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Determinants of preferences for lifestyle changes versus medication and beliefs in ability to maintain lifestyle changes. A population-based survey

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ABSTRACT

Preferences for medication treatment versus lifestyle changes are of major importance in the management of chronic diseases. This study aims to investigate determinants of preference for lifestyle changes versus medication for prevention of cardiovascular disease as well as determinants of respondents' beliefs in their ability to maintain lifestyle changes.

A representative sample of 40–60-year old Danish inhabitants was in 2012 invited to a survey and were asked to imagine that they had been diagnosed as being at increased risk of heart disease. Subsequently they were presented with a choice between a preventive medical intervention versus lifestyle change. The study population for the present paper comprises 1069 participants.

A total of 962 participants preferred lifestyle changes to medication treatment. Significant determinants for preferring lifestyle changes were female gender and high level of physical activity. Significant determinants for not opting for lifestyle changes were being self-employed, poor self-rated health and smoking. Low educational attainment, lifestyle risk factors, self-reported health-related challenges and prior experience with heart disease were associated with a low belief in ability to maintain lifestyle changes.

For conclusion we found a pervasive preference for lifestyle changes over medical treatment when individuals were promised the same benefits. Lifestyle risk factors and socioeconomic characteristics were associated with preference for lifestyle changes as well as belief in ability to maintain lifestyle changes. For health professionals risk communication should not only focus on patient preferences but also on patients' beliefs in their own ability to initiate lifestyle changes and possible barriers against maintaining changes.

1. Introduction

There is much evidence of the relevance of healthy lifestyles for the etiology of cardiovascular (CVD) and coronary heart disease (CHD) (Biswas et al., 2015; Wilkins et al., 2012; Threapleton et al., 2013; Kotseva et al., 2010; Grosso et al., 2015) as well as for disease progression and prognosis (de Lorgeril and Salen, 2011; Chow et al., 2010). However, making healthy lifestyle changes is neither an obvious choice nor easy to implement for many. The most recent EUROASPIRE study (IV), including nearly 8000 CHD patients from 78 centers in 24 European countries, found that six months after a coronary event or a coronary bypass graft the behavioral risk factor load in the study population was still substantial. The large majority of patients failed to meet the European Societies' guidelines criteria regarding lifestyles and risk factors in CHD patients (Kotseva et al., 2016).

But it is not only lifestyle changes, which pose challenges, but using preventive medication also tends to be fraught with problems. Vast resources are spent on developing new preventive medical regimens. If patients are unwilling to accept or adhere to treatment regimens, the investment will have been in vain (Horne and Weinman, 1999). Many studies have shown that this is indeed the case for sizeable proportions of patient groups who are, for instance, prescribed statins for prevention of CHD (Barfoed et al., 2016).

Unhealthy lifestyles and non-adherence to medical regimens, however, vary within populations. Thus, willingness to accept preventive medical treatment may not only be associated with personal experience with heart disease but also differs according to socioeconomic status (SES). In a previous study, we found that the price of treatment affected

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the willingness to accept treatment only for the lower income group (Bo et al., 2014; Harmsen et al., 2012). Empirical evidence also suggests that the social gradient in health (Giesinger et al., 2014; Mackenbach et al., 2008; Elgar et al., 2015) to a considerable extent can be explained by differences in health risk behaviors (Lynch et al., 2006; Nordahl et al., 2014; Nandi et al., 2014; Hoffmann et al., 2015; Stringhini et al., 2010). Health risk behaviors have been suggested to not only lead to differential levels of exposure towards health risks, such as obesity, nicotine intake, hypertension or hypercholesteremia, but also to a differential vulnerability of high and low SES groups (Diderichsen et al., 2012).

Different mechanisms may link differential population characteristics, such as SES, to levels of risk behaviors. Thus lower general education level tends to be associated with poor health literacy and health knowledge. As outlined by the Health Belief Model, low knowledge may lead to limited awareness about personal health risks and potential benefits of preventive interventions, which in turn might impede motivation to initiate change (Janz and Becker, 1984). Consistent with this, Wardle and Steptoe reported lower levels of health consciousness in British civil servants with low compared to high occupational status (Wardle and Steptoe, 2003) while Peretti-Watel et al. found lower levels of health risk perception in smokers from a low socioeconomic background (Peretti-Watel et al., 2013; Peretti-Watel et al., 2014).

Furthermore, higher and lower SES groups may differ with regard to their levels of self-efficacy for behavior change, i.e. their perceived confidence in their own ability to change behavior including the ability to overcome barriers (Bandura, 1977). In numerous studies, self-efficacy expectations have been shown to predict health behaviors, e.g. stopping smoking, increasing physical activity or eating healthy (de Hoog et al., 2016; Lindberg et al., 2015; Blanchard et al., 2015; Mosher et al., 2013; Anderson et al., 2007). Particularly when it comes to transforming a more general wish for change into specific and definite behavioral intentions and implementing the new behavior, beliefs in one's behavioral abilities and self-control are essential (Rothman et al., 2004). The strength of such beliefs may not at least be influenced by socio-structural factors as pointed out in the Social-Cognitive Theory (Mosher et al., 2013). Availability of economic as well as educational and cultural resources is likely to affect likelihood of success of behavioral change attempts and therefore will shape self-confidence in behavioral abilities over time.

