Thesis

Is prevention better than cure?

Societal preferences for reimbursement of prevention and lifestyle-related care

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Abstract

Objective: Non-communicable diseases (NCDs) are the leading cause of poor health in the world and are responsible for 71 % of all deaths globally. Patients suffering from NCDs or at risk of developing them, could potentially benefit from preventive interventions, aimed at improving lifestyle. The aim of this study is to measure societal preferences for prevention and lifestyle related healthcare in relation to other types of healthcare within the health insurance package, among the Dutch adult population. In addition, we also studied the relationship between lifestyle patterns and the preferences for prevention and lifestyle-related healthcare.

Methods: A quantitative study design was set up. Data was collected with an online questionnaire, using the DCE method to elicit preferences. Participants were asked to value prevention-related statements on a 5-point Likert scale. The relationship between lifestyle and the gathered results was assessed using a lifestyle-index. A mixed logit model was used to quantify and obtain statistical inference concerning the relative importance of the attributes and attribute levels in order to assess preferences for health interventions.

Results: The majority of the attribute levels proved to be significant ($p<0.05$). General practitioner care and prevention/lifestyle-related care proved to be the most important attributes considering their relative magnitude. The signs of the coefficients were as expected, reflecting a negative utility for a decrease of care compared to the current basic package and a positive utility for relatively more of that specific type of care in the basic package. The ideal basic package consists of all attribute levels at their highest percentage (30%, 15%, 15%, 15%, 10%) and a monthly premium decrease of 5 euros. The probability of this package being chosen compared to the base case, the current basic package, is 94%. The probability of the package being chosen in which more prevention/lifestyle-related care is reimbursed (10%), with all other attributes set at their base case level, is 75% compared to the base case package. When prevention is set at its lowest level (0%), the choice-probability decreases to 4.87%. No significant correlation between an unhealthy lifestyle and preferences for prevention/lifestyle-related care were found.

Conclusions: There is a strong societal preference for more reimbursement of prevention and lifestyle-related care in the basic package. Moreover, the healthcare reimbursed within the basic package that relatively uses the most financial resources is also deemed important, as there seemed to be aversion against a diminution of that healthcare in the basic package. Having an unhealthy lifestyle did not significantly impact preferences for more or less reimbursement of prevention related healthcare in the basic package. Also, significant preference heterogeneity was found for all different healthcare types.

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Abbreviations

BMI	Body Mass Index
DCE	Discrete Choice Experiment
MNL	Multinomial logit
NCD	Non-communicable disease
OECD	Organization for Economic Cooperation and Development
QALY	Quality Adjusted Life Year
RIVM	Rijksinstituut voor Volksgezondheid en Milieu (National institute for public health and environment)
RUM	Random Utility Model
SD	Standard Deviation
SES	Socioeconomic status
WHO	World Health Organization

Chapter 1. Introduction

Non-communicable diseases (NCDs) are the leading cause of poor health in the world and are responsible for 71 % of all deaths globally (NCD Countdown 2030 collaborators, 2018). The four most prevalent NCDs are cardiovascular diseases, cancers, chronic respiratory diseases and diabetes, which were responsible for 80% of the NCD deaths in 2016 (May et al, 2015; World Health Organization (WHO), 2018; NCD Countdown 2030 collaborators, 2018). There are four main health behaviour risk factors, smoking, harmful alcohol use, physical inactivity and an unhealthy diet, that are closely linked to NCDs (WHO, 2018). Over 7.2 million deaths per year can be attributed to smoking, more than half of the 3.3 million annual deaths attributable to alcohol use have their origin in NCDs, and insufficient physical activity accounts for 1.6 million deaths annually (WHO, 2021). Thus, patients suffering from NCDs or at risk of developing them, could potentially benefit from preventive interventions, aimed at improving lifestyle. Preventive interventions can be described as aiming to prevent healthy persons becoming ill (Luyten et al, 2015). Surprisingly, according to data of 2018 from the Organization for Economic Cooperation and Development (OECD), only a small fraction of the healthcare budget (mostly < 5 %) is allocated to prevention globally.

In the Netherlands, expenditures on prevention have been falling with 1.1 % from 2010 (4.3 %) to 2018 (3.2 %) (OECD, n.d.). Meanwhile, it was estimated that 57 percent of the Dutch population was suffering from a NCD in January 2019 (Volksgezondheidenzorg.info, 2020), compared to a prevalence of 50 percent in 2015 (Rijksinstituut voor Volksgezondheid en Milieu (RIVM), 2018). Unlike the decreasing prevention expenditures, pleads for more emphasis on prevention in the Dutch healthcare system are increasing (Karadarevic, 2019), and it is a subject increasingly appearing on the political agenda. The national prevention agreement (Nationaal Preventieakkoord) is an example of this. This agreement aims to approach the problems of smoking, problematic alcohol use and overweight in the Netherlands by monitoring joint agreements, ambitions and measures developed by over 70 different stakeholders (Ministerie van Volksgezondheid, Welzijn en Sport, 2018).

The increased NCD disease-burden will likely result in more healthcare expenditures. The aging population, contributing to this high NCD disease-burden, will also result in an increasing pressure on the healthcare system in the following decades (Soeters & Verhoeks, 2011). Another explanatory factor of the rising healthcare costs is technological innovation in healthcare, which increases the opportunities for diagnostics and treatments, and therefore leads to more costs (College voor Zorgverzekeringen, 2013). Van der Star & van den Berg (2011) state that increasing expenditures are likely to raise health-related premiums or taxes since more money is needed to cover healthcare insurance or to broaden the basic package. Priority setting is inevitable due to rising healthcare costs. In the past forty years, the health care expenditures have been growing annually with 4% on average. In the same period, the share of the national income spent on healthcare has increased from 7.5 % to more than 13 % (College voor Zorgverzekeringen, 2013). Hence, recognition of societal preferences regarding resource allocation is of increasing importance because people might no longer be willing to pay for standard health insurance (van der Wulp et al, 2012). It is necessary to further investigate

societal preferences for prevention and lifestyle-related care specifically, considering their potential benefits for both healthcare expenditures and the course and prevention of NCDs.

Several studies (Bijlmakers et al, 2020; Xesfingi et al, 2016; Pfarr & Schmid, 2015) have stressed the importance and usefulness of measuring societal preferences for the resource allocation of public funds concerning healthcare insurance. There has been some research on societal preferences regarding prevention. Van der Star & van den Berg (2011) found that willingness to pay among the general population for treatment reimbursements in the basic health insurance package unrelated to behaviour is much higher than that for a behaviour-related health problem. Other studies (Dolan & Tsuchiya, 2009; Covey et al, 2010) also found preferences for more individual responsibility for health and putting less value on diseases (partially) stemming from health-risk behaviour. There are several studies that examined the societal preferences for the availability of publicly funded preventive and curative health care interventions (Bosworth, 2010; Corso, 2006; Mortimer & Segal, 2006; Schwappach, 2002; Ubel et al, 1998). Those studies revealed no preference for the availability of either prevention or curative interventions, a preference for prevention and a preference for curative interventions.

In this study, societal preferences for different combinations of care within the health insurance package will be assessed. The following research question will be answered: 'What are the relative societal preferences regarding the inclusion of prevention or lifestyle-related care, in relation to other types of healthcare, in the basic health insurance package among the general public in the Netherlands? In addition, we will study the relationship of different lifestyle patterns on the preferences for the composition of the health insurance package.

Chapter 2. Theoretical framework

This chapter will discuss several theoretical concepts related to the research question. It will start with an overview of the Dutch health insurance system. Definitions of preventive and curative interventions will be discussed, and we will elaborate on the responsibility of adopting a healthy lifestyle and the impact of personal circumstances on preferences. The chapter will be finalized with a description of lifestyle factors.

2.1. The Dutch health insurance system

The Dutch healthcare system is regulated by managed competition. Every Dutch citizen is obliged to purchase basic health insurance. The basic package is arranged through the healthcare law (Zorgverzekeringswet, ZVW). Insurers are responsible for practicing this law for their clients, the insured. Healthcare providers are responsible for the quality of this insured care (Zorginstituut Nederland, n.d.). Additionally, there are four other system laws which determine the functioning of the healthcare system, the long-term care act (Wet langdurige zorg, Wlz), the social support law (Wet maatschappelijke Ondersteuning, Wmo), the juvenile law (Jeugdwet) and the public health law (Wet publieke gezondheid, Wpg) (RIVM, n.d.).

The contents of the basic package are annually defined by the government, based on advice from the Dutch Health Care Institute. According to article 10 of the 'Zorgverzekeringswet', a broad spectrum of healthcare is insured, namely: medical care, oral care, pharmaceutical care, medical aids care, nursing, care including maternity care, residence related to medical care and transport related to all the previous mentioned care (Zorgverzekeringswet, 2005). The Minister of Health decides if changes have to be made, these have to pass the House of Parliament (Kroneman & de Jong, 2015). The Dutch Health Care Institute bases their advice on four criteria embedded in the Dunning Funnel, an instrument developed by the Dunning committee in 1991 (Commissie keuzen in de zorg, 1991) (Figure 1). The funnel consists of four 'sieves' or criteria: necessity, effectiveness, cost-effectiveness and feasibility (Plagge & Dutree, 2010). Necessity refers to the requirement that care should be essential, meaning that it has the capacity to treat life-threatening conditions or prevent loss of quality of life. Additionally, it is evaluated if it is necessary to insure the intervention, for example based on costs (College voor Zorgverzekeringen, 2013). Effectiveness requires an intervention to be evidence based and effective. This is investigated using cost-effectiveness analysis, which compares two different interventions on costs and effects. If the ratio between costs and outcomes is acceptable, an intervention is deemed cost-effective (College voor Zorgverzekeringen, 2013). This is currently expressed in QALYs (Quality Adjusted Life Years). The acceptable cost to QALY ratio can vary with disease burden and other arguments (Kroneman & de Jong, 2015). In the Netherlands, no strict threshold is adopted for this ratio, but thresholds between 20,000 and 50,000 per QALY have been considered reasonable (Van der Pol et al, 2017). The fourth criteria, feasibility, constitutes of the factors that influence the execution of measures taken related to the basic package (College voor Zorgverzekeringen, 2013). The benefits package is subject to budget constraints, implying that inclusion of certain health services probably results in exclusion of other services (Wammes et al, 2014). It is necessary

to manage the content and expenses within the basic package, because its expenses originate from collective resources (College voor Zorgverzekeringen, 2013).

Figure 1
Criteria for reimbursement decisions, based on Dunning Funnel. (Commissie keuzen in de zorg, 1991)
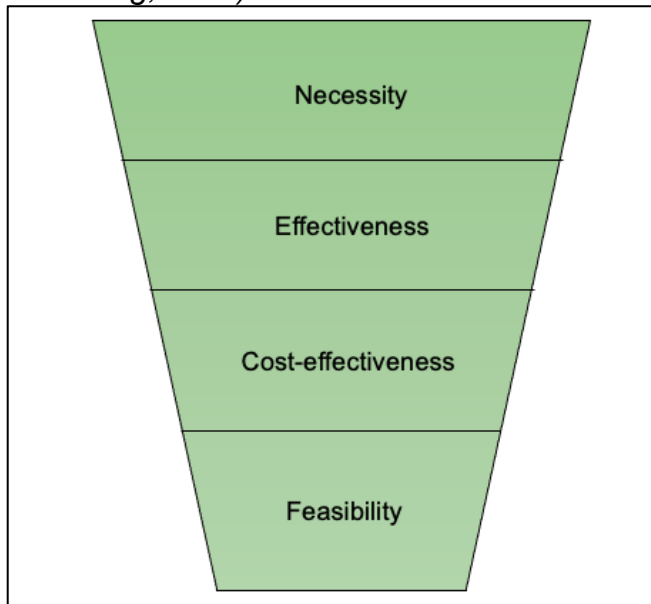
Payment for the basic package requires a monthly flat rate premium. Additionally, there is a co-payment, an annually determined fixed amount, that the insured have to pay by themselves, which is set at €385 in 2021 (Rijksoverheid, n.d.). This co-payment can be increased voluntarily, resulting in a lower monthly premium. In addition, everybody with an income needs to pay a contribution for healthcare insurance to the government, depending on the size of that income (Delsen, 2015). Health insurers are not allowed to refuse applicants from their services or to vary premiums with regard to demographic- or risk factors (Rijksoverheid, n.d.; van der Star & van den Berg, 2011).

