CHECK'D?! : determinants of participation in a two-stage cardiometabolic screening among underserved groups
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General introduction

GENERAL INTRODUCTION

Cardiometabolic disease is one of the leading causes of death in high-income countries (1). Cardiometabolic disease comprises cardiovascular disease, diabetes, and chronic kidney damage. These conditions often coexist, and the prevalence of one condition increases the risk of the other conditions. One of the strategies to tackle cardiometabolic disease is early detection by means of screening. Unfortunately, not all groups in a society participate equally well in screening initiatives, widening already existing health inequalities. These populations are, therefore, referred to as 'underserved'. What do we know about these underserved groups; what are their reasons for not participating in cardiometabolic screening?

BACKGROUND: CARDIOMETABOLIC SCREENING

Prevalence of cardiometabolic diseases: cardiovascular disease, diabetes, and chronic kidney damage

In the Netherlands, over 1 million individuals have cardiovascular disease, representing almost 6% of the population (2). Another million persons have diabetes, and approximately 1.7 million individuals have chronic kidney damage, representing 10% of the population (3, 4). Of the individuals with diabetes, approximately 1 out of 5 is not aware of this (3); of the individuals with chronic kidney damage, this number is 2 out of 5 (4). Worldwide, cardiometabolic diseases yearly cause approximately 17.5 million deaths due to cardiovascular disease and 1.5 million deaths due to diabetes (5). Chronic kidney damage acts mostly as a risk factor for cardiovascular disease and diabetes, and is less often the actual direct cause of death. Approximately three quarters of these diseases can be prevented by tackling major overarching risk factors such as smoking, poor diet, and inadequate physical activity (6). For this, an early identification of individuals who will benefit most from preventive interventions is essential. One way of doing this is by means of cardiometabolic screening.

History of cardiometabolic screening in the Netherlands

Early detection of individuals at risk enables prevention of these chronic conditions, for example by stimulating individuals to take actions regarding their lifestyle. This will lead to health gains, but also to social gains due to reductions in sick leave and prolonged social participation (7). In the early 2000's, a fast rise occurred in initiatives in the Netherlands concerning early detection of cardiometabolic disease and other lifestyle-related diseases. An explorative investigation in 2007 of cardiovascular health checks in primary care revealed 15 promising initiatives (7). The number of initiatives was even larger when taking the full range of cardiometabolic disease and healthcare settings into account. The primary care initiatives varied in their recruitment method, follow-up, and setting, but all seemed promising in systematically identifying individuals at high risk of cardiovascular disease. Despite this variation, and the dominant curative orientation of the healthcare system at the time, various important stakeholders in the field (such as municipal health services, health funds, and primary care professionals) were willing to create public support and to influence the political agenda regarding this preventive activity. The time was right to strive for a national structure for early detection, with a crucial role for the connection between preventive and curative healthcare. This was also stressed by the Ministry of Health, Wellbeing, and Sports in 2007, giving priority to preventing and postponing disease by lifestyle measures and paying attention to early detection of high-risk groups (8). The increasing interest from the various stakeholders resulted in a gradual paradigm shift in healthcare from purely curative and demand-driven care, towards care including various types of prevention (9). The development and refinement of risk prediction models, such as the SCORE and FINDRISK, contributed positively to these changes (10, 11).

This paradigm shift resulted in various initiatives from the Dutch government, non-profit organizations, and commercial companies to raise awareness among the public of the importance of assessing risk profiles and to encourage individuals at risk to take action to prevent these diseases (12). However, several threats regarding the proliferation of these initiatives were identified. First, the diversity in health checks and screening tools was confusing to the general public as well as healthcare providers. Secondly, the quality of some health checks was questionable, and for lay persons it was expected to be difficult to distinguish the higher from the lower quality checks. Thirdly, health professionals lacked sufficient skills and knowledge for coaching high-risk individuals, resulting in individuals at

high-risk who did not know what to do to reduce their risk or where to go for follow-up, as this was not arranged in regular health care (12).