In the present study we aim to describe and discuss factors associated with preference for lifestyle changes versus medication for prevention of cardiovascular disease with a special focus on factors associated with the self-efficacy expectations about one's ability to initiate and maintain lifestyle changes. The specific hypotheses are that:

- A substantial part of the respondents will prefer to replace taking medication with lifestyle changes.
- Socioeconomic characteristics, lifestyle factors and previous experience with heart diseases will influence not only the preference for lifestyle changes, but also the respondents' beliefs in their ability to initiate and retain the lifestyle changes for a longer period.

2. Methods

2.1. Sample and setting

A representative sample of Danish speaking inhabitants of Denmark aged 40–60 years was invited to participate in a survey. No information from medical records was obtained, but due to the chosen age range the individuals belonged to a target group of potential candidates for cardiovascular prevention therapy. In the survey, the respondents were presented with a hypothetical scenario and asked to imagine that they were diagnosed to be at increased risk of heart disease. Subsequently they were presented with an offer of a preventive medical intervention targeted at reducing the risk of heart disease. No medication name was mentioned, but the features of the medication (side effects and effectiveness) resembled statins. Treatment benefit was explained in terms of absolute risk reduction (from 10% to 5%). Afterwards, subjects were provided with a choice for or against accepting the medication. Next they were to indicate their preference for lifestyle changes as replacement for medication when lifestyle changes were framed as having the same benefit as the medication regimen. Finally, they were asked to what extent they believed they would be able to initiate lifestyle changes and keep them for a year.

Data were collected through a web-based questionnaire using the highly experienced organization TNS Gallup taking advantage of their web-panel GallupForum. The survey ran from March 15–22, 2012. Among the 3928 panel members receiving the invitation, 2346 (60%) accessed the website, and of these 2099 (91%) answered the questionnaire. The study population for the present paper was a subgroup of the web-panel who had received additional specific questions about beliefs in their own ability to maintain lifestyle change (n = 1069).

2.2. Questionnaire

The questionnaire included a description of a risk scenario together with 12 questions concerning self-rated health status, current lifestyle (smoking, physical activity, BMI), willingness to accept treatment, and questions related to preferences for lifestyle changes to medication, in addition to a number of questions on respondents characteristics: gender, age, experience with heart disease (own and within the family), highest educational attainment, and household income. The present paper focuses on three questions related to preferences for making lifestyle changes instead of taking medication, and on the individuals' belief in his or her own ability to initiate lifestyle changes and retain them over time, rated on a 7-point Likert scale (Table 1). The respondents were told that by adding 30 min of extra physical activity daily, changing to a low-fat diet, and stopping smoking, the same benefit as the one obtained by medication treatment would be gained. Subsequently, respondents were asked whether they preferred the following lifestyle changes to medication: increasing daily activity by 30 min, changing to a more low-fat diet and avoiding smoking. Further, they were asked to what extent they believed that they would be able to make these lifestyle changes and keep them for a year. Prior to being presented to the web-panel, the questionnaire was evaluated regarding comprehensibility, relevance, acceptability and feasibility, and pilot tested by TNS Gallup.

According to the research ethics committee system in Denmark, the present study is a questionnaire study and therefore is assessed to fall outside the demarcation of projects, which have to be approved of by a regional research ethics committee.

2.3. Statistical analyses

Univariate and multivariable logistic regression analyses were used to analyze associations between a number of covariates and preference for making lifestyle changes rather than taking medication. Respondents who chose the “don't know”-option were excluded (a total of 65 (6.1%) of all participants). For respondents who preferred making lifestyle changes, univariate and multivariable linear regression analyses were used to analyze associations between the same covariates and the respondents' own beliefs in their ability to initiate and maintain the lifestyle changes. The following covariates were considered: gender, age, self-rated health status, experience with heart disease, education, income, occupation (blue collar (manual worker), white collar (non-manual worker), self-employed, not in workforce), level of physical activity (high (daily or several times a week), low (once a week or less/never)), smoking and body mass index (BMI). All analyses were adjusted for age and gender.

Subgroup analyses were conducted for smokers, participants with low level of physical activity, and overweight participants as well as

Table 1
Information and questions given to all respondents (standard sociodemographic and socioeconomic questions not shown).

Imagine that you are visiting your GP. The GP tells you that you have an increased risk of heart disease even though you presently do not experience any troublesome symptoms. Your GP informs you that for one in ten persons like you, the disease will develop and have serious consequences for your health. You cannot know beforehand whether you belong to the small group (10%) who will get the heart disease, or to the larger group (90%) who will not.

There is now a possibility of medical treatment. The medicine is preventive, and you will need to take it the rest of your life. When you begin taking the medicine it will immediately reduce your risk of serious heart disease from 10% to 5%.