2.2. Prevention or Cure?

Lifestyle interventions, like quit smoking treatment or dietary advice have been in and out the Dutch benefits package due to considerations of affordability, which demonstrates that prevention measures are frequently subject to savings (Kroneman & de Jong, 2015). Preventive and curative services are dissimilar. With primary preventive services, the population involved is not yet affected by a disease. When an already sick population is subject to preventive measures, we call this secondary and tertiary prevention (Stolk et al, 2011). Lifestyle interventions can be deployed for all forms of prevention (Psaltopoulou et al, 2010). In addition to the preventive character of lifestyle interventions, they are increasingly deployed as a curative measure too. For example, people suffering from Diabetes Mellitus type two can cure from the disease and stop taking the related medication if they successfully change their lifestyle (Karadarevic, 2019). Thus, lifestyle-related interventions have a wide possible use. In the Netherlands they are mainly deployed as an instrument for

prevention (Ministerie van Volksgezondheid, Welzijn en Sport, 2018). Therefore, lifestyle interventions will be applied within the same category in this research.

2.3. Healthy lifestyle: own responsibility?

The Health Lifestyle Theory proposed by Cockerham (2005) states that lifestyle choices are not randomly made and disconnected, but that they are based on distinctive patterns related to class, gender, age, race or ethnicity and living conditions. These variables provide a context for behaviour patterns and experiences that finally determine lifestyle choices. Moreover, the Dunning commission has stated that a healthy lifestyle is not always a choice or merit, but also correlates with socioeconomic factors (Stolk et al, 2001). Morbidity and mortality increase when socioeconomic status (SES) decreases. Low educated people have a life expectancy of six years shorter and live fifteen years in worse health compared to highly educated people (Pharos, 2019). Wang & Geng (2019) have found that lifestyle mediates the relationship between SES and health. This implies that differences in unhealthy behaviour can also partially be explained by socioeconomic factors, and thus not only attributed to one's own responsibility (Andersen & Nielsen, 2016). According to the RIVM (2020), smoking prevalence is higher in people with a migration background and lower education level. The portion of people that are overweight decreases when educational level increases. Compliance to the guidelines of physical activity increases with educational level (RIVM, 2020).

Moreover, the insured are awarded a certain freedom of choice, therefore a strict attitude concerning life-style related diseases or complaints is not preferable (Commissie keuzen in de zorg, 1991). In contrast, many academics believe that there is a personal responsibility for certain lifestyle-related behaviour and that this counts as a constraint as to the compensation that society owes to this individual. This is in accordance with the findings of multiple studies (Covey et al, 2010; Dolan & Tsuchiya, 2009; van de Star & van den Berg, 2011), stating a preference for more individual responsibility in healthcare and a lower willingness to pay for inclusion of treatment for behaviour-related health problems. This more individualistic standpoint can be problematic, because it would mean that individuals who, as a consequence of their behaviour, suffer from a disease, would not have a right to free health care. This challenges the right of equal free access to health care, a principle on which health policy in the Netherlands is based (Andersen & Nielsen, 2016). This principle implies the guarantee of equal access to healthcare for everyone, disregarding sociodemographic factors and peoples' history, which also includes behaviour (Van der Star & van den Berg, 2011). When access to prevention and lifestyle-related care would be extended, this could possibly lead to a stricter policy regarding access to care needed as a consequence of unhealthy behaviour. In this case a lot of tools are available for improving unhealthy behaviour and preventing (progression of) disease.

2.4. Personal circumstances

When societal preferences are measured it is important to take into account people's own situation, since it is likely that they use this information in their decision making. There is a lack of research on how subgroups of people consider their personal circumstances (Van der Star & van den Berg, 2011), while this could highly influence their preferences. Luyten et al (2015) performed a DCE (Discrete Choice

Experiment) concerning societal preferences for healthcare interventions in different contexts and found that the context of the questions is important for the societal value placed on the different options. They state that several studies observed a preference for self-responsibility when it comes to self-inflicted illness. They also observed that preferences for accounting for lifestyle depended on the lifestyle of the participants themselves. This implies that they might reason according to their own situation and perspective. It seems that changing behaviour and adopting a healthier lifestyle is more difficult for certain groups. For instance, socioeconomic status or migration background are important determinants (Molema et al, 2019). This could mean that these groups value lifestyle interventions differently than those who behave healthily. According to previous research (Luyten et al, 2015; Van der Star & van den Berg, 2011) it is to be expected that the value placed on lifestyle interventions will depend on the lifestyle of the respondents themselves. People with unhealthier behaviour are more at risk for becoming ill or for their disease to progress as a result of this behaviour and would therefore benefit relatively more from these interventions to be reimbursed by basic insurance.

2.5. Lifestyle factors

It is important to define the behaviours that contribute to a (un)healthy lifestyle and how to measure its relationship with preferences. According to the WHO, 'a healthy lifestyle is a way of living that lowers the risk of being seriously ill or dying early.' (WHO, 1999, p.1). It defines the following factors contributing to an (un)healthy lifestyle: smoking, physical activity, healthy eating and overweight and alcohol (WHO, 1999). According to the RIVM (2020), 14.9% of the Dutch population smokes daily and excessive alcohol consumption is present in 6.9% of the population. Overweight is a big problem in the Netherlands, with 44.4% of the population being overweight, of which 32.4% has moderate overweight and 12.1% qualifies as obese. Moreover, only 52.7% of the Dutch population complies with the Dutch guidelines for physical activity.

Chapter 3. Research methods

To answer the thesis questions, a quantitative study design was set up. Data was collected with an online questionnaire, using the DCE method to elicit societal preferences concerning implementation of prevention and lifestyle-related care in the Dutch basic package. This chapter will elaborate on the different steps taken to gather these results. Firstly, the sample selection will be briefly discussed. Secondly, the development of the survey and its different parts will be elaborated on. A major part of this study is the DCE, which involves five phases that will all be discussed in this chapter: selection of attributes and levels, experimental design, survey development, sample selection and survey administration and data analysis (Luyten et al, 2015). The chapter will be concluded with an explanation of the lifestyle-index, which was necessary to enable the quantification of the relationship of lifestyle with preferences for healthcare.

3.1. Sample selection

The population that was approached to take part of the study consisted of the general Dutch adult population. The respondents had to be familiar with the Dutch health insurance system and thus needed to be Dutch, which is also the reason why the survey was written in Dutch. Participants were approached online, as the survey could be accessed through an online link. Therefore, participants needed to be in the possession of a computer or mobile phone. It is suggested that sample sizes over hundred can provide a sufficient basis for modelling preference data for DCE designs (Pearmain et al, 1991). As the data collection was in cooperation with two fellow students, more participants could be reached. Therefore, the goal was to have around 250 to 300 respondents.

3.2. Survey development

The online survey was developed in cooperation with two fellow students, who investigated different subtopics regarding preferences for healthcare interventions. It was developed in Sawtooth Software (Sawtooth Software, 2021) and was written in Dutch. The survey consisted of three main parts, which will be elaborated on in the further sections.

3.2.1. Survey part 1. Introduction & demographic variables

The survey started with an informed consent section. After giving consent, some general background questions concerning age, gender, educational level, employment status, household composition and income were set up for the participants. These variables were chosen based on potential relevance for preferences elicited with the DCE. The first part also consisted of a comprehensive explanation regarding the Dutch basic health insurance and the precise meaning of the different attributes and levels used in the DCE. Example tasks and illustrations were used to make the respondents familiar with the concepts. The first part concluded with an evaluation question concerning the clarity of the explanation given in this part (5-point scale).

3.2.2. Survey part 2. DCE

For the second part of the survey, a DCE was developed. DCEs are a valuable method for collection and analysis of preferences for health and healthcare (Viney et al, 2002). The analytical framework embedded in DCEs is based on Lancaster's theory of value, which makes the assumption that utility is derived from underlying characteristics or attributes (Viney et al, 2002). It is also based on the Random Utility Model (RUM), in which utility consists of both a random and systematic component. This random part is derived from measurement errors, unobserved attributes or unobserved taste variations (Viney et al, 2002). Data from a DCE allows for the estimation of the relative value of the different attributes in the total importance attributed to the different options that are valued (Luyten et al, 2015).

DCE - Structure

In the second part of the survey, respondents were presented with hypothetical scenarios concerning the content of the Dutch basic package. Per choice task, three alternatives were available. Two alternatives consisted of different compositions of the basic package, which varied on the amount of money from the healthcare budget devoted to that type of care. The third alternative, the opt-out alternative, was based on an approximation of the current basic package. To prevent complexity of the DCE choice tasks, the number of attributes has to be limited. According to a systematic review of Clark et al (2014), the vast majority of reviewed studies included 4-6 attributes in their DCE analyses and therefore it was chosen not to use more than six attributes in this DCE. It was decided to use twelve choice tasks divided into two blocks. This division was made to promote respondent engagement and reduce possible fatigue. An evaluation question was asked between the two blocks, regarding the understanding of the choice tasks (5-point scale).

DCE - Selection of attributes and levels

The six attributes used in the alternatives were five different types of healthcare included in the Dutch basic package and a price attribute. Because of the chosen maximum of six attributes in this DCE, not all types of health care included in the basic package could be set as attributes. Four attributes were selected based on their budgetary impact, meaning that the four types of health care receiving the most money from the available budget for the basic package were chosen as attributes. This resulted in the attributes medical specialist care, pharmaceutical care, mental health care and general practitioner care (Zorginstituut Nederland, 2015). In order to measure the relative societal preference for a lifestyle attribute, lifestyle/prevention-related care was the fifth attribute. Lastly, the sixth attribute was based on a change of the mandatory monthly premium. Each attribute consisted of three levels. The health care attributes were all varied depending on the amount of the available budget spent on that type of care. These amounts were displayed in percentages. The price attribute levels were based on a change of the monthly premium, a reduction, no change or an addition. The first two columns of Table 1 display the different values of the attributes and levels.
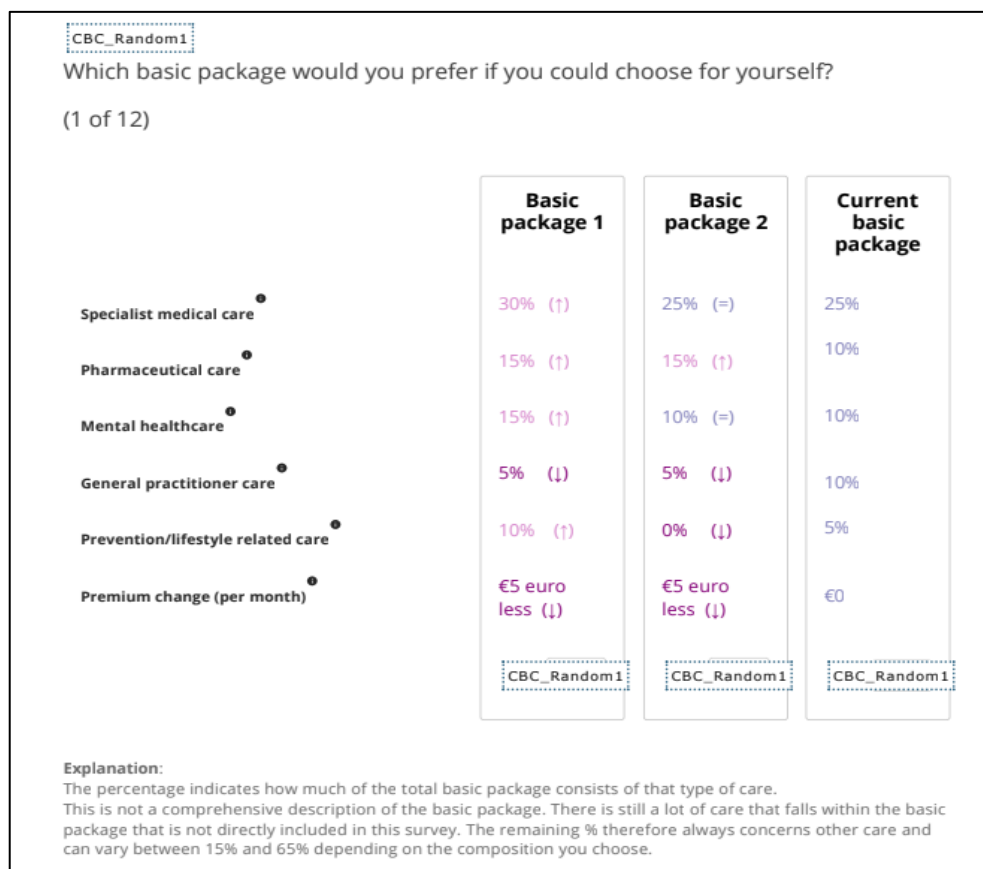
To simplify the choice tasks, attribute levels were colour coded. An increase compared to the current situation was displayed in light purple, while a decrease was labelled dark purple. When the attribute level remained consistent with the current situation, the attribute level was labelled purple. This method of colour coding is