One of the health professionals who was perceived to have a central role in the identification of cardiometabolic disease was the general practitioner (GP) (9). GPs play a central and coordinating role in the Dutch healthcare system, and every individual is registered at a GP's office. The threshold to visit the GP is very low, with 75% of individuals visiting their GP annually and basic healthcare insurance covering the costs of the consultations. The relationship of trust between GP and patient made the GP practice the most appropriate setting for programmatic approaches to prevention (with the annual flu vaccination program and screening for cervical cancer as successful examples). In addition, it was known that a large proportion of the Dutch GPs had a positive attitude towards primary prevention of cardiometabolic disease (13).

These advantages of the primary care system, as well as the threats regarding the various health check initiatives, fuelled the need for an evidence-based integrated approach to prevention, well embedded in regular primary health care (12). In 2011, the Dutch college of General Practitioners (NHG), the Dutch National Association of General Practitioners (LHV), and the Netherlands Society of Occupational Medicine (NVAB) worked together with three health foundations (the Netherlands Heart Foundation, the Dutch Diabetes Research Foundation, and the Dutch Kidney Foundation) to develop an evidence-based guideline to improve the early detection and follow-up of individuals at increased risk of cardiometabolic disease. This guideline was called "Preventieconsult, module Cardiometabool risico" (Prevention consultation, module cardiometabolic risk).

Prevention consultation, module Cardiometabolic risk

Individuals aged 45 to 70 years, without known cardiometabolic disease and not using anti-hypertensive or lipid lowering drugs, were the target group for the Prevention consultation. For Hindustani Surinamese individuals the lower age limit was set at 35 years because of their genetically increased risk of diabetes, as will be explained below. The Prevention consultation followed a two-stage approach, see figure 1.

The Prevention consultation was embedded in primary care, although GPs did not receive additional reimbursement for actively approaching their patients, as this was considered selective prevention. In the Netherlands, selective prevention is not covered by the health care insurance companies. Health insurance companies only reimbursed so-called indicated

prevention, targeted at persons with an already known increased risk. Thus, when a patient had a risk score above the threshold, follow-up actions were considered indicated prevention and could be reimbursed by the usual tariffs for a consultation.
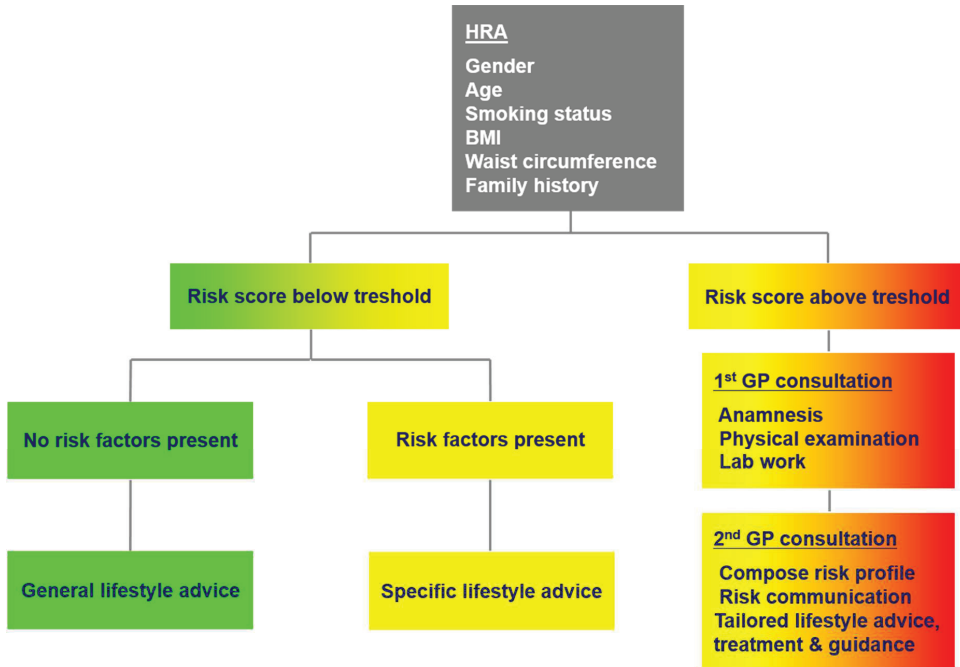

Figure 1. Two-stage approach Prevention consultation

Before the guideline was published in its definite form in 2011, three pilots had been conducted to test the feasibility in a general practice setting (9, 12, 14, 15). The researchers concluded that it was indeed feasible to implement the guideline in general practice. However, based on these experiences some adjustments were made:

- An active invitation by means of a personal letter was chosen, because it was much more effective than simply putting up a poster and having leaflets available at the practice.
- Because age turned out to be a major determinant of risk, all men over the age of 60 years and women over the age of 65 years automatically received a high-risk score. It was deemed justifiable for those groups to be invited to consult the GP immediately.
- A written HRA (in addition to the online version) was also made available, to increase response.

