


RESEARCH ARTICLE

Unwillingness to participate in health checks for cardiometabolic diseases: A survey among primary health care patients in five European countries

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Abstract

Background and aims: Since cardiometabolic diseases (CMD) are a frequent cause of death worldwide, preventive strategies are needed. Recruiting adults for a health check could facilitate the identification of individuals at risk for CMD. For successful results, participation is crucial. We aimed to identify factors related to unwillingness to participate in CMD health checks.

Methods: We performed a cross-sectional study in the Czech Republic, Denmark, Greece, the Netherlands, and Sweden. A questionnaire was distributed among persons without known CMD consulting general practice between January and July 2017 within the framework of the SPIMEU study.

Results: In total, 1354 persons responded. Nine percent was unwilling to participate in a CMD health check. Male gender, smoking, higher self-rated health, never been invited before, and not willing to pay were related to unwillingness to participate. The most mentioned reason for unwillingness to participate was “I think that I am healthy” (57%). Among the respondents who were willing to participate, 94% preferred an invitation by the general practitioner and 66% was willing to pay.

Conclusion: A minority of the respondents was unwilling to participate in a CMD health check with consistent results within the five countries. This provides a promising starting point to increase participation in CMD health checks in primary care.

KEYWORDS

cardiometabolic disease, cardiovascular disease, health check, prevention, willingness to participate

Abbreviations: BMI, body mass index; CMD, cardiometabolic disease; CVD, cardiovascular disease; HCP, health care provider; OR, odds ratio; PC, primary care; TIA, transient ischemic attack.

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1 | INTRODUCTION

1.1 | Background

Cardiometabolic diseases (CMD) are the number-one cause of death in the world.¹ They include cardiovascular disease (CVD), type 2 diabetes mellitus, and chronic kidney disease. While mortality rates have dropped in recent years, the absolute number of CMD have increased, due to ageing and an unhealthy lifestyle with physical inactivity, smoking, and an unhealthy diet as most important risk factors.²⁻⁷ Studies have shown that as much as 80% of CVD could be prevented or postponed if risk factors in lifestyle and behavior could be eliminated.⁸

Selective prevention entails the identification of persons at high risk of CMD, but who are currently asymptomatic and without known risk factors or established CMD, followed by interventions to reduce their level of risk. As such, recruiting adults for a health check and performing a CMD risk assessment is the first step to identify persons at risk. Although scientific evaluation showed conflicting results of general health checks on morbidity and mortality,^{9,10} performing health checks and starting interventions in primary care (PC) have been associated with improvements in CMD intermediate risk factors like body mass index (BMI), blood pressure, and total cholesterol level, as well as an improvement in lifestyle.¹¹⁻¹⁴

To optimize identification of persons at high risk of CMD, participation in health checks should be as high as possible. However, actual participation rates in health checks widely differ between countries ranging from 33% in an online risk estimation as first step in a CMD health check in the Netherlands¹⁵ to 65% for a health check in primary care in Sweden.¹⁶ These numbers demonstrate that there is room for improvement of participation rates in CMD health checks. Various factors have been reported to be positively related to participation including higher age,¹⁷⁻²¹ being female,^{20,22} and not smoking,^{20,22-26} but results are conflicting and most studies have been done in the United Kingdom and the Netherlands.

Willingness for participation, so the intention to participate if a person would be invited for a health check, can be seen as a precondition for actual participation. An earlier study concerning willingness to participate in a CMD health check, showed that 56% of the respondents intended to participate and their willingness to participate could increase to 80% to 90% by removing barriers for participation.²⁷ This study, however, was only performed in the Netherlands.

1.2 | Objectives

The organization of (primary) health care differs between countries.²⁸ Currently, it is unclear which factors are associated with unwillingness of persons to participate in health checks, and whether these factors differ

between countries. Furthermore, the preferred way of the organization of CMD health checks is currently unclear. More insight in these factors could eventually help to improve actual participation rates. Therefore, we conducted a survey in different European settings to assess the prevalence and personal characteristics associated with unwillingness to participate in a CMD health check, reasons for being (un)willing to participate, and the preferred organization of a CMD health check.