inspired by a study by Jonker et al (2018). The method of colour coding used in this study, colouring the text of the attribute level, is slightly different from the method described in the literature (Jonker et al, 2018), in which the complete background of an attribute level is coloured. In addition to the colour coding, each attribute level was visually supported by symbols which indicated a decrease (↓), increase (↑) or no change (=). Figure 2 shows an example choice task.

DCE - Opt-out & current basic package

Because the two alternatives in the choice tasks were variances of the current basic package, the opt-out was included. This opt-out consisted of an approximation aimed to reflect the current basic package in the Netherlands, with the levels of the different attributes corresponding with the expenses relative to the available budget displayed in percentages. The monetary amounts used to calculate these percentages were based on the numbers of the year 2015, because this was the most recent year with complete numbers. (Zorginstituut Nederland, 2021) It was decided to approximate the current basic package and make the differences between the different attributes smaller to be able to observe unbiased preferences, without attributing a certain importance to certain attributes because of the current spending. The values of the current basic package were also the values chosen as the base case reference levels, highlighted in bold in Table 1. They were chosen in a way that every attribute could either decrease or increase, so that participants could indicate both a preference for more spending on that type of care as well as less spending. The percentages do not add up to 100 percent, meaning that the remainder of the budget is spent on 'other care', including all possible care in the basic package not covered by the attributes. This remaining percentage, spent on 'other care', ranged from a minimum of 15 to a maximum of 65 percent.

Figure 2
Example choice task

CBC_Random1

Which basic package would you prefer if you could choose for yourself?

(1 of 12)

	Basic package 1	Basic package 2	Current basic package
Specialist medical care	30% (↑)	25% (=)	25%
Pharmaceutical care	15% (↑)	15% (↑)	10%
Mental healthcare	15% (↑)	10% (=)	10%
General practitioner care	5% (↓)	5% (↓)	10%
Prevention/lifestyle related care	10% (↑)	0% (↓)	5%
Premium change (per month)	€5 euro less (↓)	€5 euro less (↓)	€0
	CBC_Random1	CBC_Random1	CBC_Random1

Explanation:
The percentage indicates how much of the total basic package consists of that type of care.
This is not a comprehensive description of the basic package. There is still a lot of care that falls within the basic package that is not directly included in this survey. The remaining % therefore always concerns other care and can vary between 15% and 65% depending on the composition you choose.

3.2.3. Survey part 3. Other variables & Prevention questions

After the DCE-section, questions regarding other relevant variables were implemented in the survey. These included employment in the health care sector, experience with chronic illness, weight and height, smoking status, alcohol use and physical activity. These variables were of interest because of their potential influence of preferences for the different healthcare types. Also, information regarding COVID-19 infection and the basic package was retrieved, but not for the use of this study. Therefore, these variables will not be further discussed or used in the analysis. At the end of the study, the respondents were asked to give their opinion on several propositions concerning prevention (5-point scale) (Table 8, Chapter 4). These propositions were based on existing literature (Baltussen et al, 2018) examining the viewpoint of Dutch citizens on choices in healthcare. Also, a ranking exercise on prevention policy aimed at nutrition and overweight, physical activity, mental health and addiction was administered. In conclusion, the survey consisted of 28 questions, two example tasks and twelve choice tasks divided in two blocks. See Appendix D for the survey (separate file).

3.3. Survey administration & data collection

To ensure that the survey was of sufficient quality and to rule out unclarities, six think-aloud sessions were organized. In these sessions, participants were asked to

fill in the questionnaire while thinking out loud, in the presence of the researcher. All relevant remarks were documented. Some small adaptations were made based on these sessions, after which the survey could be administered. The survey could be accessed through an online link. Participants were approached online, through social media, friends and family, connections, work and at the university. Data collection was performed for approximately a week, after which 76 respondents were collected and the survey was temporarily closed. The data from these respondents was used to update the priors used for the experimental design, which will be elaborated on in the next section. This first data collection is referred to as 'the pilot'. After the priors were updated, the survey was updated and opened again. Data collection proceeded for a period of 2 weeks.

3.4. Experimental design

The DCE design was optimized for a multinomial logit (MNL) model. Because the number of attributes levels was too comprehensive for a full factorial design, which includes all possible choice combinations than can be created from the attribute levels all together, a non-full factorial or fractional-factorial design was used, the Bayesian efficient design (Viney et al, 2002). This design selectively chooses choice-tasks from the full-factorial to obtain the best possible design. The efficiency of the design is determined over a number of draws taken from prior parameter distributions (Bliemer et al, 2008).

3.4.1. Pilot

First, a design was developed for the pilot. The aim of this pilot was to obtain information about the chosen priors, which enables a more accurate estimation of those priors. Priors were estimated using a uniform distribution, which takes uncertainty in predicting priors into account. See Table 1 for the pilot priors. It was decided to compute 36 rows with three blocks, resulting in three different versions of twelve choice tasks, meaning that a participant could be randomly assigned to one of the three versions. There are some considerations that need to be taken into account when choosing the number of Halton draws. When choosing too few draws, the efficiency of the design will be low. On the other hand, the computation time will increase unnecessarily if the number of draws used is too high (Bliemer et al, 2008). Therefore, the number of Halton draws was set at 1000, this number is relatively high, and was chosen to retrieve estimates as accurate as possible (Bliemer et al, 2008). A few restrictions were added to the Ngene design. Because the opt-out option was implemented in the choice tasks as the current basic package, the other two alternatives in the choice tasks could not have the exact same percentages as those in the opt-out alternative. Another restriction was the combination of all attributes set at their lowest level, meaning a relatively low amount of the health care budget would be spent on the included types of healthcare. In this case it would not be logical that the premium can only be reduced with 5 euros, as the total spending on healthcare would decrease.

3.4.2. Update priors

The experimental design was developed for the pilot and ran in Ngene (Choice Metrics, 2018) up to a d-error of 0.266274 (evaluation 245501) with a total of 281550 evaluations, see Appendix A for the design. After collecting a fair number of respondents (n=76), the MNL-model was performed, and its results were used to

update the priors. Attribute levels that showed a significant beta-coefficient were updated using a Bayesian normal distribution. For attribute levels with non-significant beta coefficients the previous uniform priors were preserved, as can be found in Table 1, considering the fact that the conditional logit model results were fairly in line with the estimated pre-pilot priors. See Table 1 for the post pilot priors and Appendix C for the conditional logit model results. The updated experimental design was again implemented in Ngene, up to a d-error of 0.382945 (evaluation 76975), with a total of 101798 evaluations. See Appendix B for the updated experimental design.

Table 1
Priors pilot & post pilot

Attributes	Levels	Uniform priors pilot		Post pilot priors	
		Lower range	Upper range	Mean/ lower range	SD/upper range
Medical specialist care	a) 20%	a) -0.15	a) -0.05	**a) -0.55**	**a) 0.28**
	b) 25%	b) -	b) -	b) -	b) -
	c) 30%	c) 0.05	c) 0.15	c) 0.05	c) 0.15
Pharmaceutical care	a) 5%	a) -0.15	a) -0.05	**a) -0.42**	**a) 0.21**
	b) 10%	b) -	b) -	b) -	b) -
	c) 15 %	c) 0.05	c) 0.15	c) 0.05	c) 0.15
Mental health care	a) 5%	a) -0.15	a) -0.05	**a) -0.51**	**a) 0.26**
	b) 10%	b) -	b) -	b) -	b) -
	c) 15%	c) 0.05	c) 0.15	c) 0.05	c) 0.15
General practitioner care	a) 5%	a) -0.15	a) -0.05	**a) -0.83**	**a) 0.43**
	b) 10%	b) -	b) -	b) -	b) -
	c) 15%	c) 0.05	c) 0.15	**c) 0.07**	**c) 0.51**
Prevention/lifestyle - related care	a) 0%	a) -0.15	a) -0.05	**a) -0.83**	**a) 0.42**
	b) 5%	b) -	b) -	b) -	b) -
	c) 10%	c) 0.05	c) 0.15	**c) 0.29**	**c) 0.15**
Premium change (monthly)	a) - €5,00	a) 0.05	a) 0.15	a) 0.05	a) 0.15
	b) € 0,00	b) -	b) -	b) -	b) -
	c) + €5,00	c) -0.15	c) -0.05	**c) -0.43**	**c) 0.22**

Note. Post pilot priors that were updated to a normal distribution are highlighted in bolt. b): base case levels.

3.5. Lifestyle index

To quantify the relationship between lifestyle and elicited preferences, a lifestyle index was constructed. A meta-analysis of Barberesko et al. (2018) investigated 27 studies to identify the variables used to develop a lifestyle-index, in this case used to measure its effect on cardiovascular disease risk. Most lifestyle indices included smoking, diet, alcohol consumption, physical activity and body weight (Barbaresko et al, 2018). Another meta-analysis of Loef & Walach (2012), which investigated the combined effects of healthy lifestyle behaviours on all-cause mortality, found that in 15 studies, all of them covered at least three of the following lifestyle factors: moderate consumption of alcohol, not being overweight or obese, not smoking, healthy diet and regular physical exercise. To comprehensively measure diet and to define what constitutes a healthy lifestyle regarding diet, an elaborate method is needed (Fransen & Ocké, 2008). These elaborate methods are not suitable for the scope of this study. Therefore, diet is not taken into account when defining lifestyle.

Respondents were placed in two different groups depending on unhealthy lifestyle-behaviours, according to the meta-analysis of Barbaresko et al, (2018), which used healthy lifestyle-behaviours. Height and weight were used to calculate a Body-Mass Index (BMI), and a BMI under 18.5 kg/m^2 and above 25 kg/m^2 was valued as an unhealthy lifestyle behaviour. Unhealthy lifestyle behaviours regarding smoking were daily smoking or being an incidental smoker. A weekly consumption of seven to fourteen glasses, more than fourteen to twenty-one glasses and more than twenty-one glasses were all scaled under unhealthy lifestyle behaviours. Regarding physical activity, less than 2.5 hours a week of moderate-intensive effort and (more than) two times a week of muscle and bone strengthening activities was valued as unhealthy lifestyle behaviour. This description of physical activity is according to the Dutch exercise guidelines (Kenniscentrum sport & bewegen, 2021). Participants were assigned to the group of 'unhealthy lifestyle' or 'healthy lifestyle' dependent on the number of unhealthy lifestyle-behaviours. This division was necessary to examine the relationship of lifestyle on elicited preferences. See Table 2 for a description of the lifestyle-index.