In the Prevention consultation the screening process is divided into two distinct stages. The first stage is an (online) Health Risk Assessment (HRA): by means of a quick and low-threshold questionnaire the entire eligible population is narrowed down to a population estimated to be at high-risk of cardiometabolic disease. Only this high-risk population is then invited for the second stage, comprising two practice consultation at the GP's office to further establish an individual's 10-year risk of cardiometabolic disease and discuss options. Below, we describe the two stages in more detail.

Stage one: Online Health Risk Assessment

The Health Risk Assessment (HRA) is an integrated risk estimation for the three above mentioned cardiometabolic diseases and the outcome is a prediction of the incidence of any of these three diseases (12). The HRA was specifically developed for individuals without already diagnosed cardiometabolic disease, hypertension, or hypercholesterolemia, and is, therefore, suitable for the general public or high-risk groups. The HRA incorporates components from the SCORE risk function and the FINDRISK questionnaire (10, 11). Scores for each item are gender-specific and the sum score indicates the total risk estimation. For the questions and scores for each item see figure 2. The HRA is available online at www.testuwrisico.nl [www.testyourrisk.nl].

As can be seen in figure 1, HRA completers can be categorized in having a risk below or above the threshold. Individuals with a risk below threshold can be further classified in having risk factors or not. Individuals without risk factors only receive general lifestyle advice, to stimulate them to remain in the 'green' domain. Those with one or more cardiometabolic risk factors receive lifestyle advice tailored to the individual's risk profile. Individuals with a risk score above threshold are advised to visit their GP for the second stage of the Prevention consultation.

HRA risk score calculation for men

What is your age? I am:		
30 – 44 years	0 p
45 – 49 years	13 p
50 – 54 years	17 p
55 – 59 years	22 p
60 – 64 years	33 p
65 years or older	37 p
Do you smoke?		
No	0 p
Yes	9 p
What is your BMI?		
Underweight	0 p
Healthy weight	0 p
Overweight	4 p
Obesity	12 p
What is your waist circumference?		
Less than 94 cm	0 p
94 cm or more	3 p
Has your father, mother, brother, or sister had a cardiovascular disease before the age of 65?		
No	0 p
Yes	1 p
Does your father, mother, brother, or sister have diabetes type 2?		
No	0 p
Yes	4 p
HRA total score =	… p

Score less than 30 and all answers **black**: no increased risk
Score less than 30 and one or more answers red: slightly increased risk
Score of 30 or more: increased risk

HRA risk score calculation for women

What is your age? I am:		
30 – 44 years	0 p
45 – 49 years	10 p
50 – 54 years	16 p
55 – 59 years	23 p
60 – 64 years	29 p
65 years or older	37 p
Do you smoke?		
No	0 p
Yes	9 p
What is your BMI?		
Underweight	0 p
Healthy weight	0 p
Overweight	4 p
Obesity	7 p
What is your waist circumference?		
Less than 80 cm	0 p
80 – 87 cm	2 p
88 cm or more	6 p
Has your father, mother, brother, or sister had a cardiovascular disease before the age of 65?		
No	0 p
Yes	4 p
Does your father, mother, brother, or sister have diabetes type 2?		
No	0 p
Yes	3 p
HRA total score =	… p

Score less than 35 and all answers **black**: no increased risk
Score less than 35 and one or more answers red: slightly increased risk
Score of 35 or more: increased risk

Figure 2. HRA questions and scores for each item

Stage two: Practice Consultations

High-risk individuals according to the HRA are advised to visit the GP (or practice nurse) for two so-called Practice Consultations (PC), see again figure 1. During the first consultation the anamnesis of the 10-year risk of cardiovascular mortality and/or a diagnosis of diabetes is assessed. This risk profile includes lab work (serum cholesterol ratio and glucose level), blood pressure measurements, and a verification of the HRA items (figure 2). The second consultation consists of composing and communicating the risk profile, providing tailored lifestyle advice, and/or starting with (preventive) drug treatment (e.g. lipid lowering drugs). The tailored lifestyle advice can consist of an evidence-based lifestyle program in the local community, or a referral to a dietician for dietary advice or a physiotherapist for exercise programs.

