



## Favourable outcomes of a preventive screening and counselling programme for older people in underprivileged areas in the Netherlands: The PRIMUS project

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### ABSTRACT

An aging population is associated with an increased prevalence of diabetes, cardiovascular diseases and depression. Important aspects of programmes targeted at older people are: to reach those at risk, effective screening, optimising advice, and referral to local interventions. We examined the effect of a preventive health consultation (PRIMUS), a multi-behavioural screening programme for persons aged 55–74 years in primary care. In a multi-centre randomised controlled trial, the effects of participating in the PRIMUS intervention were compared to a comparison group receiving personalised summaries and advice by postal mail, both preceded by a health risk assessment via a questionnaire. The intervention consisted of a baseline health risk assessment, followed by a preventive health consultation (after 4 weeks), and a follow-up visit (2 weeks later) in the primary care centre. A newly developed web-based computer-tailored programme supported the nurse practitioner during the consultation. Main outcomes measures were awareness of, and compliance with referral advice for changing unhealthy lifestyles. The PRIMUS preventive health consultation was successful in older people at risk for cardio metabolic diseases compared to the comparison group (compliance: RR 1.43; 95% CI 1.12–1.79;  $p < 0.05$ ). The intervention was less successful in older people at risk for mental health problems. This preventive health consultation for older people resulted in positive changes in unhealthy behaviours by optimising reach, raising awareness, motivating and assisting individuals to change, and referring to local interventions.

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### 1. Introduction

In the Netherlands with its ageing population, compared to 2005 a 58% increase in the prevalence of diabetes, a 40% increase of cardiovascular diseases and a 10% increase in depression is expected by 2025 (van Duin, 2009; Lucht van der and Polder, 2011; Luijben and Kommer, 2010; Blokstra et al., 2007). These trends are similar in all Western countries (Shetty, 2012).

Large differences in healthy life expectancy exist between people with a low and high socioeconomic status (SES) (Mackenbach et al., 2008). In the Netherlands, high income 65-year-old men live 5.7 years longer in good health compared to low-income men; for women this is 5.3 more healthy years (Knoops and van den Brakel, 2010). Prevention of health problems by identifying risks and changing unhealthy behaviours is likely to decrease morbidity, prolong life and improve quality-of-life (Mackenbach et al., 2008; Oers van, 2002; Whitlock et al., 2002). Healthy life styles (non-smoking, limited alcohol use, physical activity and maintenance of a normal weight) are associated with

lower risk rates of cardiovascular disease, lower diabetes type 2 and reduction in cancers (Spring et al., 2013).

Various lifestyle interventions are available to help diminish health risks in the elderly. However, many older people at-risk are not reached by these interventions (Schippers et al., 2009). Therefore, the most challenging goals are to increase reach to those at-risk, promote screening on unhealthy lifestyles, and optimise advice and referral to (local) interventions. Clinicians can play a vital role in reaching those at-risk and in promoting healthier life styles (Spring et al., 2013). Few studies have evaluated the effects of population-based screening programmes (Deutekom et al., 2011). The ones that have evaluated health behaviour suggest a positive effect. Nevertheless, more research on the effect on population based screening programs is needed, especially in groups difficult to reach.

To optimise reach and increase compliance with lifestyle advice, we developed the Prevention: Intervention Mapping Used for Seniors (PRIMUS) - Preventive Health Consultations (PHC) intervention. A formal literature search followed by a RAND appropriateness method on effectiveness of screening in older people was done as part of the assessment procedure to conduct the PRIMUS-PHC (Drewes et al., 2012). We involved older people, relevant professionals and key figures to identify

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potential barriers and facilitators that needed to be tackled by means of the PRIMUS-PHC (van Dijk et al., 2012; van Dijk et al., 2009). We took into account the criteria of Wilson and Jungner (Wilson and Jungner, 1968), for example that screening has to lead to an early warning, raising awareness, without creating false senses of security. Based on the assessments, we concluded that screening in the general population of elderly aged 55–74 years was only appropriate for cardiovascular risk factors, such as smoking, insufficient physical activity, and increased body mass index (BMI) (van Dijk et al., 2012; Drewes et al., 2012; Wilson and Jungner, 1968). There was inconclusive evidence for subclinical depression and loneliness, and for alcohol abuse. However, given their high prevalence among older people and the availability of effective interventions, these health risks were also included (van Dijk et al., 2012; Weingart, 2009).