Table 2
Lifestyle-index

Lifestyle variables	'Unhealthy behaviour'
BMI	< 18.5 kg/m & > 25 kg/m^2
Smoking status	Incidental smoker, 0-10 times a day
	10-20 times a day
	>20 times a day
Alcohol consumption	7-14 glasses a week
	14-21 glasses a week
	> 21 glasses a week
Physical activity	< 2.5 hours a week of moderate-intensive effort and < two times a week of muscle and bone strengthening activities
Group	**Unhealthy lifestyle-behaviours**
Unhealthy lifestyle	≥ 2 unhealthy lifestyle-behaviours
Healthy lifestyle	0 or 1 unhealthy lifestyle behaviours

3.6. Data analysis

The choice data was modelled using STATA software version 16.1 (Stata Corp, 2019). First, the data was inspected and cleaned. Only complete responses were included in the analysis. It was decided that data records with a survey completion time of less than ten minutes would be excluded. This time threshold is based on the think aloud sessions, which showed that to be able to thoroughly read all the information and complete the choice tasks and questions in the survey, a minimum time of ten minutes was necessary. Participants that complete surveys in a relatively short time can possibly have a negative effect on the data quality (Grezki et al, 2015). Descriptive statistics were generated for age, gender, educational level, employment status, household composition and income, employment status in the care sector, lifestyle variables, evaluation questions and the prevention propositions and ranking exercise. The lifestyle variables were analysed and coded as described in the previous section to classify the participants based on lifestyle. The collected data was used to quantify and obtain statistical inference concerning the relative

importance of the attributes and attribute levels in order to assess preferences for health interventions. The participants' utility function was estimated using the mixed logit model. This model was chosen because of model fit and suitability for accounting for preference heterogeneity, given the interest to determine if preferences for different types of health care depend on specific characteristics, like lifestyle. The number of Halton draws was set at 1000. The data was checked for problematic correlations using the 'vif' command after performing a regression. To be able to find preference heterogeneity concerning lifestyle, interaction terms were created and analysed within the mixed logit model. The choice for interaction terms to look for preference heterogeneity was based on the fact that all parameters are on a latent scale, and the use of interaction terms enables the presentation of the coefficients in one regression and on one latent scale, which enables the comparison of the different coefficients. The cut-off value for statistical significance was set at p-value ≤ 0.05. When considering the coefficients, this indicates that an attribute was considered important by the respondents in the choice-making process embedded in the DCE. Whether an attribute has a positive or negative effect on utility is reflected in the sign of the coefficients. Coefficients computed with the mixed logit model were used to calculate choice probabilities, using the following formula:

$$Prob = \frac{exp(logit(prob))}{1 + (\exp(logit(prob)))}$$

The prevention-related statements were analysed by stratifying on lifestyle, and chi-squared tests were performed to examine the relationship between lifestyle and agreement with the statements.

Chapter 4. Results

4.1. Respondents

In total, 432 respondents started the survey and 238 completed the survey. Hence, the drop-out rate was 45% (Table 3). Results of the evaluation questions are also reported in Table 3, showing that the introduction was valued to be clear by most of the respondents, the same applies to the understanding of the choice tasks. Survey completion time was analysed and respondents with a completion time under ten minutes (n=37) were excluded from the survey. This led to the inclusion of 201 respondents in the analyses. They had a mean age of 37 years (SD=16.36) and two-third (n=133) of the respondents were female. The majority of the respondents was highly educated (81%) and/or employed (61%), more than half of the respondents had a monthly net income under €2500. Moreover, 52 (26%) of the respondents reported to work in the health care sector. Self-rated health was good or excellent by the majority of the respondents. 24 respondents (12%) were suffering from one or more chronic disease(s) (Table 4).

Table 3
Descriptive statistics & Survey evaluation questions

		N (%)
Completes		238 (100)
Drop-outs		194 (44.9)
Survey completion time		
	0-5 min	0 (0)
	5-10 min	37 (15.6)
	10-15 min	73 (36.3)
	15-20 min	56 (27.9)
	20-25 min	24 (11.9)
	> 25 min	48 (23.9)
Introduction clarity		
	Disagree	25 (12.4)
	Neutral	49 (24.4)
	Agree	127 (63.2)
Understanding of choice tasks		
	Disagree	13 (6.5)
	Neutral	36 (17.9)
	Agree	152 (75.6)

Table 4

Respondents' characteristics.

		Respondents (%) (n=201)
Female		133 (66.2)
Age (mean, SD)		36.61 (16.4)
Education		
	Low	23 (11.4)
	Medium	15 (7.5)
	High	163 (81.1)
Employment status		
	Employed	123 (61.2)
	Student	61 (30.4)
	Unemployed	6 (3.0)
	Pensioned	11 (5.5)
Net income (monthly)		
	< € 2500	128 (63.7)
	> € 2500	73 (36.3)
Employment in healthcare sector		52 (25.9)
	MSC	16 (30.8)
	PC	0 (0.0)
	MHC	5 (9.6)
	GPC	5 (9.6)
	PLC	5 (9.6)
	Policy	2 (2.9)
	Other	19 (36.5)
Chronic disease(s)		
	Non	177 (88.1)
	1	20 (10.0)
	>1	4 (2.0)
Self-rated health		
	Bad	4 (2.0)
	Neutral	12 (6.0)
	Good	118 (59.0)
	Excellent	67 33.3)

Note. MSC: medical specialist care, PC: pharmaceutical care, MHC: mental health care, GPC: general practitioner care, PLC: prevention/lifestyle-related care.

One-fifth of the respondents reported to smoke (21%), with 9 daily smokers (4%) and 33 incidental smokers (16%). Alcohol intake was excessive in 51 respondents (25%) and 49 respondents (24%) reported physical activity not complying with the norm according to the Dutch exercise guidelines (Kenniscentrum sport & bewegen, 2021). BMI calculations from the collected weight and height values resulted in 1 underweighted respondent (0.1 %), 144 normally weighted respondents (72%) and 55 respondents being overweight (27%). The mean BMI in the study population was estimated to be 23.59 ± 3.52 (mean ± SD). Based on these variables, respondents were defined to have an (un)healthy lifestyle dependent on their number of unhealthy lifestyle behaviours, as described in the method section. This resulted in 55 respondents (28%) being assigned to the unhealthy lifestyle group. (Table 5)

Table 5
Lifestyle variables

		Respondents (%) (n=201)
Smoking		
	Daily	9 (4.5)
	Incidental	33 (16.4)
	Ex-smoker	8 (4.0)
	Never	151 (75.0)
Alcohol intake		
	Excessive	51 (25.4)
	Normal	131 (65.2)
	Never	19 (9.5)
Physical activity		
	Under norm	49 (24.4)
	Norm	72 (35.8)
	Above norm	80 (39.8)
BMI (23.59 ± 3.52)		
	Underweight	1 (0.5)
	Normal weight	144 (71.6)
	Overweight	55 (27.4)
Lifestyle		
	Unhealthy	55 (27.5)
	Healthy	145 (72.5)

4.2. DCE results

Table 6 presents the DCE results of the mixed logit model in detail. All attributes have the same (expected) signs for its attribute levels, reflecting a negative utility for a decrease of care compared to the current basic package and a positive utility for relatively more of that specific type of care in the basic package. The majority of the attribute levels proved to be significant ($p < 0.05$), except for coefficients of the attribute levels of medical specialist care (0.17) and pharmaceutical care (0.17) that reflected a higher percentage compared to the current situation. From this, and the size of the coefficients, follows that those attributes are relatively less important for the decision-making process. General practitioner care (-2.40***, 0.56***) and prevention/lifestyle-related care (-2.97***, 1.12***) proved to be the most important attributes considering their relative magnitude. Mental healthcare showed significant levels in both directions (-1.43***, 0.31*). The price attribute also yielded the expected signs with positive utility (0.42**) for a decline in the monthly premium and vice versa (-1.01***). The negative opt-out coefficient (-0.44*) implies that participants derived less utility from the-opt out compared to the base case levels. The estimated standard deviation (SD) coefficients are all significant, reflecting preference heterogeneity in all attribute levels. This is also reflected in the minimum and maximum values of the coefficients from the individual beta-parameters. In particular, the lower levels of mental health care (SD: 2.17***) and prevention/lifestyle-related care (SD: 3.13***) showed a high preference heterogeneity. The ideal basic package consists of all attribute levels at their highest percentage (30%, 15%, 15%, 15%, 10%) and a monthly premium decrease of 5 euros. The probability of this package being chosen compared to the base case, the

current basic package, is 93.93%. The probability of the package being chosen in which more prevention/lifestyle-related care is reimbursed (10%), with all other attributes set at their base case level, is 75.31%, compared to the base case package. When prevention is set at its lowest level (0%), the probability decreases to 4.87%.

Table 6

DCE results mixed logit

Mixed logit				Individual β			
		Coeff	[95% CI]	Min	Max	SD	[95% CI]
Medical specialist care							
	20%	-1.54***	[-1.95, -1.14]	-4.87	3.80	1.82***	[1.32, 2.32]
	30%	0.17	[-0.11, 0.45]	-1.83	2.67	1.09***	[0.72, 1.45]
Pharmaceutical care							
	5%	-1.21***	[-1.60, -0.82]	-5.13	2.62	1.78***	[1.31, 2.25]
	15%	0.17	[-0.10, 0.45]	-1.76	2.90	1.04***	[0.71, 1.38]
Mental health care							
	5%	-1.43***	[-1.87, -0.98]	-7.21	2.43	2.17***	[1.67, 2.67]
	15%	0.31*	[0.02, 0,60]	-2.40	2.77	1.29***	[0.95, 1.64]
General practitioner care							
	5%	-2.40***	[-2.81, -1.99]	-5.21	0.96	-1.31***	[-1.72, -0.90]
	15%	0.56***	[0.30, 0.82]	-1.32	1.88	0.76***	[0.37, 1.16]
Prevention/lifestyle-related care							
	0%	-2.97***	[-3.60, -2.35]	-11.17	5.12	3.13***	[2.42, 3.83]
	10%	1.12***	[0.81, 1.42]	-2.45	5.46	1.73***	[1.41, 2.05]
Premium change (monthly)							
	- €5,00	0.42**	[0.12, 0.71]	-1.93	2.99	1.24***	[0.86, 1.61]
	+ €5,00	-1.01***	[-1.36, -0.67]	-4.27	1.70	1.39***	[0.93, 1.84]
Opt-out							
		-0.44*	[-0.81, -0.06]	-2.93	2.18	1.15***	[0.80, 1.49]

Note. *p<0.05 **p<0.01 ***p<0.001. Sign of the estimated standard deviations is irrelevant: interpret them as being positive.

4.2.1. Influence of lifestyle

To quantify the effect of lifestyle on preferences for prevention and lifestyle-related care, interaction terms were added to the mixed logit model. The 'unhealthy' group was interacted with the attribute levels of prevention and lifestyle-related care. Table 7 represents the estimates of this model. The addition of the interaction terms resulted in minor changes to the coefficients of the attributes not related to the prevention/lifestyle-related care attribute. As a result of the interaction terms, the coefficients for the latter attribute can be interpreted as belonging to the 'healthy' group. These show a significant positive utility (1.18***) for more prevention in the basic package and a significant negative utility (-2.56***) for a decrease of prevention/lifestyle-related care in the basic package. Looking at the relative magnitude of the coefficients, there is more aversion against less prevention-related care in the basic package than there is positive valuation for more of that attribute in the basic package. The estimated standard deviations (3.36***, 1.63***) show that there is a significant preference heterogeneity among the study population. The 'unhealthy' group, which exists of 55 participants, has a negative utility for both more (-0.02) and less prevention-related care (-0.58) in the basic package compared to the base case, the current basic package. Note that the coefficients are not significant and of a small magnitude.