Studies indicate that two-stage screening could be a cost-effective strategy (16, 17). The cost-effectiveness of the Prevention consultation specifically is currently investigated (18). A pre-requisite for cost-effectiveness is reaching those who benefit most, in other words: those who are at highest risk. Unfortunately, individuals participating in health checks are more often the health-conscious, higher-educated, affluent people (9, 19). Participation is lower among people with an increased risk, generally individuals of non-Western descent or with a lower SES (20).

CARDIOMETABOLIC SCREENING AMONG UNDERSERVED GROUPS

Underserved groups

Some groups in a society are underserved regarding health profits to be gained from cardiometabolic screening.

In the Netherlands, these groups are those of native Dutch origin with a low SES and certain non-Western immigrant groups. On the one hand this is due to an increased susceptibility to cardiometabolic disease, generally because of an unfavourable genetic makeup and/or unhealthier lifestyle habits (21, 22). On the other hand these groups are more vulnerable to be (unintentionally) excluded from screening initiatives because the one-size-fits-all approach does not reach them or does not appeal to them (20). This increased susceptibility and vulnerability are described in the next paragraphs.

Susceptibility to cardiometabolic disease

Mortality from cardiovascular disease is higher among those with a low socioeconomic status (23). Additionally, individuals with a low SES have an increased risk of type 2 diabetes, particularly in high-income countries like the Netherlands (24). A low SES is also associated with measures of chronic kidney damage: lower estimated glomerular filtration rate (eGFR), higher albuminuria, and unfavourable eGFR/ albuminuria ratios, and with renal failure (25). The prevalence of cardiovascular disease is more than two times higher (10.6%) among Turkish than among native Dutch (5.0%), even when adjusting for lifestyle factors, educational level, and other health-related factors (figure 3) (26). The prevalence of diabetes is almost two times higher (5.6%) among Turkish than among native Dutch (3.1%) (27). Additionally, the age of onset is typically a decade lower for Turkish than for native Dutch. The age-standardized prevalence of chronic kidney disease is more than two and a half times higher (8.0%) among Turkish than among native Dutch (3.0%) (28).
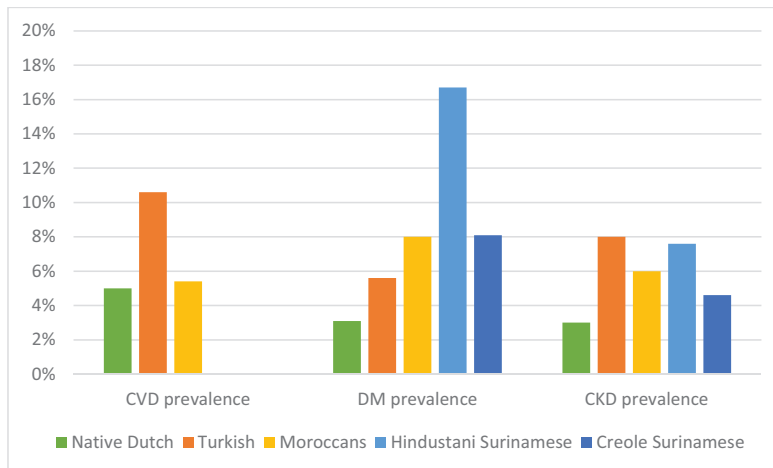

Figure 3. Prevalence of cardiometabolic disease among non-Western groups when compared to native Dutch (26-29)

As can be seen in figure 3 the prevalence of cardiovascular disease does not differ substantially between Moroccans (5.4%) and native Dutch (5.0%) (26). The mortality due to cardiovascular disease is even lower among Moroccan males than among native Dutch males, with a relative risk of 0.51 (21). However, the prevalence of diabetes is more than two and a half times higher (8.0%) among Moroccans than among native Dutch (3.1%) (27). When adjusting for sociodemographic factors and physical activity, the prevalence of diabetes is

even three and a half times higher among Moroccans than among native Dutch (27). Additionally, the age of onset is typically two decades younger for Moroccans than for native Dutch. The age-standardized prevalence of chronic kidney disease is more than two times higher (6.0%) among Moroccans than among native Dutch (3.0%) (28).