1. Will you based on this information accept the offer and begin preventive medical treatment?

   a. Yes
   b. No

2. By doing physical activity for 30 min daily, eating a low-fat diet, and not smoking, you will gain the same benefit as by the above-mentioned medical treatment. Would you prefer doing another 30 min of daily activity, changing to a more low-fat diet and avoid smoking to medication?

   a. Yes
   b. No
   c. Don't know

3. To what extent do you believe that you would be able to make these lifestyle changes with physical activity 30 min daily, changing to low-fat diet, and avoid smoking, and keep them for more than a year?
   Rating on a 7-point Likert scale (1 = very uncertain, 7 = very certain).

4. How would you rate your present state of health in general?

   a. Very good
   b. Good
   c. Fair
   d. Poor
   e. Very poor

5. Do you have knowledge of any heart disease of your own or within your family?

   a. Yes, I have a heart disease myself
   b. Yes, I have had a heart disease myself
   c. Yes, there are others in my family who have or have had a heart disease
   d. No

those who reported at least one of these lifestyle risk factors. Tests for trends were conducted when appropriate, i.e. for continuous and ordinal covariates. All analyses were conducted using Stata Release 13 (StataCorp, College Station, TX, USA).

3. Results

Of the 1069 respondents, 51% were females, and the average age of respondents was 51 years (Table 2). More females than males were overweight, smoked and reported at least one lifestyle risk factor. Smokers, participants with overweight and those with a low level of physical activity rated their health status lower than average. There were more smokers and people with low levels of physical activity among participants with low household income. Further, more smokers and overweight people had low education and the frequency of smoking was highest among participants not in the workforce (Table 2). The 3928 invited TNS Gallup members were randomized into different groups receiving slightly different information. As the effect of the medication is likely to affect the choice between medication vs. lifestyle changes, we have chosen to include only respondents who all received the same information. In total 2099 responded to the questionnaire, of these 1069 were included in this paper. The 1069 respondents did not differ from the entire group of respondents in terms of gender, age distribution, health status, household income, educational attainment, or occupational status. Moreover, for the age strata used, the sample of respondents was representative of the Danish population regarding household income, educational attainment, and occupational status (data not shown).

A total of 365 (34%) initially stated that given their hypothetical risk status they would accept taking the preventive medication. When subsequently asked to express their preference regarding making lifestyle changes or taking medication, 65 (6.1%) of participants replied "don't know". Of the remaining 1004 participants, 962 (96%) preferred lifestyle changes to medicine. The preference for lifestyle changes over medication did not depend on whether the respondent had initially accepted the offer of preventive medication; this was the case in the total study population ($p = 0.602$) as well as in all four subgroups (participants with at least one lifestyle risk factor ($p = 0.780$), smokers (0.207), participants with low level of physical activity ($p = 0.632$), and overweight participants ($p = 0.403$)) (Table 3).

Among all respondents, significant determinants for preferring lifestyle changes were female gender (OR = 2.8, 95% CI 1.4–5.6) and high level of physical activity (OR = 2.4, 95% CI 1.3–4.4). Significant determinants for not opting for lifestyle changes were being self-employed (OR = 0.3, 95% CI 0.1–0.9), having poor or very poor self-rated health status (OR = 0.2, 95% CI 0.1–0.6) and being a smoker (OR = 0.3, 95% CI 0.1–0.5) (Table 4).

In the subgroups of participants with at least one lifestyle risk factor and of overweight participants, female gender was also associated with preferences for lifestyle changes (Table 4). A further determinant for lifestyle change preference was increasing household income (OR = 2,71, 95% CI 1.02–7.18) in the overweight group. The same tendency was seen for all the other subgroups, although not statistically significant. A significant determinant for not opting for lifestyle changes was being self-employed (OR = 0.25, 95% CI 0.06–0.97) for the subgroup of participants with low level of physical activity. Further determinants for not opting for lifestyle changes were being a smoker (OR 0.35, 95% CI 0.18, 0.67) and having poor or very poor self-rated health status (OR 0.35. 95% CI 0.15–0.84) for the subgroup of participants with at least one lifestyle risk factor (Table 4).

Results regarding the associations between belief in one's own ability to initiate and maintain lifestyle changes and various socioeconomic covariates among the respondents preferring lifestyle changes to medication are shown in Table 5. A significantly positive trend ($p < 0.001$) was observed between self-reported health status and a belief in the ability to initiate and maintain lifestyle changes. Participants with low educational attainment and those with experience with heart disease had a lower belief in initiating and maintaining lifestyle changes for 1 year ($p < 0.05$, test for trend). Among the behavioral determinants, non-smoking ($p < 0.001$) and high level of physical activity ($p < 0.001$) were associated with higher belief in initiating and maintaining lifestyle changes for the total group of participants (Table 5). With increasing BMI, the belief weakened ($p < 0.001$, test for trend) (Table 5). Similar trends were seen in each of the four subgroups of participants with lifestyle risk factors. Overweight participants with low educational attainment and those with a low income had a lower belief in maintaining lifestyle changes for a year, ($p < 0.05$, test for trend.) The better the present self-reported health status, the higher the belief in maintaining lifestyle changes in all subgroups (Table 5).