Table 7

DCE results mixed logit with interactions

Mixed logit with interactions				Individual β			
		Coeff	[95% CI]	Min	Max	SD	[95% CI]
Medical specialist care							
	20%	-1.51***	[-1.89, -1.12]	-5.17	3.06	1.54***	[1.06, 2.03]
	30%	0.11	[-0.18, 0.40]	-2.52	1.96	1.05***	[0.65, 1.45]
Pharmaceutical care							
	5%	-1.20***	[-1.58, -0.82]	-4.89	2.73	1.65***	[1.22, 2.07]
	15%	0.25	[-0.03, 0.54]	-2.12	2.18	1.07***	[0.67, 1.47]
Mental health care							
	5%	-1.13***	[-1.52, -0.73]	-6.50	2.16	2.09***	[1.58, 2.60]
	15%	0.28	[-0.02, 0.58]	-3.07	2.15	1.38***	[1.04, 1.71]
General practitioner care							
	5%	-2.42***	[-2.85, -1.99]	-5.91	1.19	1.56***	[0.97, 2.15]
	15%	0.50***	[0.23, 0.78]	-1.40	2.39	0.96***	[0.54, 1.39]
Prevention/lifestyle-related care							
	0%	-2.56***	[-3.27, -1.86]	-8.61	5.70	3.36***	[2.64, 4.08]
	10%	1.18***	[0.80, 1.56]	-1.99	2.81	1.63***	[1.30, 1.96]
Premium change (monthly)							
	- €5,00	0.38*	[0.08, 0.67]	-1.99	2.81	1.17***	[0.83, 1.51]
	+ €5,00	-1.04***	[-1.40, -0.69]	-4.76	3.47	1.63***	[1.18, 2.08]
Opt-out							
		-0.41*	[-0.79, -0.03]	-3.33	2.27	1.23***	[0.78, 1.68]
Interactions							

Prevention 0%xunhealty	-0.58	[-1.69, 0.52]	-1.92	0.78	0.46	[-0.34, 1.27]
Prevention 10%xunhealthy	-0.02	[-0.66, 0.63]	-2.68	2.73	1.05*	[0.19, 1.91]

Note. *p<0.05 **p<0.01 ***p<0.001. Sign of the estimated standard deviations is irrelevant: interpret them as being positive.

4.3. Prevention Statements

Participants were asked to give their opinion on several propositions concerning prevention (5-point scale). These statements are described in detail Table 8. Table 9 shows the results, stratified on lifestyle. As the statements were valued on a 5-point scale, a low score means a relatively low rate of agreement, whereas a high score displays high agreement. 'Agreement' is achieved when the participants chose either '4' or '5' on the 5-point Likert scale. Statements 1 and 4 yielded the most agreement by both groups. Statement 2 shows the most heterogeneity when it comes to agreement with the statement. These findings are in accordance with the previous results, implying a preference for more emphasis on prevention and lifestyle-related care in the Dutch basic package. A chi-square test of independence was performed to examine the relationship between lifestyle and agreement with the prevention-statements. The relationship between these variables was significant for all statements. (Statement 1: X^2 (1, N=200) = 10.02, p=0.002; Statement 2: X^2 (1, N=200) = 139.74, p=0.000; Statement 3: X^2 (1, N=200) = 30.73, p=0.000; Statement 4: X^2 (1, N=200) = 36.90, p=0.000).

Table 8
Prevention statements

Statement 1: 'If a treatment can prevent complaints at a later age, that can be a reason to reimburse the treatment.'
Statement 2: 'Measures that contribute to more awareness of people concerning their lifestyle should qualify for reimbursement within the basic package.'
Statement 3: 'If lifestyle has played a role in the origin or persistence of a disease, this can be a reason to not reimburse the treatment.'
Statement 4: 'More money has to become available for the prevention of diseases instead of curing diseases.'

Table 9
Results prevention statements

	Healthy (n=145)			Unhealthy (n=55)			P-value for the Pearson's chi-square test
	Mean	SD	Agreement	Mean	SD	Agreement	
Statement 1	4.21	0.70	92.4%	4.15	0.55	94.6%	0.002**
Statement 2	3.77	0.92	71.0%	3.56	0.93	56.3%	0.000***
Statement 3	2.72	1.08	28.3%	2.62	1.07	21.8%	0.000***
Statement 4	4.21	0.75	85.5%	4.18	0.69	90.9%	0.000***

Note. 5-point Likert scale: (1) Strongly disagree; (2) Disagree; (3) Neither agree nor disagree; (4) Agree; (5) Strongly agree. Agreement: 4 or 5 on Likert scale.

Figures 3-6 show a visual representation of the results, also stratified on lifestyle.

Figure 3
Slideplot statement 1
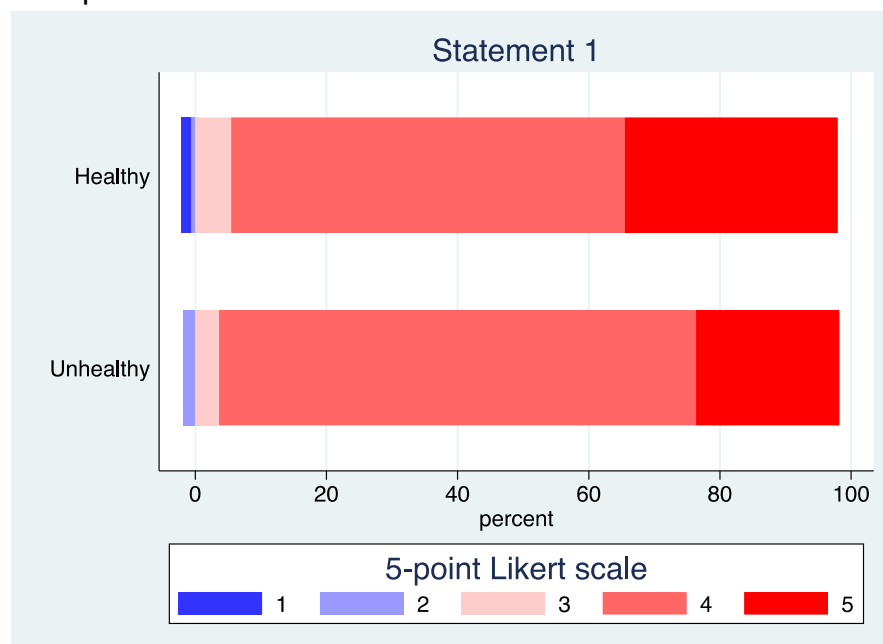
Note. 5-point Likert scale: (1) Strongly disagree; (2) Disagree; (3) Neither agree nor disagree; (4) Agree; (5) Strongly agree. Healthy (n=145), unhealthy (n=55).

Figure 4
Slideplot statement 2

Note. 5-point Likert scale: (1) Strongly disagree; (2) Disagree; (3) Neither agree nor disagree; (4) Agree; (5) Strongly agree. Healthy (n=145), unhealthy (n=55).

Figure 5
Slideplot statement 3

Note. 5-point Likert scale: (1) Strongly disagree; (2) Disagree; (3) Neither agree nor disagree; (4) Agree; (5) Strongly agree. Healthy (n=145), unhealthy (n=55).

Figure 6
Slideplot statement 4

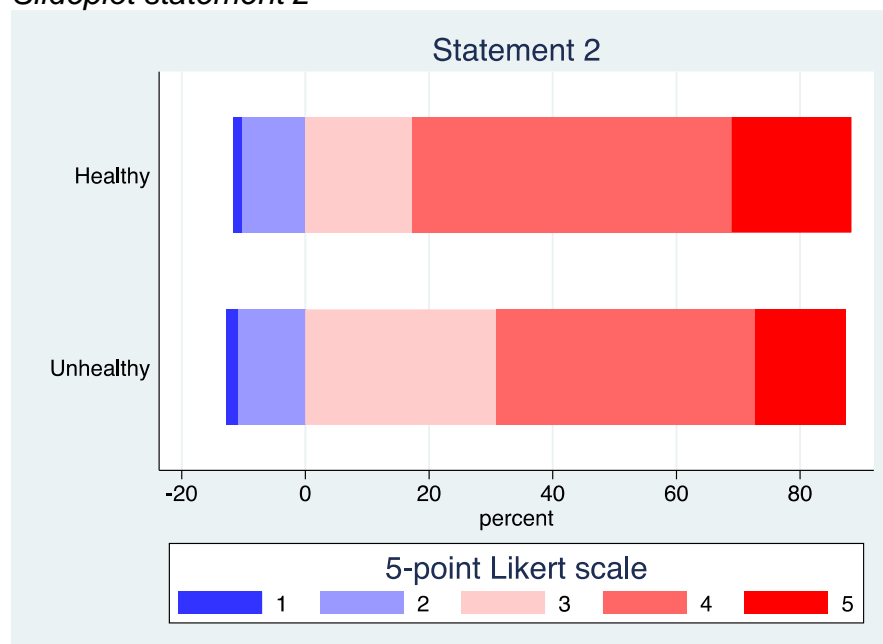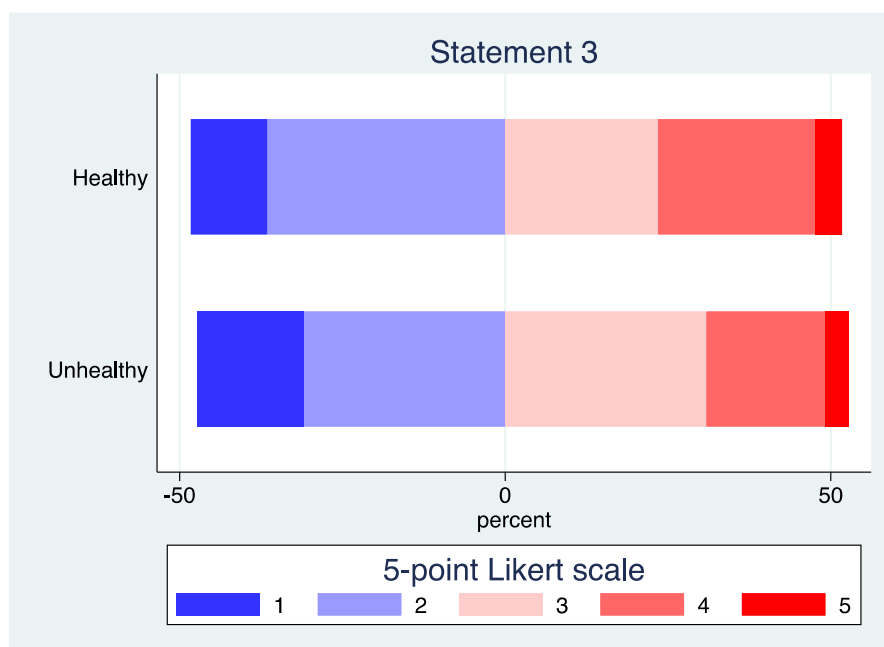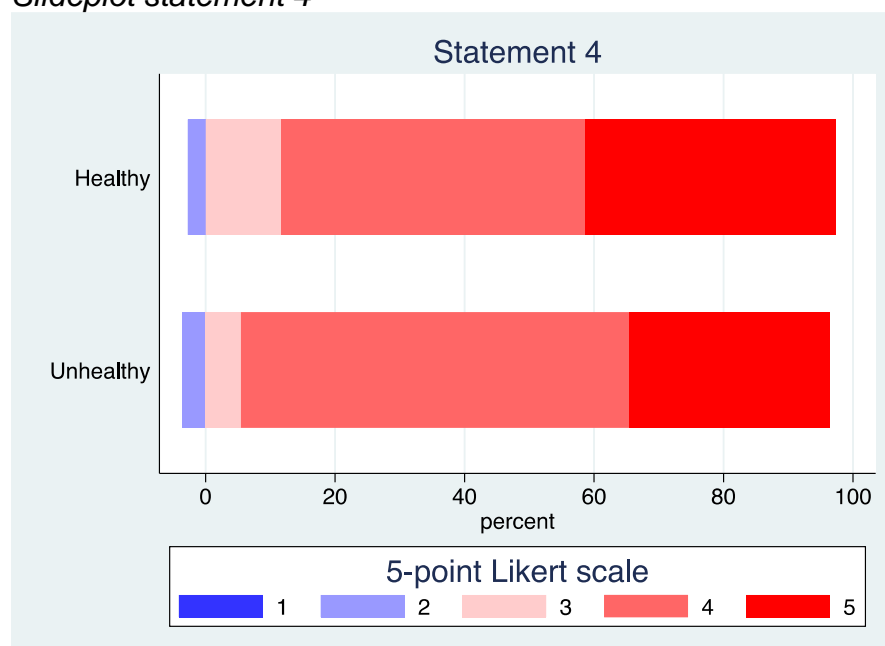*Note.* 5-point Likert scale: (1) Strongly disagree; (2) Disagree; (3) Neither agree nor disagree; (4) Agree; (5) Strongly agree. Healthy (n=145), unhealthy (n=55).