Mortality due to cardiovascular disease is higher among Surinamese than among native Dutch, both for males and females (21). Surinamese individuals have a higher risk of diabetes, and at a younger age. This is especially so for the Hindustani Surinamese. The prevalence of diabetes is four times higher among Hindustani Surinamese than among native Dutch, and two times higher among Creole Surinamese than among native Dutch (figure 3) (29). For the age group of 35-44 years, this comes down to 16.7% of Hindustani Surinamese having diabetes, 8.1% of Creole Surinamese, and 4.2% of native Dutch. For the age group of 45-60 years, prevalences are 35.0%, 19.0%, and 8.2%, respectively. Hindustani Surinamese have a two and a half time higher (7.6%) prevalence of chronic kidney disease than native Dutch, and Creole Surinamese a one and half time higher prevalence (4.6%) (28).

Vulnerability due to limited access to screening

In recent years, in the Netherlands as well as in other European countries, (quality-adjusted) life expectancy has increased. However, this increase has not been equal for all groups within society. The largest increases have been seen among the highest educated, resulting in a health gap (30). This gap has been widening in the period from 2001 to 2011: inequalities in mortality as well as in health-related quality of life increased between the highest and lowest educated. In 2001, the difference in quality-adjusted life expectancy between the low and the highly educated was 7.4 healthy years for men and 6.3 for women. By 2011 this difference had increased to 8.1 health years for men and to 7.1 healthy years for women (30).

Next to the fact that those with a low socio-economic status and certain non-Western immigrant groups have an increased risk of cardiometabolic disease, it has been shown that these groups are more vulnerable to be (unintendedly) excluded from health checks (20). Those with greater clinical need or risk factors, thus, take up health checks unequally. This differential uptake may lead to suboptimal health gains from cardiometabolic screening and, thus, contributes to the widening of health inequalities in society. This may be even more so for a cardiometabolic health check with a two-stage screening approach, as individuals may drop out on two separate occasions. Therefore, it is important to investigate why underserved groups do or do not participate in two-stage cardiometabolic screening.

Determinants of participation

Most of the literature regarding determinants of cardiometabolic screening concerns (non-)attendance among the general population. From this literature we can conclude that health-conscious patients more frequently follow up an invitation for a health check as they see the importance and advantages of doing so. Individuals without health problems have a more negative attitude and do not recognize the necessity of screening because they consider themselves to be in good health (20, 31, 32). Contrastingly, it has also been found that individuals with already existing health problems less often attend health checks. Perhaps these individuals lack personal relevance as they already have regular contact with primary care for their health complaints (32). Next, not wanting to know one's risk and fear (for the outcome and the consequences of that outcome) seem to play a distinct role in non-attendance among the general population (20, 31, 33, 34). Finally, individuals with unhealthy lifestyle habits (such as smoking) seem to be more reluctant to visit a GP for lifestyle advice wanting to avoid comments on their unhealthy behaviour (35).

Few studies specifically investigated (non-)participation in cardiometabolic screening among non-Western immigrants or individuals with a lower SES. Moreover, those studies that do report determinants among underserved populations exclusively focus on physical assessments at a doctor's office (one-stage screening), not two-stage screening with risk stratification as a first step. Some of the determinants that we find in the literature regarding one-stage cardiometabolic screening have to do with the invitation method. A multi-strategy approach combining mailed letters, telephone calls, and/or especially face-to-face strategies seems useful for increasing uptake in underserved groups (36). Determinants from these studies may also provide insight into determinants of participation in two-stage screening, although decision making can be expected to differ when potential participants have to weigh pros and cons twice.