To increase uptake the PRIMUS-PHCs took place in primary care settings, because older people prefer this to other settings, such as a homecare organisation (van Dijk et al., 2009). In addition, because older people with a lower SES have a lower healthy life expectancy, the PHCs were conducted in primary care centres located in underprivileged areas. The invitation was sent to clusters of people living in the same street, thus increasing a favourable social norm of participation by inviting neighbours (van Dijk et al., 2009). To facilitate uptake among people from a non-Dutch cultural background, educators with a similar cultural origin conducted home visits to ensure their understanding of the PHC goal and content.

The intervention content was guided by the Health Belief Model and Stages of Change Model (Strecher et al., 1997; Rollnick and Miller, 1995). As the main behavioural technique, Motivational Interviewing was used to optimise awareness of and compliance with advice (Prochaska and Diclemente, 1983). This way the best available tools and most recent insights were used to optimise motivation. As part of the invitation, individuals received an initial health risk assessment (HRA) form. At the first step of the PHC each person was informed about their results via this HRA, i.e. their individual health risks. Prior to consultation, counsellors were also provided with the results of the HRA as a reminder to discuss barriers and lifestyle changes with the participant (Strecher et al., 1997). The choice of topic of conversation was based on the HRA and the motivation of the participants to engage in specific lifestyle changes.

The present study evaluated the effect of the PRIMUS-PHCs on awareness of and compliance with referral advice for changing unhealthy lifestyles among older people, compared to general advice on lifestyle changes received by postal mail.

## 2. Methods

### 2.1. Design and participants

This multi-centre randomised controlled study (RCT) (conducted in 2010–2011) used the street where the participants lived as the unit of randomisation. A power calculation was carried out a priori with estimates 'at least one cardio metabolic risk (60%)' and 50% expected response. For a power of 90%, alpha of 0.05, 567 people had to be invited in both groups to find an increase in compliance with cardio metabolic referral advices of 15% (30 vs. 15%) (Altman, 1991).

Potential participants (n = 1699) aged 55–74 years were selected from four primary care centres situated in several underprivileged neighbourhoods in The Hague, the third largest city of the Netherlands with about half a million inhabitants. Of those aged 55–74 years, 14% is from Turkish, Moroccan or Surinam origin (Bevolkingsgegevens gemeente Den Haag, 2013). The number of participants invited per primary care centre depended on the availability of working hours of the nurse practitioners (NPs). Criteria for study exclusion were: 1) cerebrovascular or cardiac events within 6 months prior to the intervention, 2) participating in diabetes mellitus II or other lifestyle programmes,

and/or 3) physically/emotionally/cognitively unable to comply with a lifestyle programme.

The primary care physicians (PCPs) checked the patient's eligibility prior to inviting them to participate. Fig. 1 shows the selection and enrolment of the PRIMUS participants.

All eligible participants (n = 1147; 67.5%) received a written invitation, a brochure explaining the purpose of the study, a baseline questionnaire, and an informed consent form from their PCP; those returning the questionnaire were included in the study. From March to December 2010 the participants were recruited in weekly cohorts.

### 2.2. Intervention

The intervention consisted of three phases: a written HRA at baseline, a preventive health consultation (after 4 weeks) and a follow-up visit (2 weeks later) at the primary care centre. We developed a web-based computer-tailored programme guided by theory and evidence, using Tailor Builder Software V<sub>2</sub>, to screen respondents regarding risk behaviour, to provide summaries of the HRA, to support NPs during the consultations, and to create written evidence-based referral advice for all participants (Tailor Builder Software [computer program], 2011). The screening was tailored towards motivation. All NPs received a 12-h training to explain the intervention and protocol of the computerised-tailored intervention and to train motivational skills.

#### 2.2.1. Phase 1: health risk assessment (HRA)

Patients were able to link to the web-based HRA form or to fill in a paper version; a reply envelope was enclosed. Following the Dutch public health guidelines, participants with the following characteristic(s) were considered to be at increased risk for cardiovascular diseases, depression or loneliness:

1. being a smoker
2. having a BMI  $\geq 25$  (Van Binsbergen et al., 2010)
3. being physically (moderately) active for less than the national norm of at least 30 min/day for at least 5 days/week (Wendel-Vos et al., 2003)
4. drinking  $>7$  units of alcohol/week (Adams et al., 1996)
5. having a score on the Centre for Epidemiologic Studies Depression Scale (CESD-20) for subclinical depression of  $\geq 16$  (Thomas et al., 2001)
6. having a score on the De Jong-Gierveld loneliness scale of  $\geq 3$  (de Jong and van Tilburg, 2008; de Jong-Gierveld, 1987)