2 | METHODS

2.1 | Study design

This cross-sectional study was performed as part of the SPIMEU project (Determinants of successful implementation of selective prevention of cardiometabolic diseases across Europe), a collaborative cross-European project, which aims to identify determinants of successful implementation of programmatic selective prevention of CMD in primary care across Europe.²⁹

2.2 | Setting

A questionnaire assessing the willingness to participate in a health check was distributed between January and July 2017 by general practitioners (GPs) in five countries: the Czech Republic, Denmark, Greece, the Netherlands, and Sweden among consulting patients. The GPs were free to choose the method for distribution of the questionnaire. GPs received a remuneration for every returned questionnaire varying from €2.15 to €7.60. In Sweden, no remuneration was provided. Detailed information about the data collection in each country are given in Supplementary file 1.

2.3 | Participants

Persons consulting the practice for any complaint who fulfilled the inclusion and exclusion criteria were invited to complete the questionnaire.

Inclusion criteria

- 19 years of age or older
- Sufficient reading and writing skills to complete the questionnaire

Exclusion criteria

- History of:
 - Myocardial infarction
 - Angina pectoris

- Heart failure
- Stroke (ischemic, haemorrhagic)
- Transient ischemic attack (TIA)
- Peripheral arterial disease
- Diabetes mellitus
- Chronic renal failure
- Hypertension with use of antihypertensive medication
- Hypercholesterolemia with use of lipid lowering drugs

2.4 | Questionnaire

We developed a semistructured questionnaire in English which was largely based on previous work.²⁷ We described the term “health check” in the questionnaire as: “a health check for CMD, which aims to identify persons at high risk of CMD.” This health check could be very broad, ranging from a short online questionnaire to a detailed health check at the doctor’s office including physical examination and laboratory tests.

To increase the response and comprehensibility, the initial English questionnaire was pilot tested by two independent persons with good knowledge of the English language and without a medical background. After testing and improving the questionnaire, the original English version was translated into the national language of the participating countries by a native speaker and subsequently translated back by a different person, who was well experienced in English, without knowledge of the original English version. The initial and translated versions were compared and mismatches were discussed by the SPIMEU partners from the respective country and adapted if necessary. The questionnaire was provided in five languages: Czech, Danish, Dutch, Greek, and Swedish.

The printed questionnaires were sent to the GPs and after completion by the respondents they were anonymously returned by the GPs to the project representative in each country and entered in an online data-entry program. To be able to trace the original questionnaires back to check the data-entry process, each questionnaire was numbered.

2.4.1 | Study

We aimed to invite 600 eligible persons per country represented in the SPIMEU project. Based on experience with surveys in primary care across Europe, we expected a response rate of 40% leading to 240 respondents per country, so in total 1200 respondents.

2.5 | Variables

The main outcome was being unwilling to participate in a health check (“Suppose you would be invited for a health check, would you participate?” Answer options: yes or no). Independent variables were:

- Personal characteristics
 - Age: divided in 4 categories: <40, 40-55, 56-70, and >70 years of age

- Gender: male or female
- Education level: low (no education, primary school), middle (secondary school, high-school), high (vocational training, University)
- Job status: (self)employed, looking for work, not working, student/other
- Living situation: alone, together
- CMD risk factors
 - BMI: <25: normal BMI, 25-30: overweight, >30: obesity
 - Smoking: currently smoking, not smoking, or smoked in the past
 - Alcohol consumption: low: <6 alcoholic drinks per day on <1 time per week
 - Physical activity: high: ≥5 days with >30 minutes of physical activity
 - Family history of CVD or diabetes (yes/no)
 - Self-rated health: Measured on a scale from 0 (very bad health) to 10 (very good) Good health was defined as the median score, which was 7 or higher.
- Invitation to a health check before and willingness to pay for a health check (yes / no).