Underserved groups have been studied in the context of participation in another form of screening, namely cancer screening. Results from these studies theoretically also provide insight into reasons for (non-)participation in cardiometabolic screening. However, the risk perceptions and beliefs regarding cancer differ substantially from those regarding cardiometabolic diseases: perceived risk and worries are much higher for cancer than for CMD (37).

Clearly, the reasons of members of underserved groups to participate in two-stage cardiometabolic screening or not need to be investigated further.

AIM OF THIS THESIS

With the high burden of cardiometabolic disease among non-Western immigrants in the Netherlands and native Dutch with a low SES, their participation in preventive screening is eminent. It is, therefore, worrisome that these groups are particularly underrepresented in screening initiatives, as this may widen health inequalities in a society. To increase participation of these underserved groups in two-stage cardiometabolic screening, insight into the motivation and determinants of participation of these groups is essential. This dissertation describes the **CHECK'D** (**C**ardiometabolic **H**ealth check **E**valuating **C**ardiometabolic and **K**idney **D**isease) study. The aim of the CHECK'D study was to get insight into the (psychosocial) determinants of participation of underserved groups in both stages of the Dutch cardiometabolic health check (Prevention consultation, module cardiometabolic risk) as well as the actual response and participation rates in the two stages.

We pursued a systematic inventory of these determinants of participation and used a comprehensive theoretical framework for this purpose: the I-change model (figure 4). The I-change model explains health behaviours and has been applied in studies among native and immigrant populations (38-41). Health check attendance can be seen as a health behaviour and in that sense can be studied using this model. Another reason that we selected this model is that it provides the opportunity to get a comprehensive insight into the factors influencing participation as it integrates ideas from several theories: the transtheoretical model (motivational stages of change), theory of planned behaviour, social cognitive theory, the health belief model, and goal setting theories. The model states that behaviours are determined by a person's motivation or intention, as well as his or her abilities to carry out the behaviour. Attitudes, social influences, and self-efficacy expectations influence a person's motivation and are determined by predisposing (e.g. current lifestyle), information (e.g. source of delivery), and awareness (e.g. knowledge and risk perception) factors.
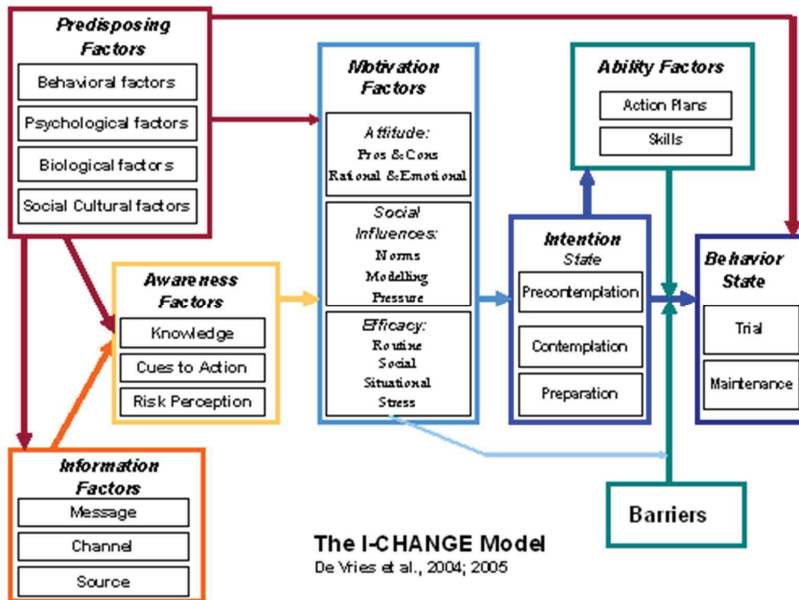
Figure 4. The I-change model, from http://www.maastricht-university.eu/hein.devries/interests/change

OUTLINE OF THIS THESIS

Chapter 2 describes a qualitative study among underserved groups on their determinants of (hypothetical) participation in the first stage (the HRA) and in the second stage (the PC). In Chapter 3, the response and participation rates of underserved groups in both the HRA and the PC are described. Chapter 4 and 5 cover the determinants among underserved groups of (actual) participation in the HRA and the PC, respectively. Chapter 6 describes the yield of the PC among underserved groups. The thesis ends with a summary and discussion.

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