#### 2.2.2. Phase 2: preventive health consultation (PHC)

At the start of the PHC, NPs informed participants about their risks by emphasising healthy behaviours and stimulating change of the unhealthy ones. Participants with multiple unhealthy behaviours could choose the order in which they preferred behaviour(s) to be discussed. NPs used motivational interviewing techniques to move participants through the various behaviour change processes and to enhance participant's intention, self-efficacy, and attitude (Rollnick and Miller, 1995). To support NPs in discussing and advising about unhealthy behaviours, we developed computerised Minimal Intervention Strategies (MIS), grounded on the Stages of Change theory (Prochaska and Diclemente, 1983), making use of the available MIS programmes for smoking, overweight and drinking behaviour (Pieterse et al., 2001; Fransen, 2011). We developed MIS for physical activity, subclinical depression and loneliness. All MIS were based on the 5A's behaviour change model: 1) 'Assess' motivation to change, and existing beliefs and knowledge regarding the health behaviour, 2) 'Advise' on health risks and provide information, 3) 'Agree' or collaborate by discussing benefits and ambiguities, and by setting goals tailored to the participant's interest, 4) 'Assist' by thinking of strategies, setting quitting or starting dates, and offering support, 5) 'Arrange' referral and follow-up appointments. NPs referred participants to evidence-based interventions in the

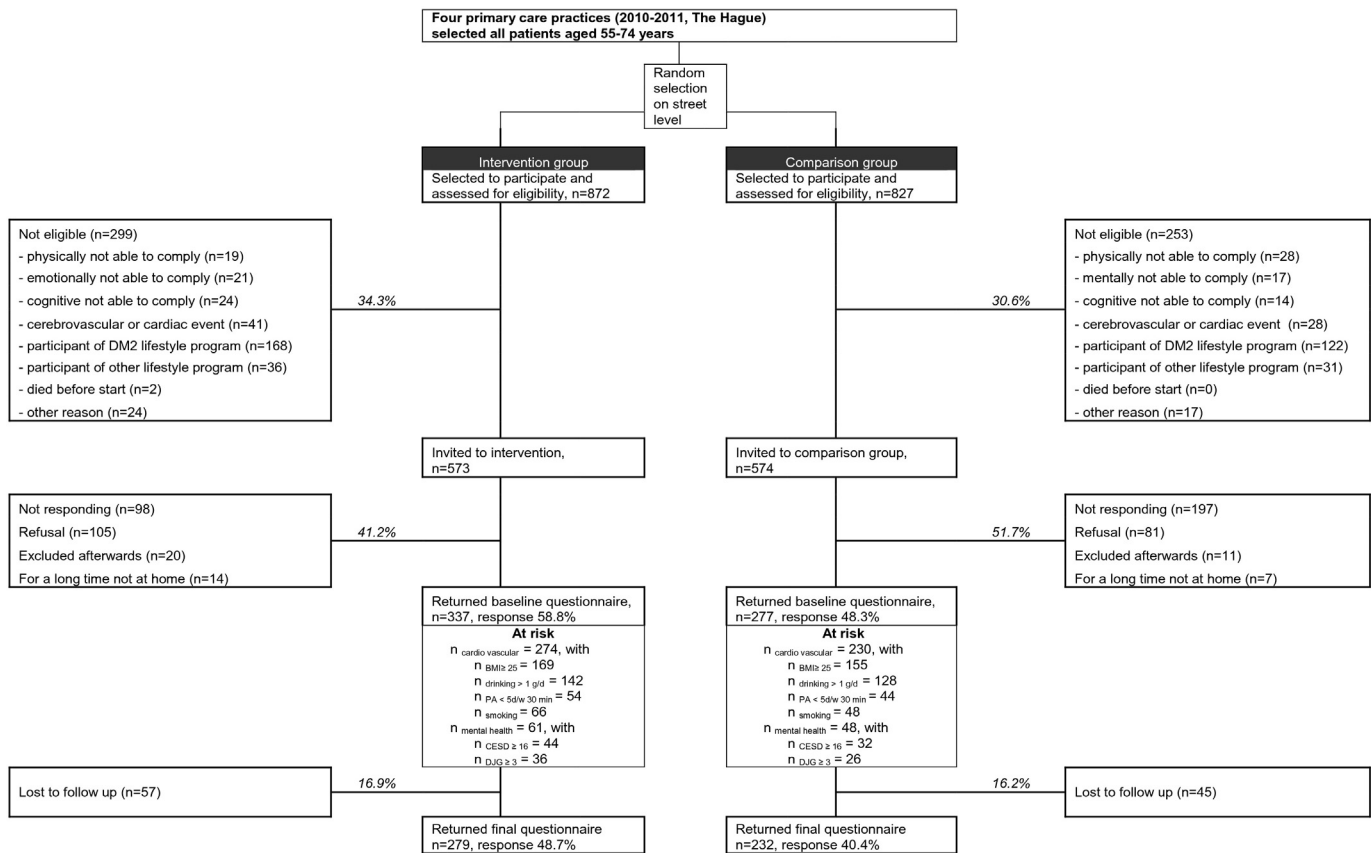


Fig. 1. Participant flow and follow-up.

neighbourhood (Haringsma et al., 2006; Grandes et al., 2000; Dekker et al., 2011).