2.6 | Statistical methods

We performed univariable logistic regression analyses and reported odds ratio’s (OR) for the association between the independent variables and the outcome unwillingness to participate in a health check for all countries together and for each country separately. Furthermore, we used descriptive analysis (percentages) to describe the baseline characteristics per country and the preferred situation for a health check for CMD by country. Only respondents who answered the outcome question were included in the analysis. For the independent variables, we excluded cases with missing data for that specific variable. Frequencies and ORs were calculated for all countries combined and stratified for country. We considered a *P*-value of less than 0.05 as statistically significant. Due to the low number of respondents who were unwilling to participate in a health check, we decided not to focus on significance levels when exploring the differences between countries. We limited the description to factors that showed an overall significant association, and with an opposite direction between countries. So, factors significantly associated overall and with the association in the same direction for all countries are not described separately in the results.

2.7 | Ethical considerations

In all five countries, the appropriate ethical procedures were followed. In the Czech Republic, Denmark, Greece, and Sweden the protocol was reviewed and approved by the ethical boards from the University Hospital in Prague, the National Committee on Health Research Ethics and the Danish Data Protection Agency, and the regional ethical board in Stockholm and Crete respectively. In the Netherlands, the medical ethical committee of the UMC Utrecht declared that medical

ethical approval was not required for this study. In Greece, an information sheet about the study was provided and written informed consent was required from the participants at the beginning of the questionnaire (of protocol number 11138-05/08/2016). In the other four countries, the need for consent was deemed unnecessary according to national regulations with protocol numbers 100/16 for the Czech Republic, 16/41062 for Denmark, number 16/679 for the Netherlands, and 2016/2190-32 for Sweden.

3 | RESULTS

3.1 | Characteristics of the respondents

In total, 1531 persons completed the questionnaire, ranging from 193 in Denmark to 404 in the Czech Republic. The participating GPs did not keep record of the number of persons who received the questionnaire, so we were not able to calculate a response rate or a reason for nonparticipation. We excluded 161 respondents who indicated to have a CMD and 16 respondents who did not answer the outcome-question on willingness to participate. In total, 1354 questionnaires were suitable for analysis. More information about missing data for each variable can be found in Supplementary file 3. The baseline characteristics are presented in Table 1.

3.2 | Unwillingness to participate

In total, 124 respondents (9%) reported to be unwilling to participate, varying from ten respondents (5%) in Denmark to 43 (14%) in Greece (Table 3). Males, smokers, and respondents with a high self-rated health were more often unwilling to participate (OR 1.48 (95% CI 1.02-2.14), 1.88 (95% CI 1.25-2.82), and 1.51 (95% CI 1.04-2.20), respectively (Table 2). Respondents who had not been invited for a CMD health check before (OR 2.24; 95% CI 1.15-4.36) or who were not willing to pay (OR 3.09; 95% CI 2.11-4.53) were also more often unwilling to participate (Table 2, Figure 1).

3.2.1 | Country-specific factors associated with being unwilling to participate

Supplementary file 4 shows the factors associated with unwillingness to participate per country. Overall, males, smokers, and respondents with a good self-rated health were less often willing to participate in all countries. However, in Sweden, males (OR 0.85), smokers (OR 0.78), and respondents with a good self-rated health (OR 0.79) and in the Netherlands smokers (OR 0.95) were more often willing to participate.

3.2.2 | Reasons for being unwilling to participate

The reasons for being unwilling to participate differed between the countries. "I think that I am healthy" was mentioned most frequently

(57%), ranging from 44% in Greece to 90% in Denmark. In the Czech Republic, Greece, and the Netherlands "I already have regular medical check ups" was often a reason for being unwilling to participate (18%, 23%, and 28% respectively). In Greece, "I do not have time to participate" and "I am afraid that the results of the health check might be negative" were mentioned often (30% and 21% respectively) compared to 0% to 18% and 0% to 4% in the other countries. No access to the internet (0%), being too old (3%), and interference of others in personal health (3%) were the least frequently mentioned reasons in all the countries for being unwilling to participate.

