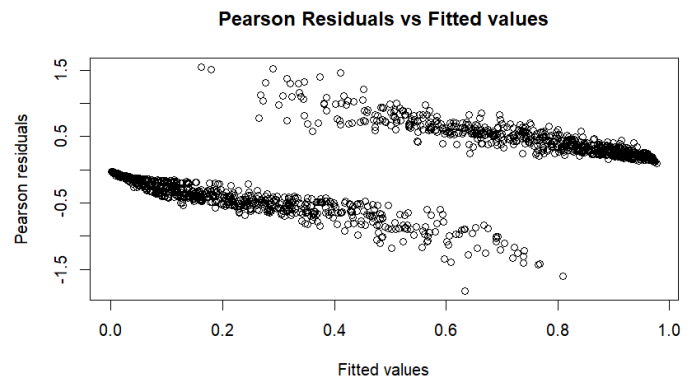


FIGURE 6: PLOT OF DEVIANCE RESIDUALS VS RESPONSE ID

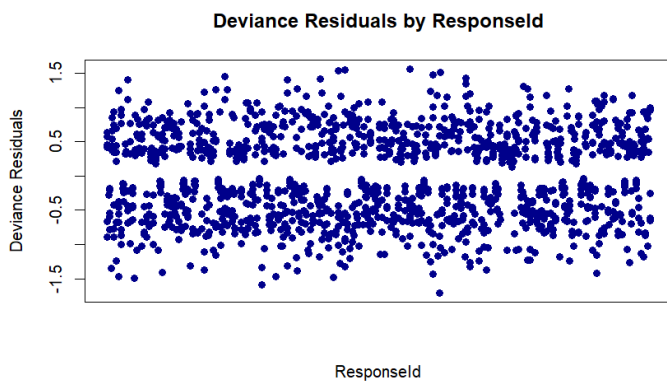
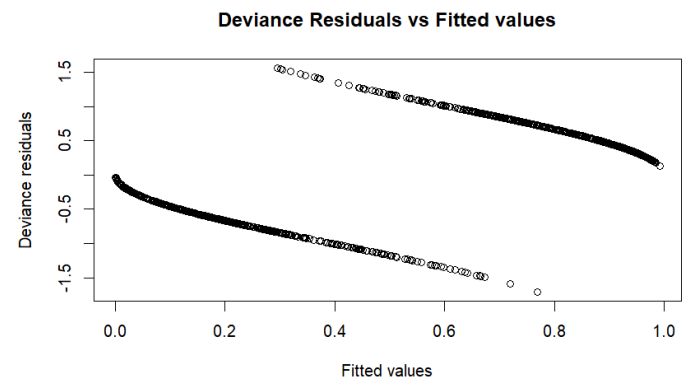


FIGURE 7: PLOT OF DEVIANCE RESIDUALS VS VS FITTED VALUES



### 8.4.2 Multicollinearity

In table 22 below, the values for the Variance Inflation Factor can be found. No variable shows a VIF higher than 5 which means that no multicollinearity is present.

TABLE 22: VARIANCE INFLATION FACTOR

Variable	VIF	SQRT VIF	Tolerance	R-squared
Setting	1.005472	1.002732	0.9945578	0.005442236
Differentiation Type	1.003856	1.001926	0.9961583	0.003841682

Variable	VIF	SQRT VIF	Tolerance	R-squared
Group	1.281548	1.132055	0.7803063	0.219693692
Smoking Status	1.354146	1.163678	0.7384726	0.261527374
Perception of Health	1.937538	1.391955	0.5161189	0.483881110
Exercise Category	1.997484	1.413324	0.5006298	0.499370163
BMI Category	2.280644	1.510180	0.4384727	0.561527334
Alcohol Consumption	1.563849	1.250539	0.6394480	0.360552009
Gender	1.392654	1.180108	0.7180536	0.281946423
Age Group	2.130924	1.459768	0.4692800	0.530719980
Level of Education	1.556896	1.247756	0.6423036	0.357696408
Social Value Orientation	1.176465	1.084650	0.8500039	0.149996064

### 8.5 Appendix E: Comparison of models and intraclass correlation

The likelihood ratio test was used to determine the goodness of fit of the model with only a random intercept, for a model for with a random slope for the setting, a model with a random slope for the differentiation type and a model with random slopes for the setting and the differentiation type. Table 23 shows the results of this test. Since the log-likelihood is the largest for the model with a random slope for the differentiation type and a random slope for the setting, these are included in the final model.

TABLE 23: COMPARISON OF MIXED EFFECTS MODELS

Model	Df (test)	AIC	BIC	Log-Likelihood	Chi-squared	p-value
Random Intercept Only		1,706	1,884	-818.82		
Random Slope: Setting	2	1,702	1,891	-814.83	7.991	0.0184
Random Slope: Differentiation Type	3	1,674	1,879	-798.14	33.372	2.688e-07
Random Slope: Setting and Differentiation Type	4	1,666	1,892	-790.09	16.115	0.002869

The intraclass correlation of a binary logistic regression can be calculated via the following formula (Wu et al., 2012):

$$ICC = \frac{\sigma_u^2}{\sigma_u^2 + \frac{\pi^2}{3}}$$

The calculated intraclass correlation is 0.784.

## 8.6 Appendix F: Documentation of Generative AI usage

This appendix provides a detailed account of the use of Generative AI tools during the development and writing of this thesis. These tools were used for refinement of language. All outputs generated were critically evaluated and, where necessary, modified by myself to align with the objectives of this thesis.

### 8.6.1 Tools used

- ChatGPT

### 8.6.2 Scope of use

#### Writing and grammar refinement

- Tool: ChatGPT
- Purpose: Improved clarity and fluency in writing. Suggestions were provided to restructure complex sentences in the introduction and the literature review
- My role: AI-generated suggestions were critically reviewed and revised before inclusion. No sections were directly copied verbatim without editing
- My reflection: AI helped me to improve the structure of my text, and to be more concise in writing while expressing the same content
- Applied in sections: Introduction, Literature Review, Methodology, Results and Discussion

#### Survey design in Qualtrics

- Tool: ChatGPT
- Purpose: assisting with the designing the experiment in Qualtrics to ensure that the flow of the experiment was correct such as the random assignment of the participants to one of the two perspectives and the randomization of the presented scenarios
- My role: the AI suggestions were tested in Qualtrics to test whether the survey flow was set correctly.
- My reflection: AI helped me to correctly structure the experiment

- Applied in sections: Methodology and appendix A

### Data cleaning

- Tool: ChatGPT
- Purpose: assisting with data cleaning in R and recoding variables before running the analyses
- My role: the AI suggestions were reviewed first before running in R. Afterwards, the output was checked by myself to ensure that the data was cleaned/variables are recoded in the right way.
- My reflection: AI helped me in this process
- Applied in sections: Results

### Data analysis

- Tool: ChatGPT
- Purpose: assisting with the creating the R script for testing the regression assumptions, running the regressions and creation of the results tables
- My role: the AI suggestions were reviewed first before running in R. The testing of the regression assumptions and interpretation of the results were based on the literature
- My reflection: AI helped me with the coding in R to run the analyses and creating proper regression results table.
- Applied in sections: Results