4. Discussion

We found an overwhelming preference for lifestyle changes to medication in the present study, where lifestyle changes and medication treatment were assumed to have the same benefits on risk of serious heart disease. Even among respondents who had themselves experienced heart disease or had experienced it in their families, those who had a low income, or were smokers more than 90% preferred lifestyle change to medicine. An explanation for the overall high preference for lifestyle changes could be that medication is considered intrusive to daily living, and is changing the self-concept from that of a healthy person to a sick individual (Horne and Weinman, 1999). Further, in studies on patients' beliefs about prescription medicines strong concerns about medication were based on fear of dependence or long-term adverse effects (Horne and Weinman, 1999). Also the hypothetical nature of the setting may have contributed to the large preference of lifestyle change,

Table 2
Sample characteristics.

	Participants	Participants at least one lifestyle risk factor	Participants smoking	Participants low level of physical activity	Participants overweight
Total, n(%)	1069(100)	808(75.6)	279(26.1)	333(31.2)	607(56.8)
Gender, n(%)					
Female	548(51.3)	456(56.4)	153(54.8)	176(52.9)	371(61.1)
Male	521(48.7)	352(43.6)	126(45.2)	157(47.1)	236(38.9)
Age, mean (SD)	50.8(5.8)	50.8(5.8)	50.9(5.9)	51.0(5.8)	50.7(5.7)
Age groups, n(%)					
40–44	180(16.8)	133(16.5)	51(18.3)	48(14.4)	99(16.3)
45–49	278(26.0)	15(24.6)	66(23.7)	95(28.5)	167(27.5)
50–54	267(25.0)	16(26.2)	70(25.1)	81(24.3)	147(24.2)
55–60	344(32.2)	21(34.4)	92(33.0)	109(32.7)	194(32.0)
Health status, n(%)					
Good/very good	668(62.5)	450(55.7)	147(52.7)	157(47.1)	336(55.4)
Fair	325(30.4)	289(35.8)	108(38.7)	137(41.1)	214(35.3)
Poor/very poor	75(7.0)	69(8.5)	24(8.6)	39(11.7)	57(9.4)
Experience with heart disease, n(%)					
No	739(71.1)	562(71.7)	184(69.2)	238(74.4)	425(71.8)
Yes, family member has had	245(23.6)	175(22.3)	65(24.4)	64(20.0)	128(21.6)
Yes, have or have had myself	55(5.3)	47(6.0)	17(6.4)	18(5.6)	39(6.6)
Household income, n(%)					
Low (<80,000 USD)	329(34.2)	261(35.6)	110(44.4)	122(40.8)	188(33.9)
Medium	368(38.2)	287(39.2)	84(33.9)	103(34.4)	225(40.5)
High (>130,000 USD)	266(27.6)	185(25.2)	54(21.8)	74(24.7)	142(25.6)
Education, n(%)					
Low (<high school)	243(22.9)	202(25.2)	83(29.9)	79(23.9)	154(25.6)
Medium	717(67.5)	541(67.5)	173(62.2)	225(68.2)	412(68.6)
High (university degree)	102(9.6)	58(7.2)	22(7.9)	26(7.9)	35(5.8)
Employment, n(%)					
Blue collar	311(29.1)	229(28.3)	89(31.9)	91(27.3)	164(27.0)
White collar	559(52.3)	409(50.6)	122(43.7)	169(50.8)	318(52.4)
Self-employed	66(6.2)	59(7.3)	23(8.2)	26(7.8)	44(7.2)
Not in workforce	133(12.4)	111(13.7)	45(16.1)	47(14.1)	81(13.3)
Smoking, n(%)					
No	788(73.9)	528(65.4)	0(0.0)	223(67.2)	459(75.7)
Yes	279(26.1)	279(34.6)	279(100.0)	109(32.8)	147(24.3)
Physical activity[a], n(%)					
Low	333(31.2)	333(41.2)	109(39.1)	333(100.0)	216(35.6)
High	736(68.8)	475(58.8)	170(60.9)	0(0.0)	391(64.4)
BMI, n(%)					
<25	406(40.1)	175(22.4)	116(44.1)	98(31.2)	0(0.0)
25–29	388(38.3)	388(49.6)	96(36.5)	125(39.8)	388(63.9)
30+	219(21.6)	219(28.0)	51(19.4)	91(29.0)	219(36.1)

[a] Physical activity categorised as High: “daily” or “several times a week”; Low: “never” or “once a week or less”.

Table 3
Associations between accepting original medical treatment offer vs. preferring lifestyle changes.