3.3 | Willingness to participate

3.3.1 | Payment

Among the respondents who were willing to participate ($n = 1230$), more than half (66%, ranging from 49% in Denmark to 81% in Sweden) would pay for a health check including laboratory tests. However, one third of the respondents would not be willing to pay, and another one third would be willing to pay €20 or less. In contrast with the other four countries (2%-5%), 11% of those willing to participate in Greece indicated to be willing to pay more than €100 for the health check (Table 3).

3.3.2 | Reasons for participation

The two most important reasons in each country for being willing to participate were: "I am curious to know my risk for CVD / diabetes" (74%, range 57%-86%) and "I want to be healthier" (40%, range 29%-44%). In the Netherlands, 22% reported "because I think I have a high risk of CVD or diabetes" whereas in Sweden, Greece, the Czech Republic, and Denmark the corresponding percentages were 15%, 15%, 14%, and 8% respectively. In Greece, the Czech Republic, the Netherlands, and Sweden "only if the doctor insists that I participate" was reported by 14%, 10%, 5%, and 4% respectively, whereas in Denmark this was less than 1%. The influence of close relatives was a reason for willingness to participate for only 2% (range < 1%-4%).

3.3.3 | Preferences for the organization of CMD health checks

More than 90% of the respondents who were willing to participate would like to be invited by their GP, but also a medical specialist (37%) or practice nurse (24%) were considered as suitable options. Most respondents (64%) preferred to receive an invitation either by a letter or telephone call, especially in the Netherlands (84%) and Sweden (85%). In Denmark, the preferred method was digital (74%), so by e-mail, a website, social media, or a text message on a mobile phone. On average 91% preferred to have a broader health check, including also screening, for example, for cancer and depression.

TABLE 1 Baseline characteristics of survey respondents

	The Czech Republic N = 404	Denmark N = 193	Greece N = 300	The Netherlands N = 247	Sweden N = 210	Total N = 1354
Age (%)						
<40	56	45	37	42	44	46
40-55	28	31	48	35	35	35
56-70	14	21	13	18	18	16
>70	2	3	2	6	4	3
Male (%)	42	36	48	34	25	39
Education ^a (%)						
Low	5	16	12	3	8	8
Middle	43	26	28	17	25	30
High	52	59	60	81	67	62
Job status ^b (%)						
(Self)employed	82	73	64	65	67	71
Looking for work	3	3	11	3	2	4
Not working ^b	8	14	18	17	17	14
Student, other	7	10	7	16	14	10
Living situation ^c (%)						
Alone	18	18	20	12	19	17
Together	82	82	80	88	81	83
BMI ^d (kg/m ²) (%)						
BMI <25	57	54	41	54	59	53
BMI 25-30	33	32	42	34	33	35
BMI >30	10	14	17	13	9	13
Currently smoking ^e (%)	21	18	37	17	7	21
Low alcohol consumption ^f (%)	98	98	98	97	97	98
High physical activity ^g (%)	28	20	15	32	18	23
No family member with CVD/DM II ^h (%)	58	65	54	55	59	58
Self-rated health ⁱ median (SD)	7.0 (1.9)	7.2 (2.0)	7.2 (2.1)	6.7 (2.1)	6.9 (1.8)	7.0 (2.0)
Invited for a health check before (%)	20	17	18	9	9	16

Note: Results from questionnaire distributed in general practice in the Czech Republic, Denmark, Greece, the Netherlands, and Sweden between January and July 2017 within the framework of the SPIMEU study. The bold values in this table represent the values for the total number of respondents from all five countries together.

^aLow: no education, primary school, middle: secondary school/high-school, high: vocational training, university.

^bNot working because of poor health, fulltime house person, retired.

^cLiving together: living with partner, children and/or parents.

^dBMI: Body mass index. <25: normal BMI, 25-30: overweight, >30: obesity.

^eSmoking: At least one cigarette per day.

^fLow alcohol consumption: <6 alcoholic drinks per day <1 time per week.

^gHigh physical activity: ≥5 days/week ≥30 min.