Chapter 5. Discussion and conclusion

5.1. Main findings

This is the first study to explore societal preferences for prevention and lifestyle-related care in the Dutch basic package. In this study, societal preferences for different combinations of care within the health insurance package were assessed to quantify the relative societal preferences regarding inclusion of prevention and lifestyle-related care, in relation to other types of healthcare, in the basic health insurance package. An additional subject of interest was the influence of different lifestyle patterns on preferences for the composition of the health insurance package. This study shows that there is a strong societal preference for the reimbursement of prevention or lifestyle-related care in the basic package. This follows from the significant positive valuation of a relative increase of prevention-related healthcare in the basic package, with a choice probability of 75% compared to the base case package. There is also a strong aversion against no reimbursement of this type of care, with a choice-probability of the basic package with no prevention or lifestyle related care of only 5%. Having an 'unhealthy' lifestyle did not significantly impact preferences for prevention and lifestyle-related care.

Moreover, it can be concluded that the Dutch population seems reluctant towards decreasing the money spent on the four types of healthcare with the highest budgetary impact, considering the estimated significant negative coefficients. All attributes were significantly important in the decision-making process, but general practitioner care and prevention and lifestyle-related care had the strongest impact on the decision for a certain basic package. The attribute levels implying a relative increase of medical specialist care and pharmaceutical care were the only non-significant findings. This can possibly be explained by the fact that only 12 percent of the participants reported to suffer from one or more NCD('s), while it was estimated that 57 percent of the Dutch population was suffering from a NCD in January 2019 (Volksgezondheidenzorg.info, 2020). This implies that that the study population was relatively healthy, and as the participants were asked what their preferences would be if they had to choose a basic package for themselves, it is plausible that medical specialist care and pharmaceutical care are not that important.

Significant preference heterogeneity was found in all attribute levels, showing that individuals differ in their preferences for healthcare reimbursement. An unhealthy lifestyle was found not to significantly impact preferences for prevention-related healthcare in the basic package, as no significant relationship was found between an unhealthy lifestyle pattern and preferences for more or less reimbursement of prevention and lifestyle related care. This is a bit surprising, as the expectation would be that the people more in need of this care, as a result of their unhealthy lifestyle, would indicate a stronger preference. Possible explanations for this finding are that the 'unhealthy' group was too small (n=55) to result in significant findings. Also, it might be hypothesized that their unhealthy lifestyle is (partly) a result of a disinterest in healthy living and therefore also no interest in care related to a healthy lifestyle is present. The presence of chronic diseases is fairly similar in the unhealthy (11%) and healthy groups (11%), so this cannot explain why there is not such a convincing preference in the unhealthy group as seen in the healthy group.

This is the first study to explore societal preferences for prevention and lifestyle-related care in the Dutch basic package; however, previous studies explored citizens preferences on healthcare allocation. Bijlmakers et al. (2020) found that, following a citizen forum, participants found it appropriate to reimburse preventive services aimed at supporting people in changing their unhealthy lifestyle as they might lead to better health and cost savings. They reported more disagreement concerning reimbursement of treatments for conditions related to lifestyle. This is in accordance with Van der Star & van den Berg (2011), who found that willingness to pay among the general population for treatment reimbursements in the basic health insurance package unrelated to behaviour is much higher than for a behaviour-related health problem. There are several studies that examined the societal preferences for the availability of publicly funded preventive and curative health care interventions (Bosworth, 2010; Corso, 2006; Mortimer & Segal, 2006; Schwappach, 2002; Ubel et al, 1998). Those studies revealed varying results. It seems that there is a tendency and willingness to pay for the prevention of diseases by improving lifestyle, but when lifestyle has a role in the origin of a disease, there is more discussion whether treatment for that disease should be reimbursed. In this study, the participants were also asked to value the statement 'If lifestyle has played a role in the origin or persistence of a disease, this can be a reason to not reimburse the treatment.' The statement had to be rated on a 5-point scale, with 1 corresponding to 'completely disagree' and 5 to 'completely agree'. This resulted in a mean of 2.72 ± 1.08 in healthy people and 2.62 ± 1.07 in unhealthy people, showing a mild overall tendency to agree with this statement.

5.2. Strengths & Limitations

A strength of this study is the use of qualitative methods for the pilot. Think-aloud sessions were implemented to ensure that the survey was of sufficient quality, to rule out unclarities and to confirm the choice of attributes. Even better would have been the addition of a complete qualitative study with interviews or focus groups to ascertain that relevant attributes are used. This also gave some insights in the minimal time necessary to complete the survey in a thorough manner. According to Grezki et al. (2015), very short response times are a sign of low data quality. By implementing a minimum completion time and the exclusion of participants not meeting that condition, the possibility of 'speeders' was minimized. Task complexity was reduced by colour coding and the addition of symbols to the different attribute levels, indicating a decrease (↓), increase (↑) or no change (=). It has to be noted that the method of colour coding used in this study, colouring the text of the attribute level, is slightly different from the method described in the literature (Jonker et al, 2018), in which the complete background of an attribute level is coloured. According to Jonker et al. (2018), colour coding and other visually informative presentations can be used to reduce the dropout rate and improve attribute attendance.

Due to the fact that there is a cap with regard to the number of attributes that can be used in a DCE to prevent high complexity (Clark et al, 2014), not all types of health care that are reimbursed within the basic package could be set as attributes. As a consequence, this care was bundled and referred to as 'other care'. Consequently, the percentages in the choice tasks did not add up to 100 percent and the remainder of the budget, the remaining percentage, is meant for 'other care'. This percentage varied from 15 to 65 percent, depending on the height of the attribute levels.

Participants were alerted to the presence of this health care and that it was represented by the remaining percentage in the choice tasks, but it was not possible to extensively explain which types of care were classified in the 'other care' group, as the survey already included a lot of text and explanation. Consequently, participants might have overlooked the healthcare not covered by the attributes. This may have resulted in an overvaluation of the attributes, as no clear trade-off had to be made with regard to 'other care'. Visualizing the percentage devoted to 'other care' in each choice alternative could have simplified this, but as the survey consisted of three different designs which were presented randomly, this was not possible.

An important consideration that was made during the survey development phase related to the resemblance to reality of the attribute levels and the opt-out, referred to as the current basic package. It was decided to approximate the current basic package and reduce the differences between the attributes to be able to observe unbiased preferences, without attributing a certain importance to certain attributes because of the current spending. This led to small changes with regard to the attributes pharmaceutical care (11.28% → 10.00%), mental health care (8.18% → 10.00%) and general practitioner care (7.54% → 10.00%) (Zorginstituut Nederland, 2015). Relatively major changes were made with respect to the attributes medical specialist care (51.30% → 30.00%) (Zorginstituut Nederland 2015) and prevention/life-style related care (0.46% → 5.00%) (van Gils et al, 2020). These major changes led to a less realistic basic package in the survey but were necessary to observe preferences not biased by the current Dutch situation. It was also necessary to simplify the choice tasks. Because relatively high weight was given to a realistic demonstration of reality in the choice tasks, the steps between the attribute levels were set relatively small. A disadvantage of this approach is that it probably led to a higher complexity of the choice tasks. Moreover, because differences were small, a decrease or increase of a specific type of care in the basic package might not have meant that much to the participants. An alternative approach would have been to choose less realistic attribute levels, with higher steps between the attribute levels. This would have simplified the choice tasks and it would have been easier to detect relative preferences for prevention and lifestyle-related care in relation to the other healthcare types. However, with this approach, it would have been more difficult to extrapolate the results because the numbers used are further from reality.

A few other limitations need to be acknowledged. Because the survey was distributed in the authors' own network, there is a risk of convenience sampling bias. This type of bias occurs when the sample is chosen as a consequence of the convenience of the investigator. This causes the data to be ungeneralizable beyond the sample, which impacts the external validity of the results (Acharya et al, 2013). This probably also influenced the representativeness of the study sample for the Dutch adult population. For example, the degree of highly educated people is 81.09% in the sample, while in the general Dutch population, this is only 33.00% (Onderwijs in cijfers, 2019). The same goes for the distribution of age, which is the following in the Netherlands: 22% under twenty, 25% between twenty and forty, 34% between forty and sixty-five, 15% between sixty-five and eighty and 5% above eighty (CBS, 2021). In the study sample, this distribution is respectively: 1.49%, 64.18%, 27.86%, 6.47% and 0%. Further research in this area should focus on a more representative sample, for example by using different methods to gather participants.

A good option would be the use of an independent survey sample provider, with the big disadvantage that financial resources are necessary to make this possible.

The average drop-out rate in general invitation online surveys is about 30 percent (Galesic, 2006). With a rate of 45%, this survey has a relatively high drop-out rate. There are several possible explanations to this. Firstly, the DCE design was fairly complex, using a lot of rates and numbers, which might have caused problems with the understanding of the choice tasks. However, only 6.47% of respondents reported to not understand the choice tasks, indicating that the results have been impacted only little by participants with low understanding of the DCE. Still, alternatives should be sought for the use of percentages, as this does promote high task complexity (de Bekker-Grob et al, 2018). Secondly, the survey was relatively long consisting of 47 pages, 28 questions, 14 choice tasks and long texts. The mean survey length for all completes, after removing outliers (completion time >100 minutes, n=10) from the dataset, was 21.14±14.31 minutes (median 16.45 minutes). This is slightly above the general and rough benchmark of maximum survey length according to Callegaro et al. (2015), which is 20 minutes. The long survey length could be a reason for participants to drop-out. Thirdly, no incentives to complete the survey were in place. According to Callagero et al. (2015), incentives have been proved to be effective in increasing the response and completion rate in web surveys.

5.3. Conclusions & Recommendations

In summary, there is a strong societal preference for more reimbursement of prevention and lifestyle-related care in the basic package. Moreover, the healthcare reimbursed within the basic package that relatively uses the most financial resources is also deemed important, as there seemed to be aversion against a diminution of that healthcare in the basic package. Having an unhealthy lifestyle did not significantly impact preferences for more or less reimbursement of prevention related healthcare in the basic package. Also, significant preference heterogeneity was found for all different healthcare types.

If more resources would be devoted to prevention, this will be at the expense of other healthcare in the basic package. Further research should focus more on this trade-off and should therefore include all healthcare that is reimbursed within the basic package in the study, to enforce participants to make their choice taking all the available care into account. It would also be interesting to see what preferences are when taking different perspectives. In this study participants were asked which package they would prefer if they had to choose for themselves. This individual perspective probably causes people to choose based on their own (expected) health problems, and therefore there is a lot of heterogeneity in the study sample. The same kind of questions can also be asked to policymakers, physicians or citizens taking the societal perspective, so asking what would be best for society instead of taking the individual approach.