	Prefer life-style change n(%)			Prefer lifestyle changes (yes/no) vs. medication		
	Yes	No	Don't know	OR	OR_{adj}(95%-CI)[b]	p-Value[b]
All participants, n = 1069						
Total	962(90.0)	42(3.9)	65(6.1)	–	–	–
Declining treatment offer	643(91.3)	26(3.7)	35(5.0)	(ref.)	(ref.)	0.602
Accepting treatment offer	319(87.4)	16(4.4)	30(8.2)	0.81	0.84(0.44, 1.60)	
At least one lifestyle risk factor, n = 808						
Total	704(87.1)	40(5.0)	64(7.9)	–	–	–
Declining treatment offer	462(88.5)	25(4.8)	35(6.7)	(ref.)	(ref.)	0.780
Accepting treatment offer	242(84.6)	15(5.2)	29(10.1)	0.87	0.91(0.47, 1.77)	
Smoking, n = 279						
Total	216(77.4)	22(7.9)	41(14.7)	–	–	–
Declining treatment offer	136(76.8)	17(9.6)	24(13.6)	(ref.)	(ref.)	0.207
Accepting treatment offer	80(78.4)	5(4.9)	17(16.7)	2.00	1.96(0.69, 5.59)	
Low physical activity[a], n = 333						
Total	284(85.3)	21(6.3)	28(8.4)	–	–	–
Declining treatment offer	192(87.3)	13(5.9)	15(6.8)	(ref.)	(ref.)	0.632
Accepting treatment offer	92(81.4)	8(7.1)	13(11.5)	0.78	0.80(0.32, 2.01)	
Overweight, n = 607						
Total	545(89.8)	25(4.1)	37(6.1)	–	–	–
Declining treatment offer	357(91.3)	14(3.6)	20(5.1)	(ref.)	(ref.)	0.403
Accepting treatment offer	188(87.0)	11(5.1)	17(7.9)	0.67	0.70(0.31, 1.61)	

[a] Physical activity categorised as High: “daily” or “several times a week”; Low: “never” or “once a week or less”.
[b] Adjusted for age (two age-groups) and gender.

Table 4
Associations between preferring life-style changes to medicine and various covariates among participants choosing between medical treatment and lifestyle changes.

	All participants, n = 1004		At least one lifestyle risk factor, n = 744		Smoking, n = 238		Low physical activity[a], n = 305		Overweight, n = 570	
	OR	OR_{adj}(95%-CI)[b]	OR	OR_{adj}(95%-CI)[b]	OR	OR_{adj}(95%-CI)[b]	OR	OR_{adj}(95%-CI)[b]	OR	OR_{adj}(95%-CI)[b]
Gender, n(%)		**		*						*
Male	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Female	2.81	**2.80(1.39, 5.63)**	2.10	**2.11(1.03, 4.29)**	2.34	2.41(0.90, 6.42)	1.86	1.85(0.72, 4.72)	4.93	**4.71(1.39, 15.98)**
Age groups, n(%)										
40–49	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
50–60	0.57	0.57(0.29, 1.12)	0.52	0.52(0.26, 1.04)	0.54	0.52(0.20, 1.34)	0.62	0.63(0.24, 1.60)	0.47	0.51(0.21, 1.25)
Health status, n(%)		##								
Good/very good	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Fair	0.90	0.92(0.44, 1.94)	1.15	1.12(0.53, 2.37)	1.56	1.42(0.51, 3.94)	1.06	1.05(0.38, 2.91)	1.10	1.09(0.42, 2.79)
Poor/very poor	0.24	**0.24(0.11, 0.56)**	0.36	**0.35(0.15, 0.84)**	0.68	0.63(0.16, 2.49)	0.39	0.37(0.11, 1.21)	0.41	0.36(0.12, 1.09)
Experience with heart disease, n(%)										
No	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Yes, family member has had	1.45	1.33(0.58, 3.09)	1.25	1.17(0.50, 2.74)	1.40	1.36(0.43, 4.30)	1.29	1.27(0.35, 4.58)	1.06	0.95(0.34, 2.64)
Yes, have or have had myself	0.87	1.17(0.26, 5.15)	0.87	1.17(0.26, 5.22)	1.00	1.00(1.00, 1.00)	0.32	0.43(0.08, 2.29)	0.58	0.83(0.18, 3.87)
Household income, n(%)										#
Low (<80,000 USD)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Medium	1.62	1.89(0.90, 3.97)	1.75	1.99(0.92, 4.28)	1.01	1.22(0.44, 3.38)	1.42	1.57(0.54, 4.56)	2.13	**2.71(1.02, 7.18)**
High (>130,000 USD)	1.94	2.03(0.86, 4.78)	1.98	2.22(0.90, 5.51)	1.34	1.29(0.38, 4.43)	1.59	1.67(0.50, 5.59)	2.45	3.06(0.95, 9.88)
Education, n(%)										
Low (<high school)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Medium	1.01	1.00(0.48, 2.09)	0.98	1.01(0.47, 2.13)	0.59	0.64(0.22, 1.85)	0.75	0.74(0.24, 2.34)	1.06	1.05(0.43, 2.61)
High (university degree)	2.28	1.87(0.39, 8.85)	1.54	1.45(0.30, 6.97)	1.00	1.00(1.00, 1.00)	0.65	0.60(0.10, 3.63)	1.00	1.00(1.00, 1.00)
Employment, n(%)		*		*		*				
Blue collar	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
White collar	1.28	1.33(0.62, 2.84)	1.44	1.54(0.70, 3.37)	1.84	1.95(0.69, 5.57)	1.14	1.20(0.38, 3.82)	1.76	1.92(0.75, 4.87)
Self-employed	0.28	**0.34(0.13, 0.88)**	0.33	0.41(0.15, 1.08)	0.34	0.40(0.11, 1.44)	0.22	**0.25(0.06, 0.97)**	0.75	1.04(0.26, 4.12)
Not in workforce	0.98	0.92(0.31, 2.71)	1.10	1.09(0.37, 3.22)	4.57	5.04(0.60, 42.04)	0.76	0.81(0.18, 3.64)	1.44	1.16(0.29, 4.59)
Smoking, n(%)		***		**						*
No	(ref.)	(ref.)	(ref.)	(ref.)	—	—	(ref.)	(ref.)	(ref.)	(ref.)
Yes	0.26	**0.27(0.14, 0.50)**	0.36	**0.35(0.18, 0.67)**	—	—	0.69	0.69(0.28, 1.74)	0.35	**0.36(0.16, 0.82)**
Physical activity[a], n(%)		**								*
Low	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	—	—	(ref.)	(ref.)
High	2.38	**2.38(1.27, 4.35)**	1.64	1.69(0.90, 3.23)	0.90	0.88(0.35, 2.22)	—	—	2.86	2.86(1.25, 6.67)
BMI, n(%)				#						
<25	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	—	—
25–29	0.85	1.08(0.53, 2.20)	1.94	2.50(1.18, 5.31)	0.90	1.16(0.45, 3.04)	0.66	0.82(0.26, 2.61)	—	—
30+	1.19	1.38(0.55, 3.45)	2.74	3.20(1.24, 8.28)	5.56	6.31(0.78, 51.18)	0.96	1.04(0.29, 3.80)	—	—