^hCVD: cardiovascular disease, onset before the age of 60, DM II: diabetes mellitus type 2.

ⁱScale from 1 to 10, 1 very bad health 10 very good health.

4 | DISCUSSION

4.1 | Key results

Unwillingness to participate in a CMD health check was low in all countries. Male gender, smoking, and a good self-rated health were associated with being unwilling to participate. The most important reason for unwillingness to participate was “I think that I am healthy.” Important reasons for willing to participate were “I am curious to

know my risk for CVD/diabetes” and “I want to be healthier.” Among those willing to participate, most would like to be invited by the GP and more than half was willing to pay for it.

4.2 | What is already known on this topic

The availability and organization of selective prevention programs, including a health check to identify the people at risk for disease,

TABLE 2 Factors associated with unwillingness to participate in a health check

		Univariable		
		OR	95% CI	P-value
Age	<40	1		
	40-55	1.49	0.99-2.24	.059
	56-70	1.08	0.61-1.90	.797
	>70	0.90	0.27-3.02	.868
Gender	Male	1.48	1.02-2.14	.040
Education level ^a	High	1		
	Middle	1.05	0.69-1.59	.818
	Low	1.30	0.68-2.48	.430
Job status ^b	Not (self) employed	1.39	0.94-2.05	.101
Living situation ^c	Living alone	1.47	0.94-2.30	.092
BMI (kg/m ²) ^d	<25	1		
	25-30	1.41	0.94-2.12	.097
	>30	1.17	0.64-2.13	.607
Smoking status ^e	Currently smoking	1.88	1.25-2.82	.002
Alcohol consumption ^f	Low	1.01	0.30-3.30	.991
Physical activity ^g	High	1.19	0.78-1.83	.413
Fam. Hist of CVD/DM II ^h	No	1.36	0.92-2.00	.120
Self-rated health ⁱ	≤7, not good	1		
	>7, good	1.51	1.04-2.20	.031
Invited for health check before	No or don't know	2.24	1.15-4.36	0.017
Willing to pay for health check	No	3.09	2.11-4.53	<.001

Note: Results from questionnaire distributed in general practice in the Czech Republic, Denmark, Greece, the Netherlands, and Sweden between January and July 2017 within the framework of the SPIMEU study.

Abbreviations: OR, odds ratio, 95% CI, 95% confidence interval.

^aLow: no education, primary school, middle: secondary school/high-school, high: vocational training, university.

^bNot (self) employed includes looking for work, not working because of poor health, fulltime house person or being retired, being a student, or other.

^cLiving together: living with partner, children, and/or parents.

^dBMI: Body mass index.

^eSmoking: At least one cigarette per day.

^fLow alcohol consumption: <6 alcoholic drinks per day on <1 time per week.

^gHigh physical activity: ≥5 days/week ≥30 min.

^hCVD: cardiovascular disease, onset before the age of 60, DM II: type 2 diabetes mellitus.

ⁱScale from 1 to 10, 1 very bad health 10 very good health.

differs between countries. In the Czech Republic, GPs offers a national CMD health check, which is totally reimbursed for the participants.³⁰ In the Netherlands, a guideline for a step-wise health check to identify persons at high risk is available, yet implementation fails because it is not reimbursed.³¹ In Sweden,¹⁶ a health check is systematically available in only one county (Västerbotten), which is a different county than the one where our survey was performed (Stockholm) (Supplementary file 2). In Denmark and Greece, currently no health check is available. Remarkably, willingness to participate was the highest in the country where no health check exists (Denmark). Furthermore, willingness to participate was consistently high among the five countries. This implicates that willingness among persons to participate is not influenced by the availability of a CMD health check within a country.