It is encouraging that there seems to be a tendency to increase the share of prevention and lifestyle related care in the basic package. This is necessary as the NCD-burden is growing (Volksgezondheidenzorg.info, 2020) and preventive interventions aimed at improving lifestyle could be beneficial for patients suffering from NCDs or at risk of developing them (WHO, 2018). Our findings can be used by

policymakers to guide their decisions on the contents of the basic package in the Netherlands. Additionally, for insurers the importance of knowing societal preferences is growing, as this enables them to match their offer with these preferences. Insurers who insufficiently respond to the demand will eventually price themselves out of the market, because potential clients have the ability to choose, meaning they will insure themselves with insurers that do respond to their preferences (Van der Burgt et al, 2006). As insurers do not impact which care is included in the basic package, it is relevant for them with regard to additional insurance coverage. Further research using a more extensive and representative sample, taking all relevant healthcare in the basic package into account could verify and support our results. If these results get confirmed, there is a strong incentive for policy makers to plead for more emphasis on prevention and lifestyle-related care in the basic package. As the saying goes: 'Prevention is better than cure'.

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Appendices

Appendix A

Ngene design pilot

```
design
;alts=altA,altB,altC
;eff=(mnl,d,mean)
;bdraws=halton(1000)
;rows=36
;block=3
;alg=mfederov
;reject:
altA.MSZ=25 and altA.FZ=10 and altA.GGZ=10 and altA.HZ=10 and altA.PZ=5,
altB.MSZ=25 and altB.FZ=10 and altB.GGZ=10 and altB.HZ=10 and altB.PZ=5,
altA.MSZ=20 and altA.FZ=5 and altA.GGZ=5 and altA.HZ=5 and altA.PZ=0,
altB.MSZ=20 and altB.FZ=5 and altB.GGZ=5 and altB.HZ=5 and altB.PZ=0
;model:
U(altA)= b1.dummy[(u,-0.15,-0.05)| (u,0.05,0.15)]
*MSZ [20,30,25]
+ b2.dummy[(u,-0.15,-0.05)|(u,0.05,0.15)]
*FZ [5,15,10]
+ b3.dummy[(u,-0.15,-0.05)|(u,0.05,0.15)]
*GGZ [5,15,10]
+b4.dummy[(u,-0.15,-0.05)|(u,0.05,0.15)]
*HZ [5,15,10]
+b5.dummy[(u,-0.15,-0.05)|(u,0.05,0.15)]
*PZ [0,10,5]
+b6.dummy[(u,0.05,0.15)|(u,-0.15,-0.05)]
*P [-5, 5, 0]
/
U(altB)= b1.dummy*MSZ
+ b2.dummy*FZ
+ b3.dummy*GGZ
+ b4.dummy*HZ
+ b5.dummy*PZ
+ b6.dummy*P
/
U(altC)= 0
$
```

Appendix B

Ngene design post-pilot

```
design
;alts=altA,altB,altC
;eff=(mnl,d,mean)
;bdraws=halton(1000)
;rows=36
;block=3
;alg=mfederov
;reject:
altA.MSZ=25 and altA.FZ=10 and altA.GGZ=10 and altA.HZ=10 and altA.PZ=5,
altB.MSZ=25 and altB.FZ=10 and altB.GGZ=10 and altB.HZ=10 and altB.PZ=5,
altA.MSZ=20 and altA.FZ=5 and altA.GGZ=5 and altA.HZ=5 and altA.PZ=0,
altB.MSZ=20 and altB.FZ=5 and altB.GGZ=5 and altB.HZ=5 and altB.PZ=0
;model:
U(altA)= b1.dummy[(n,-0.55,0.28)| (u,0.05,0.15)]
*MSZ [20,30,25]
+ b2.dummy[(n,-0.42,0.21)|(u,0.05,0.15)]
*FZ [5,15,10]
+ b3.dummy[(n,-0.51,0.26)|(u,0.05,0.15)]
*GGZ [5,15,10]
+b4.dummy[(n,-0.83,0.43)|(n,0.07,0.51)]
*HZ [5,15,10]
+b5.dummy[(n,-0.83,0.42)|(n,0.29,0.15)]
*PZ [0,10,5]
+b6.dummy[(u,0.05,0.15)|(n,-0.43,0.22)]
*P [-5, 5, 0]
/
U(altB)= b1.dummy*MSZ
+ b2.dummy*FZ
+ b3.dummy*GGZ
+ b4.dummy*HZ
+ b5.dummy*PZ
+ b6.dummy*P
/
U(altC)= 0
$
```

Appendix C

Results conditional logit model used to estimate post-pilot prior

Attributes	Levels	Mean (CI)
Medical specialist care	20%	-0.55*** (-0.79, -0.31)
	25%	b.c.
	30%	0.15 (-0.10, -0.40)
Pharmaceutical care	5%	-0.42* (-0.72, -0.11)
	10%	b.c.
	15%	0.19 (-0.02,0.40)
Mental health care	5%	-0.51*** (-0.85, -0.17)
	10%	b.c.
	15%	0.17 (-0.06,0.41)
General practitioner care	5%	-0.83*** (-1.18, -0.49)
	10%	b.c.
	15%	0.29* (0.07,0.51)
Prevention/lifestyle-related care	0%	-0.83*** (-1.20, -0.45)
	5%	b.c.
	10%	0.78*** (0.50,1.06)
Premium change (monthly)	- €5,00	0.25 (-0.08,0.58)
	€0,00	b.c.
	+ €5,00	-0.43*** (-0.68, -0.17)

Note. *p<0.05 **p<0.01 ***p<0.001. b.c.: base case level.

Appendix D

Survey

Please confirm that you understand and agree with each of the points below:

☐ I understand that my participation is voluntary.

☐ I understand that the purpose of this questionnaire is to gain more insight into my preferences for the composition of the basic benefit package.

☐ I understand that the questionnaire is anonymous and that my answers will be used for scientific purposes.

First, we would like to ask you some questions about yourself.

What is your age? [____]

What is your gender?

○ Male

○ Female

○ Undefined

What is your highest level of completed education?

○ Primary education

○ Pre-vocational Secondary Education (VMBO-g, VMBO-k or VMBO-b)

○ Secondary Education (VMBO-t/HAVO/VWO, etc.)

○ Secondary Vocational Education (MBO level 1)

○ Secondary Vocational Education (MBO level 2/3/4)

○ Higher Professional Education (HBO)

○ University Education (BSc)

○ University Education (MSc)

○ PhD

○ No education

What decribes your daily occupation best?

- ◯ Working, fixed contract
- ◯ Working, no fixed contract
- ◯ Self-employed without staff / Self-employed with staff
- ◯ Student and working
- ◯ Student and not working
- ◯ Unemployed, looking for a job
- ◯ Unemployed, not looking for a job
- ◯ Housekeeping/care
- ◯ Retired

What does your household look like?

- ◯ I live alone
- ◯ I live alone with a child/children
- ◯ I live with my partner
- ◯ I live with my partner and child/children
- ◯ I live with one or more roommates
- ◯ I live with my parents
- ◯ Other

What is your net income per month?

- ○ Up to 999 euros
- ○ 1000 - 1499 euros
- ○ 1500 - 1999 euros
- ○ 2000 - 2499 euros
- ○ 2500 - 2999 euros
- ○ 3000 - 3499 euros
- ○ 3500 - 3999 euros
- ○ 4000 - 4499 euros
- ○ 4500 - 4999 euros
- ○ 5000 euros or more
- ○ I would rather not say

Every adult Dutch person (18+) is obliged to purchase health insurance in the form of the basic healthcare package, for which a monthly premium is paid. The basic benefit package covers the costs for various types of care, such as a doctor's visit or medication.

For this study, we are interested in your preference for the composition of the basic healthcare package. You will be presented with three alternative basic healthcare packages each time. One of the options approximately represents the composition of the current basic package, the other options are variations on this. We will ask you which is your preferred option, viewed from your own perspective.

Now the five types of care are explained in three steps.

1) **Specialist medical care**: medical care for which you need a referral. This includes, for example, a visit to a medical specialist, such as an oral surgeon, internist or allergist, in the hospital.

2) **Pharmaceutical care**: care that contributes to a patient using his/her medicines as correctly, efficiently and safely as possible. This includes all registered medicines that are available at the pharmacy on prescription from a doctor.

In this study we use percentages that show how much of the total basic healthcare package is spent on the type of care in question. Here are a few examples:
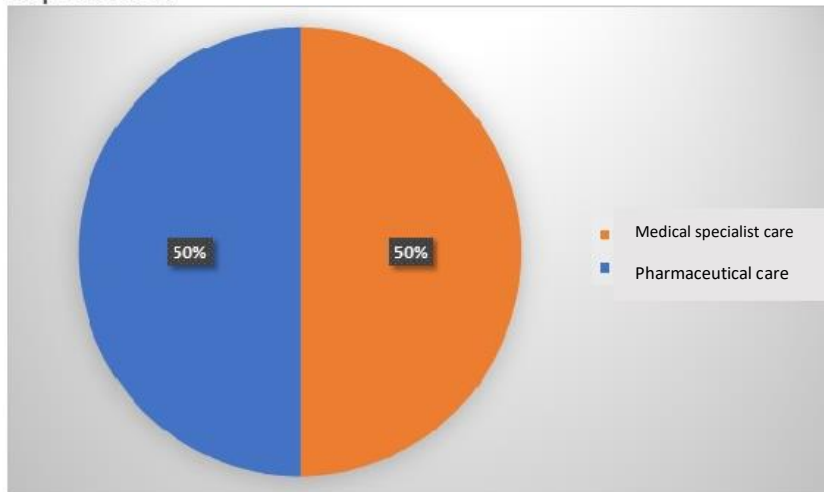

■ Pharmaceutical care

100%
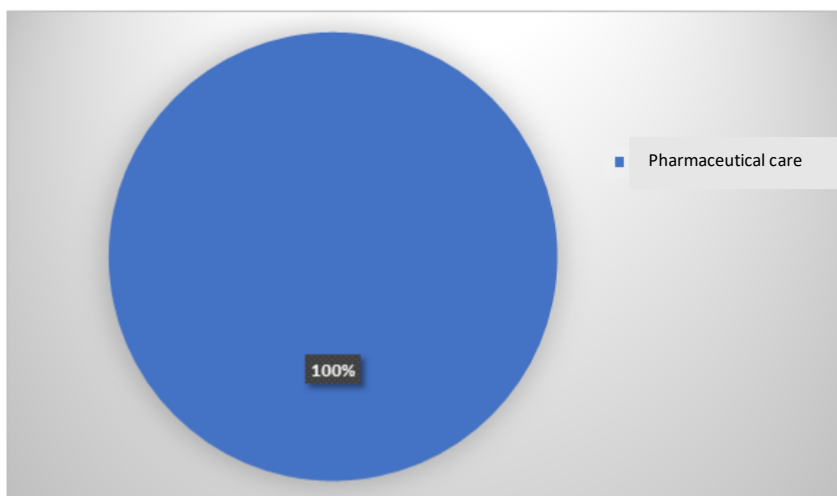
Explanation:
In the figure above you can see that the entire circle is colored blue. This means that 100% of the basic healthcare package consists of pharmaceutical care. In this example, medical specialist care would not be covered from the basic benefit package. For example, you would have to pay this yourself.