Bold indicates significant results.
[a] Physical activity categorised as High: "daily" or "several times a week"; Low: "never" or "once a week or less".
[b] Adjusted for age (two age-groups) and gender.
* $p < 0.05$ (composite test of covariate).
** $p < 0.01$ (composite test of covariate).
*** $p < 0.001$ (composite test of covariate).
# $p < 0.05$ (test for trend of covariate).
$p < 0.01$ (test for trend of covariate).

since a hypothetical level of threat might be considered less serious than in a real-life situation.

Despite the overwhelming tendency to prefer lifestyle changes to medication, some differences between groups were noted. As expected, non-smoking, and a current high level of physical activity were positively associated with preference for lifestyle changes. It is not surprising that respondents with none of the lifestyle risk factors considered are more likely to accept lifestyle changes, since the degree of effort required by them is less than the effort required by respondents with one or more lifestyle risk factors. Explanations that similar differences were found for non-smoking and physical activity but not for healthy eating might be that the first two criteria are fairly clear-cut whereas the nutrition status is considerably more difficult to assess. In general, we found that female participants were more likely to opt for lifestyle changes – a finding in line with prior studies, which indicate that women are more interested in and more easily motivated to make lifestyle changes (Murray et al., 2012). Respondents who were self-employed, on the other hand, were less likely to opt for lifestyle changes – a finding which might be due to this group perceiving time as a barrier for making lifestyle changes.

Poor self-rated health status was associated with relatively lower preference for lifestyle change. Those with poor health status might feel more threatened by (further) health risks and may therefore be more likely to choose medication as an option they expect to be able to adhere to. Also, since lifestyle change is associated with physical and mental effort, those in poor health might feel that they do not have the resources required to meet these demands. However, it is noteworthy that even among the ones who rated their health as very poor, 88% preferred lifestyle change to medication.

In contrast to our expectation, the general motivation for healthy living and avoiding having to take medication when facing a hypothetical health risk seems to be similar for people with high or low education and income. However, the subgroup analyses revealed that for overweight persons lower income is associated with a lower preference for lifestyle change. Similar, though non-significant, tendencies occurred in the other subgroups. This suggests that a possible discouraging effect of existing lifestyle risks on preference for lifestyle change may be stronger among the less socially advantaged. Thus, once there are lifestyle problems, the motivation to change may be weaker in those with low income, possibly because of lack of resources to buy healthier foods or to join a fitness club.

In agreement with our hypothesis participants with lifestyle risk factors such as smoking, low levels of physical activity or high BMI, and participants with low self-reported health had weaker beliefs in starting

Table 5
Associations between belief in maintaining life-style change and various covariates among respondents preferring life-style changes to medication.