According to the literature, actual participation in CMD health checks ranged from 33%¹⁵ in the Netherlands, to 37% to 66% in

Denmark³² and 65%¹⁶ in Sweden. Obviously, there is a wide gap between the willingness to participate and the actual participation in CMD health checks. Varying barriers may hamper to turn the willingness into actual participation. According to the literature, barriers for actual participation in health checks were being male, smoking, being unemployed, having a low SES, and being younger.^{20,22-26,33} Examples of organizational barriers for actual participation were lack of time,³⁴⁻³⁷ difficulties to access the practice,^{38,39} or fear for a positive outcome of the health check.^{37,40}

4.3 | What this study adds

In all five countries, the majority of the respondents prefer to be invited by the GP (89%-95%). These findings support the

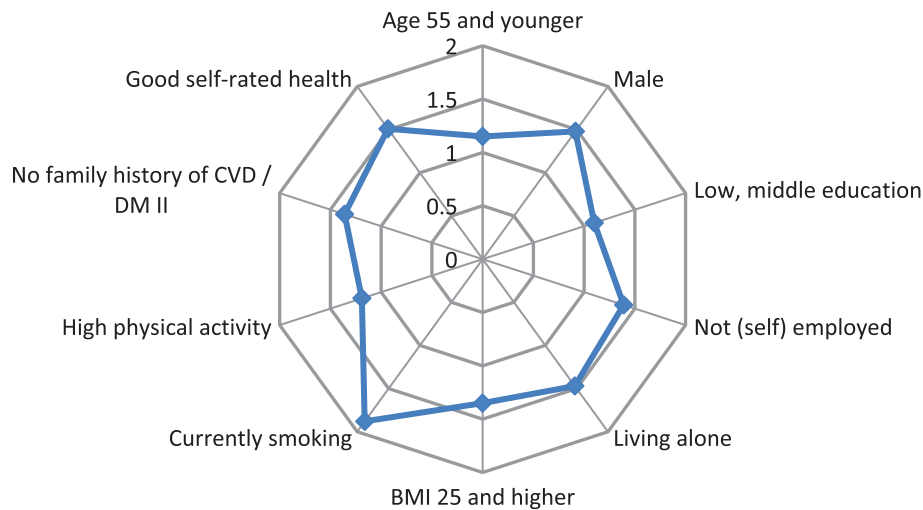


FIGURE 1 Odds ratios of factors associated with unwillingness to participate in a cardiometabolic health check. Age 55 and younger, reference group: 56 and older. Male, reference group: female. Low, middle education. Reference group: high education. Low: No education, primary school, middle: Secondary school/high-school, high: Vocational training, University. Not (self) employed, reference group: self-employed. Not (self) employed includes looking for work, not working because of poor health, fulltime house person, being retired, or being a student or other. Living alone, reference group: Living together: living with partner, children, and/or parents. BMI: Body mass index 25 and higher. Reference group: BMI below 25. Currently smoking at least one cigarette per day Reference group: smoking in the past or not smoking. High physical activity: ≥ 5 days/week ≥ 30 min. Reference group: low physical activity, < 5 days/week. No family history of CVD/DMII, Reference group: family history of CVD/diabetes CVD: cardiovascular disease, onset before the age of 60, DM II: type 2 diabetes mellitus. Good self-rated health: > 7 . Reference group: self-rated health below median ≤ 7 . Scale from 1 to 10, 1 very bad health 10 very good health

recommendation of the European Society for Cardiology guideline⁸ which states that in many countries “GPs are in a unique position to provide selective CMD prevention and consider prevention as their task.”⁴¹ The consistency across countries is remarkable, since the position of the GP in the health care system differs between these countries. For example, in the Czech Republic, Denmark, and Greece there is no formal gatekeeping system, so people have access to the specialist without interference of the GP, however there are incentives when patients are referred by the GP. In Sweden and the Netherlands, a (partial) gatekeeper system is in place.⁴² Furthermore, the strength of primary care has been identified to be less strong in Greece and Sweden than in the Czech Republic, Denmark, and the Netherlands.²⁸

The willingness to pay for a health check differed between countries. The willingness to pay seemed not to be consistently related to the different reimbursement policies in the various countries. For example, Danish participants were least willing to pay for a health check, which may be due to the fact that persons do not have to pay for most of the services in general practice with the exception of medicine.⁴³ In contrast in Greece, people were willing to pay more for a health check, and they pay privately for their health care.⁴⁴ However, in the Czech Republic, the majority was willing to pay for a health check but people do not have to pay for most of their health care.⁴⁵

To maximize the attendance rate for health checks, it is important to use an “active” invitation method using, for example, either telephone calls or personal letters which has been demonstrated to be more effective than a “passive” invitation using flyers and posters.¹⁵ A lesson from our study was that among the methods of active

invitation, an invitation by mail or telephone would be the preferred method, only in Denmark, digital methods (website, e-mail, text message) were preferred.