Explanation:

In the figure above, you can see that half of the circle is colored blue and the other half orange. This means that 50% of the basic healthcare package consists of pharmaceutical care and the other 50% consists of medical specialist care. In this example, general practitioner care would not be covered from the basic package. For example, you would have to pay this yourself.
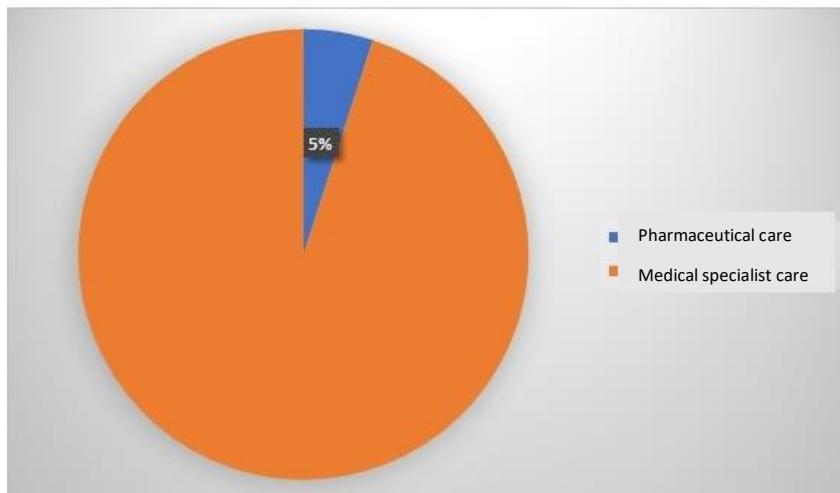
In this second example, 5% of the basic benefit package consists of pharmaceutical care and the remaining 95% consists of medical specialist care. In this example, general practitioner care would not be covered from the basic package. For example, you would have to pay this yourself.

To indicate how the percentages change compared to the current situation, the following signs and colors are used in the choice tasks:

↑ means that the percentage (%) (so the part of the basic healthcare package that includes that specific type of care) increases compared to the current situation. This is displayed in light purple.

↓ means that the percentage (%) (so the part of the basic healthcare package that includes that specific type of care) decreases compared to the current situation. This is displayed in dark purple.

= means that the percentage (%) (so the part of the basic healthcare package that includes that specific type of care) remains the same compared to the current situation. This is displayed in purpe.

Now step 2 of the explanation follows.

3) **Mental healthcare**: care that is aimed at preventing, treating and curing mental illnesses. This includes for example: basic mental health care (mild to moderate mental illnesses), specialist mental health care (severe, complicated mental illnesses) and the first three year of residence in a mental healthcare facility.

4) **General practitioner healthcare**: care that the general practitioner prescribes (e.g. medication), the diagnostics that the general practitioner orders outside his or her practice, a visit to the general practitioner and the health care that he or she refers to (e.g. physical therapist or medical specialist).

In addition to the two compositions of the basic healthcare package, a third option will be present in the choice tasks. This third option approximates the current basic package, it does not completely correspond, but for this research, you can assume that it depicts the current situation. Choose which option you think is the best for yourself.

On the next page a practice question follows to become acquainted with the choice tasks and previously explained concepts.

In the Netherlands, the content of the basic package is determined by the government. Imagine that you had a choice yourself, which basic package then has your preference?

	Basic package 1	Basic package 2	Current basic package
General practitioner care ❶	10% (=)	10% (=)	10%
Mental healthcare ❶	5% (↓)	15% (↑)	10%
	Select	Select	Select

Explanation:
The percentage indicates how much of the total basic healthcare package consists of that type of care.
This is not a comprehensive description of the basic healthcare package. There is still a lot of care that falls within the basic package that is not directly included in this survey. The remaining % therefore always concerns other care and can vary between 15% and 65% depending on the composition you choose.

Now the third and final step of the explanation follows:

5) **Prevention/lifestyle-related care**: care that is aimed at improving health, early detection of diseases and prevention of health problems or negative consequences of already present diseases. This entails for example prevention programmes like education and physical exercise programs.

6) **Premium change (monthly)**: in the Netherlands everybody pays a monthly premium for health care within the basic package. This is a fixed amount of 125 monthly. In this research, this amount will stay equal, or change with +€5 or -€5.

The different types of care relevant to this questionnaire are all introduced now. In the pie chart beneath they are all displayed. In this figure, the current basic healthcare package is shown.

Contents current basic package

- Pharmaceutical care
- Medical specialist care
- Mental health care
- General practitioner care
- Prevention/lifestyle-related care
- Other care
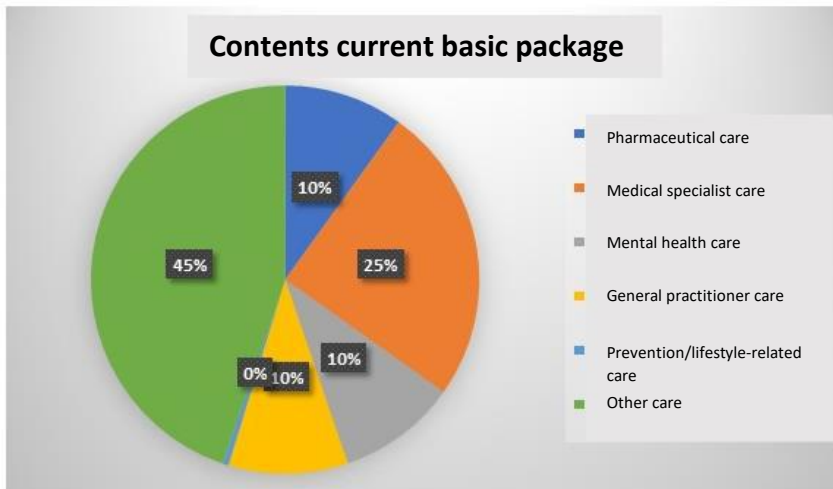
The different compositions of the basic healthcare package that are represented to you are not complete. There is still a lot of health care that falls within the basic package but is not directly represented in this research. The remaining percentage concerns 'other care' and can vary between 15% and 65%, depending on the composition chosen. In the pie chart, 'other care' is depicted in green.

Now the last practice exercise follows.

In the Netherlands, the content of the basic package is determined by the government. Imagine that you had a choice yourself, which basic package then has your preference?

	Basic package 1	Basic package 2	Current basic package
Medical specialist care	30% (↑)	20% (↓)	25%
Pharmaceutical care	15% (↑)	10% (=)	10%
Mental healthcare	15% (↑)	5% (↓)	10%
General practitioner care	15% (↑)	10% (=)	10%
Prevention/lifestyle-related care	10% (↑)	5% (=)	5%
Premium change (monthly)	€5 euro minder (↓)	€5 euro meer (↑)	€0
	Oefening3_Fixed1	Oefening3_Fixed1	Oefening3_Fixed1

Explanation:
The percentage displays the amount of the total basic package that consists of that specific type of health care.

This is no complete description of the basic package. There is still a lot of healthcare that is covered within the basic package but not represented in this research. Therefore, the remaining % concerns 'other care'.

You have completed the introduction and the example questions to get familiar with the choice tasks.

On a scale of 1 (strongly disagree) to 5 (strongly agree), to which extent do you agree with the following statement?

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The introduction was clear.	○	○	○	○	○

You have completed the tutorial. The first 6 (of the total 12) choice tasks will now follow.

Which basic package would you prefer if you could choose for yourself?

	Basic package 1	Basic package 2	Current basic package
Specialist medical care	30% (↑)	25% (=)	25%
Pharmaceutical care	15% (↑)	15% (↑)	10%
Mental healthcare	15% (↑)	10% (=)	10%
General practitioner care	5% (↓)	5% (↓)	10%
Prevention/lifestyle related care	10% (↑)	0% (↓)	5%
Premium change (per month)	€5 euro less (↓)	€5 euro less (↓)	€0
	CBC_Random1	CBC_Random1	CBC_Random1

Explanation:
The percentage indicates how much of the total basic package consists of that type of care.
This is not a comprehensive description of the basic package. There is still a lot of care that falls within the basic package that is not directly included in this survey. The remaining % therefore always concerns other care and can vary between 15% and 65% depending on the composition you choose.

Thank you for repeatedly answering the same kind of questions.
This is important for us to know your preferences regarding the basic healthcare package.

You have answered 6 of the 12 choice tasks. One evaluation question follows now.

On a scale from 1 (strongly disagree) to 5 (strongly agree), to what extent do you agree with the following statement?

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I understand the questions so far.	○	○	○	○	○

Now the final 6 choice tasks will follow.

You have completed the 12 choice tasks! In the next part of the questionnaire, we would like to ask you a few more in-depth questions.

Do you work in the healthcare sector?

○ Yes

○ No

In which of the following sectors are you employed?

○ Specialist medical care

○ Pharmaceutical care

○ Mental healthcare

○ General practitioner care

○ Prevention/lifestyle related care

○ As a policy officer/advisor in health care

○ Others

Some questions related to the basic healthcare package follow below:

Suppose you could put together the basic healthcare package of your choice, but you would have to pay an extra premium every month. How much extra would you be willing to pay per month for this? The monthly health care premium is currently about €125 per month.

○ €5 extra (so €130 per month)

○ €10 extra (so €135 per month)

○ €15 extra (so €140 per month)

○ More than €15 extra (so more than €140 per month)

○ I don't want to change anything, so €0 extra (so €125 per month)

How would you rate your own knowledge of the basic healthcare package and health insurance in the Netherlands?

Very little knowledge	Little knowledge	Neutral	Good knowledge	Very good knowledge
○	○	○	○	○

How satisfied are you with the composition of the current basic health package?

Very unsatisfied	Unsatisfied	Neutral	Satisfied	Very satisfied
○	○	○	○	○

We will now ask you some questions related to your health and the coronavirus:

Do you have one or more long-term or chronic diseases? (e.g. diabetes, high blood pressure, rheumatism, lung disease, cancer)?

○ I have no long-term or chronic diseases

○ I have one long-term or chronic diseases

○ I have several long-term or chronic diseases

In general, how do you rate your health?
(from 0 to 10 where 0 is very bad and 10 is very good)

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Have you tested positive and been contaminated with covid-19 in the past?

○ No, I have not been contaminated

○ Yes, I have been contaminated and had a mild course of disease

○ Yes, I have been contaminated and had a severe course of disease

How long have you been unable to carry out your daily activities due to (persistent) health problems caused by the coronavirus?

○ I have had no health problems

○ < 1 week

○ 1 to 3 weeks

○ 3 to 6 weeks

○ > 6 weeks

Now some questions related to your lifestyle will follow:

What is your height in cm? [   ]

What is your weight in kg? [   ]

If you prefer not to answer this question, you can leave the answer field empty.

Do you smoke, and if so how much?

○ No

○ Incidental

○ 0-10 times a day

○ 10-20 times a day

○ > 20 times a day

○ Ex-smoker, stopped < 5 years ago

○ Ex-smoker, stopped > 5 years ago

What is your (average) alcohol consumption?

○ Never

○ Incidental

○ 1-7 glasses per week

○ 7-14 glasses per week

○ 14-21 glasses per week

○ > 21 glasses per week

Which description of physical activity fits you best?

○ **Less than 2.5 hours a week** of moderate intensity exercise (e.g. walking or cycling) & **less than twice a week** of muscle and bone strengthening activity (e.g. weight training)

○ **2.5 hours per week** moderate-intensity exercise (e.g. walking or cycling) & **twice per week** muscle and bone strengthening activities (e.g. weight training)

○ **More than 2.5 hours per week** of moderately intense exercise (e.g. walking or cycling) & **more than twice a week** of muscular and bone-strengthening activity (e.g. weight training)

Finally, we would like to ask you some prevention-related questions.

On a scale from 1 (strongly disagree) to 5 (strongly agree), to what extent do you agree with the following statements?

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
If a treatment ensures that complaints can be prevented later in life, that is a reason to reimburse the treatment.	○	○	○	○	○
Measures that contribute to people's awareness of their lifestyle should be eligible for reimbursement within the basic health insurance package.	○	○	○	○	○
If lifestyle has played a role in the occurrence or continuation of a disorder, this may be a reason not to reimburse the treatment.	○	○	○	○	○
More money should be made available for preventing diseases instead of curing them.	○	○	○	○	○

How important do you think the following types of prevention are? Drag the types of prevention from left to right in order of preference.

Types of prevention to rank	Most wanted
Interventions aimed at nutrition and the prevention of overweight	
Interventions aimed at physical activity	
Interventions aimed at mental health	
Interventions aimed at addiction	Less wanted

Do you have any feedback?

This is the end of the survey. We would like to thank you very much for your participation! Please click on the arrow to hand in your answers.