	All participants, n = 962		At least one lifestyle risk factor, n = 704		Smoking, n = 216		Low physical activity[a], n = 284		Overweight, n = 570	
	Mean diff.	Mean diff.$_{adj}$ (95%-CI)[b]	Mean diff.	Mean diff.$_{adj}$ (95%-CI)[b]	Mean diff.	Mean diff.$_{adj}$ (95%-CI)[b]	Mean diff.	Mean diff.$_{adj}$ (95%-CI)[b]	Mean diff.	Mean diff.$_{adj}$ (95%-CI)[b]
Gender, n(%)										
Male	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Female	0.07	0.07(−0.10, 0.25)	−0.11	−0.11(−0.33, 0.11)	−0.02	−0.02(−0.42, 0.37)	−0.07	−0.06(−0.41, 0.29)	−0.15	−0.14(−0.39, 0.11)
Age groups, n(%)										
40–49	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
50–60	0.11	0.11(−0.07, 0.29) ###	0.12	0.12(−0.09, 0.34) ###	0.10	0.10(−0.29, 0.50) ###	0.31	0.31(−0.04, 0.66) ##	0.14	0.13(−0.11, 0.38) ###
Health status, n(%)										
Good/very good	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Fair	−0.76	−0.76(−0.95, −0.57)	−0.61	−0.60(−0.83, −0.38)	−0.49	−0.49(−0.90, −0.09)	−0.41	−0.40(−0.77, −0.03)	−0.71	−0.71(−0.96, −0.46)
Poor/very poor	−1.32	−1.31(−1.67, −0.95) #	−1.21	−1.20(−1.60, −0.81)	−1.27	−1.27(−1.98, −0.55)	−0.79	−0.75(−1.34, −0.16)	−1.27	−1.25(−1.67, −0.83)
Experience with heart disease, n(%)										
No	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Yes, family member has had	−0.19	−0.20(−0.41, 0.02)	−0.22	−0.21(−0.48, 0.05)	−0.14	−0.14(−0.62, 0.35)	−0.18	−0.20(−0.65, 0.26)	−0.28	−0.26(−0.56, 0.04)
Yes, have or have had myself	−0.39	−0.41(−0.87, 0.06)	−0.19	−0.23(−0.77, 0.31)	−0.05	−0.06(−0.94, 0.82)	−0.44	−0.55(−1.57, 0.47)	−0.07	−0.13(−0.71, 0.46) #
Household income, n(%)										
Low (<80,000 USD)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Medium	0.27	0.29(0.06, 0.52)	0.28	0.27(−0.00, 0.54)	0.05	0.05(−0.45, 0.56)	0.27	0.28(−0.16, 0.72)	0.38	0.36(0.06, 0.66)
High (>130,000 USD)	0.16	0.17(−0.07, 0.41) #	0.11	0.09(−0.21, 0.38)	−0.41	−0.40(−0.95, 0.15)	0.02	0.00(−0.47, 0.48)	0.38	0.35(0.02, 0.68) #
Education, n(%)										
Low (<high school)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Medium	0.30	0.29(0.07, 0.51)	0.23	0.22(−0.03, 0.48)	0.42	0.41(−0.03, 0.85)	0.27	0.26(−0.16, 0.68)	0.26	0.26(−0.03, 0.54)
High (university degree)	0.31	0.28(−0.06, 0.63)	0.18	0.18(−0.27, 0.64)	0.13	0.11(−0.64, 0.85)	0.15	0.11(−0.62, 0.84)	0.47	0.49(−0.06, 1.04)
Employment, n(%)										
Blue collar	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
White collar	−0.04	−0.05(−0.25, 0.16)	−0.12	−0.14(−0.40, 0.11)	−0.55	−0.56(−1.02, −0.11)	−0.20	−0.24(−0.65, 0.17)	−0.03	−0.05(−0.34, 0.24)
Self-employed	−0.12	−0.13(−0.55, 0.29)	0.06	0.02(−0.46, 0.50)	−0.02	−0.04(−0.91, 0.83)	−0.06	−0.05(−0.83, 0.72)	0.04	−0.01(−0.54, 0.51)
Not in workforce	−0.28	−0.31(−0.62, 0.00) ***	−0.30	−0.30(−0.66, 0.06) ***	−0.21	−0.24(−0.84, 0.36)	−0.51	−0.56(−1.15, 0.03) *	−0.18	−0.17(−0.59, 0.24) ***
Smoking, n(%)										
No	(ref.)	(ref.)	(ref.)	(ref.)	—	—	(ref.)	(ref.)	(ref.)	(ref.)
Yes	−0.92	−0.91(−1.12, −0.70) ***	−0.63	−0.62(−0.85, −0.39) ***	—	— *	−0.43	−0.43(−0.82, −0.05)	−0.85	−0.85(−1.14, −0.56) ***
Physical activity[a], n(%)										
Low	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	—	—	(ref.)	(ref.)
High	0.97	0.97(0.78, 1.16) ###	0.68	0.68(0.47, 0.90) ##	0.45	0.45(0.05, 0.85) ##	—	— ###	0.86	0.86(0.61, 1.10)
BMI, n(%)										
<25	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	—	—
25–29	−0.36	−0.36(−0.57, −0.16)	0.36	0.35(0.07, 0.63)	−0.25	−0.27(−0.73, 0.19)	0.02	−0.01(−0.43, 0.42)	—	—
30+	−1.13	−1.12(−1.36, −0.88)	−0.40	−0.41(−0.72, −0.10)	−0.71	−0.72(−1.24, −0.19)	−0.90	−0.90(−1.35, −0.45)	—	—