The majority of our respondents preferred a combined health check with other diseases such as cancer and depression. This might be very efficient, since, for example, cancer has common risk factors with CVD⁴⁶ such as obesity⁴⁷ and smoking,⁴⁸ and depression itself is a risk factor for CVD.⁴⁹ However, a health check for multiple diseases is only possible when the target population for screening is overlapping (e.g., the same age range). Organization of multi disease prevention programs would be challenging as they would require more steps, more time, and more money to organize.

4.4 | Strengths and limitations of this study

The method GPs used to distribute the questionnaire among their patients was not standardized and left to their initiative. Therefore, we were not able to calculate a response rate nor were we able to compare the characteristics of the respondents with the nonrespondents. This might have introduced selection toward inclusion of people with an interest in the topic compared to the general population.

In an earlier study, the willingness to participate in health checks for CMD was lower (56%) than in our study.²⁷ This may be explained by the different selection of the participants. In this previous study,²⁷ persons from an already existing panel, consisting of a representative population sample in the Netherlands were invited. These people are on a structural basis invited to complete questionnaires, on different

TABLE 3 Preferred situation for a health check for CMD by country

	The Czech Republic	Denmark	Greece	The Netherlands	Sweden	Total
Willingness to participate (%)	93	95	86	90	91	91
Willing to participate (n)	n = 376	n = 183	n = 257	n = 222	n = 192	n = 1230
Preferred invitation by (%) ^{a,c}						
GP	95	95	89	93	92	93
Pharmacist	4	3	8	7	26	9
Occupational HCP	15	10	11	19	60	21
Medical specialist	33	24	21	42	71	37
Municipal health service	2	18	13	25	42	17
National health service	3	32	18	24	30	18
Practice nurse	24	13	8	18	63	24
Allied healthcare professional ^b	9	15	6	10	51	16
Researchers, other	6	19	10	14	54	18
Preferred invitation method(s) (%) ^c						
At home ^d	57	58	54	84	85	64
Digitally ^d	61	74	39	57	54	56
During visit to doctor	65	57	45	40	64	55
Commercials, other	1	5	5	<1	8	4
Willingness to pay ^c (%)						
Don't want to pay	22	51	44	41	19	34
€0-€10	23	6	4	3	11	11
€11-€20	33	16	7	11	33	21
€21-€50	14	19	25	25	26	21
€51-€100	4	5	10	18	8	8
Over €100	5	3	11	2	3	5
Reasons to participate ^c (%)						
I am curious to know my risk of CVD/ diabetes	72	86	57	83	78	74
I think I have a high risk of CVD/diabetes	14	8	15	22	15	15
I want to be healthier	41	38	44	29	44	40
Only if my partner, family or friends insists that I participate	2	3	4	<1	2	2
Only if the doctor insists that I participate	10	<1	14	5	4	8
Combined health check ^{c,e} (%)	93	97	88	85	94	91

Note: Results from questionnaire distributed in general practice in the Czech Republic, Denmark, Greece, the Netherlands, and Sweden between January and July 2017 within the framework of the SPIMEU study. The bold values in this table represent the values for the total number of respondents from all five countries together.

Abbreviations: GP, general practitioner; HCP, health care provider.

^aMore answers possible.

^bE.g., dietician or physiotherapist.

^c% of respondents willing to participate.

^dAt home: letter, call. Digitally: e-mail, social media, text message on mobile phone.

^e"I prefer to have a health check that also includes other diseases such as depression and cancer."

subjects. In our study, however, consulting patients were incidentally invited by their GPs to respond to the survey, possibly resulting in a study population with a high interest in this particular subject, or a positive attitude toward prevention. If so, this selective participation may have resulted in a more positive view on the intention to participate in a CMD health check.

Another limitation was the unequal distribution of motivation among respondents, with a very low number of respondents unwilling to participate. In previous research, this was less skewed with 44% unwilling to participate.²⁷ As a consequence, numbers were too low for multivariate analysis. We performed univariate analysis to give an overview of the results, but the

unadjusted OR maybe an overestimation, and should be interpreted with caution.

A strength of our study is that we were able to distribute the same questionnaire in five countries with different (primary) healthcare systems, which facilitates direct cross country comparisons.

4.5 | Interpretation

Overall, our study shows that the willingness to participate in health checks of the population visiting general practice is high, and health checks seem to be a promising strategy to identify persons at risk for CMD.

In our study, we focused on selective prevention of CMD, which is a prevention strategy using a health check to identify people at high risk. As described in our study, we used a broad definition of a health check; ranging from a short online questionnaire to a detailed health check at the doctor's office including physical examination and laboratory tests. An advantage of this strategy is that interventions could be started on an individual level after identification of CMD risk factors. Since people are more aware of their own risk and feel the urgency on individual level, they might be more motivated to, for example, change their lifestyle. Furthermore, shared decision making can be used on individual level to improve motivation for lifestyle changes or taking preventive medication. However, a possible drawback of this high-risk approach (selective prevention), is that the ones who would benefit the most, so the ones with a higher CMD risk, might be the ones who are the least likely to attend a health check, the so-called prevention paradox. In our study, we also see that, for example, smokers and males, who are generally at higher risk of CMD, are less willing to participate. To improve uptake of health checks, special attention could be paid to attract the people who are at higher risk such as smokers.

Another option is to focus preventive strategies on the entire population, with the advantage that everyone in the population will be reached, also those that would not participate in a health check. However, population strategies usually require actions beyond the curative health care sector and are politically more difficult to achieve.

Finally, we would also like to point out that a risk of basically every screening program is overtesting and overdiagnosis. This might lead to, for example, irrational fear for the target disease and medicalization of healthy people. However, the burden of the tests used in health checks is usually limited (mostly a questionnaire, physical examination, and blood test) and there are many, quite simple, options for treatment available such as improving lifestyle and medication. We think therefore that the positive effects of early treating the risk factors and preventing disease, outweigh the negative consequences of health checks.

4.6 | Generalizability

Since we were able to distribute the same questionnaire in five countries with different (primary) healthcare systems, we think that our

results are also applicable to countries with different (primary) healthcare systems. Furthermore, we were able to collect data from a broad population with different characteristics. However, as previously described, given the overrepresentation of people with a positive attitude toward health checks, our results could at least be generalized to the population who is willing to participate. Our study has provided useful insight in factors for implementation of health checks for CMD, and we would recommend to give more insight in the unwilling people to improve implementation of health checks in the future.

4.7 | Implications

Given the wide gap between the willingness to participate in our study and the actual participation in health checks according to the literature, we recommend to pay attention to remove barriers for actual participation as much as possible. An example could be to teach communication skills to general practitioners to enable them to motivate people to participate in health checks. Costs for the health check seem to be of less importance since the majority was willing to pay, however differences were seen between the countries.

5 | CONCLUSIONS

We conclude that only the minority of the respondents was unwilling to participate in a CMD health check with consistent results within the five countries. The majority considered general practice as the preferred supplier. Together this provides a promising starting point to improve participation rates in CMD health checks in primary care.

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CONFLICT OF INTEREST

The authors declare that they have no competing interests.

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All authors have read and approved the final version of the manuscript.

Anne-Karien de Waard had full access to all of the data in this study and takes complete responsibility for the integrity of the data and the accuracy of the data analysis.

TRANSPARENCY STATEMENT

Anne-Karien de Waard affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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