[a] Physical activity categorised as High: “daily” or “several times a week”; Low: “never” or “once a week or less”.
[b] Adjusted for age (two age-groups) and gender.
* $p < 0.05$ (composite test of covariate).
*** $p < 0.001$ (composite test of covariate).
# $p < 0.05$ (test for trend of covariate).
$p < 0.01$ (test for trend of covariate).
$p < 0.001$ (test for trend of covariate).

and maintaining lifestyle changes Surprisingly, prior experience with heart disease was associated with a low belief in maintaining lifestyle changes. A reason for this might be previous negative experiences with attempts at changing lifestyle (Janz and Becker, 1984). Contrary to our hypotheses we found no overall associations between socioeconomic status and beliefs in maintaining lifestyle changes. Although low educational attainment was associated with a lower belief in initiating and maintaining lifestyle changes for 1 year, the same trend was not seen for status of employment or level of household income. According to the subgroup analyses, overweight participants with low educational attainment or low income were significantly less confident about their ability to successfully implement and maintain lifestyle change. The literature suggests that different segments of the population have different resources and may perceive different levels of barriers regarding lifestyle change, and those with an unfavorable balance between resources and perceived barriers might be reluctant to engage in lifestyle changes even when facing a serious health risk (Lynch et al., 2006; Nordahl et al., 2014; Nandi et al., 2014; Hoffmann et al., 2015; Stringhini et al., 2010). This might explain why overweight participants with fewer resources, might be less likely to actually engage in the behavior change process because they do not believe in their capacities to succeed.

4.1. Strengths and weaknesses

A strength of the present study is that data were collected through the highly experienced organization TNS Gallup taking advantage of their web-panel, Gallup Forum, which is a validated data collection tool. The age group 40–60 year was considered relevant for first time users of preventive therapy against cardiovascular disease. A weakness might be that no existing validated questionnaire suited the purpose of the study. However, care was taken in construction of the questionnaire. It was a priority to keep it short, and to ensure the questions were simple and unambiguous. To further support the validity, the questionnaire was pilot tested for feasibility and comprehensibility before being used in the survey.

Some limitations in the design should be recognized. Data for the study are based on self-reports. A general tendency to underreport smoking status, alcohol intake, and weight, and to overreport height, could introduce bias to the self-reported lifestyle risk factors. However, the reported rates are within the plausible range for a population-based survey (Elliott et al., 2011)and web-based questionnaires have been suggested to enhance the perception of privacy among participants, increasing the reliability of responses regarding sensitive subjects such as lifestyle risk factors (Connor Gorber et al., 2009; Connor Gorber et al., 2007). Another potential limitation may be that the present study was a survey where the respondents were asked to state their intentions and beliefs referring to a hypothetical risk situation, rather than to a real-life CVD risk for the majority of the respondents. Moreover, respondents were asked if they preferred lifestyle changes that included “more low-fat diet”. Since this phrase lacked a precise definition or quantification of required changes it cannot be excluded that respondents had different interpretations of what was entailed by “change” and that some may have underestimated the costs of choosing behavior change.

Further explanatory factors could have been relevant to include, e.g. differential levels of social norms or social support. To the extent that health risk behaviors differ between networks of people with low and high SES, it is likely that perceived social norms and actual pressure towards healthier or unhealthier behaviors may also vary, and that these normative perceptions will mediate SES-health behavior relationships (Janssen et al., 2000; Teuscher et al., 2015; Moore et al., 2011).

5. Conclusion

We found a preference for lifestyle changes to medication in the present study, where lifestyle changes and medication treatment were assumed to have the same benefits on risk of serious heart disease. Lifestyle risk factors and socioeconomic characteristics influenced not only the preference for lifestyle changes, but also the respondents' beliefs in their ability to maintain the lifestyle changes for a longer period of time.

6. Implications

In general, beliefs about medicine differ among different groups in the population (Mardby et al., 2007), which is a particular challenge to the doctor-patient communication. If healthcare professionals assume that the patient has the same general beliefs about medicines as the healthcare professionals, concerns and questions important for the patient may not be discussed (Horne et al., 2001). This study indicates that when suggesting preventive interventions, early identification of patients' beliefs about their ability to initiate and adhere to lifestyle changes should be an important element in patient communication. Likewise, awareness of contextual factors that may trigger intuitive and emotional decision processes affecting acceptance of a given intervention is important.

Healthcare professionals should be aware not only of the importance of patients' own preferences regarding lifestyle changes contra medicines, but also about their thoughts about self-efficacy. The study suggests that focus on patients' beliefs in their own abilities and possible barriers against maintaining behavioral changes should be integrated in risk communication.

Authors' contributions

DEJ participated in the analyses and drafted the manuscript; JBN participated in the design, planning, analyses and helped to draft the manuscript; PVL performed the statistical analyses and helped to draft the manuscript, DGH participated in the design, planning, and helped to draft the manuscript. JS, AL, CB and BLB all helped to draft the manuscript. All authors have read and approved the final manuscript.

Conflicts of interest

None.

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