During the consultation, the patient's weight and height were measured, and blood pressure was measured twice. Participants received a laboratory form to test total cholesterol (TC) and high density lipoprotein cholesterol (HDL) to determine the TC/HDL ratio, and blood glucose. An appointment was made for a follow-up consultation 2 weeks later.

### 2.2.3. Phase 3: follow-up consultation

During follow-up, NPs discussed outcomes of the laboratory tests. Meanwhile, the absolute 10-year cardiovascular risk score (SCORE) on morbidity and mortality was calculated, based upon age, gender, smoking behaviour, systolic blood pressure and TC/HDL ratio (Dekker et al., 2011). Since the SCORE function stops at age 65 years, we used the same 65-year data for persons aged 66–74 years. NPs discussed perceived barriers in achieving the health goals set in the former consultation.

### 2.3. Comparison group

The comparison group received the same HRA as the intervention group. Four weeks after the HRA, they received personalised summaries of the results of the screening forms, with relevant healthy lifestyle advice and written referrals. Participants received information based on the Dutch public health guidelines to identify risk behaviours, and similar local interventions for referral, as those offered to the intervention group.

### 2.4. Questionnaires

Both groups received a baseline questionnaire together with the HRA. All participants that completed the baseline received a follow-up

questionnaire 6–8 weeks after the PHC, or the advice received by mail. Turkish, Moroccan and Hindustan interviewers visited participants from according origin, to assist them in filling out the HRA and questionnaires, and to emphasise the importance of participation.

In the final questionnaire, responses were assessed separately for each risk factor. Awareness of having received an advice was measured by questions like: “Did you get any advice to quit smoking?” or “Did you get any advice concerning your depressed feelings?” (Awareness: yes/no). Responses were categorised into two outcomes: 1) being aware of having had at least one advice concerning cardiometabolic risk factors (smoking, BMI, physical activity, and alcohol use), and 2) being aware of having had at least one advice concerning mental health risk factors (depression and loneliness).

Compliance with received advice was defined as self-reported follow-up of referral advice and was measured as follows: “Did you make an appointment with the dietician since the PHC or since we sent you this advice?” (Compliance: yes/no). Compliance was categorised into two outcomes 1) compliance with at least one advice concerning cardiometabolic risk factors, 2) compliance with at least one advice concerning mental health risk factors.

Secondary outcomes were measured by reported positive changes in lifestyle behaviour, BMI, and scores on subclinical depression and loneliness. These were measured based on the percentage of participants not exceeding the norms at the final measurement of all participants exceeding them at baseline.

Participants were asked for their age, gender, level of income, level of education, household composition, and ethnicity (Table 1). Health characteristics included the number of chronic disorders and perceived health status.

Motivation to change was assessed at baseline for people not meeting the healthy guidelines, using a 5-point Likert-type scale. Intention to change unhealthy behaviours was measured by questions like “Suppose

you decide to increase physical activity, when do you intend to start? (1 = no and I never will, 2 = within a year, 3 = within six months, 4 = within one month, 5 = right now)". Self-efficacy in changing behaviour was measured by questions like "Suppose you want to quit smoking, do you think you will be able to do so? (1 = certainly not, 2 = probably not, 3 = maybe, 4 = probably, 5 = certainly)".

**Table 1**  
Baseline characteristics of the intervention and comparison group (2010–2011, The Hague).

	Intervention (n = 337) %	Comparison (n = 277) %	P*
<b>Demographic</b>			
<b>Sex</b>			
Male	42.4	46.9	Ns
Female	57.6	53.1	
<b>Age group</b>			
55–59 years	30.6	26.0	Ns
60–64 years	33.2	32.5	
65–69 years	22.0	25.6	
70–74 years	14.2	15.9	
<b>Level of education</b>			
Very low	9.7	12.7	Ns
Low	33.6	32.1	
Intermediate	23.1	19.4	
High	33.6	35.8	
<b>Ethnic origin</b>			
Dutch	87.8	90.3	Ns
Surinam (Hindu)/Turkish/Moroccan	5.8	5.8	
Other	6.4	4.0	
<b>Net income</b>			
<€1350	18.6	21.3	Ns
€1351–€1750	12.9	13.5	
€1751–€3100	39.2	34.4	
>€3100	29.3	30.7	
<b>Household</b>			
Couple	66.2	68.5	Ns
Single	31.8	30.1	
Other	1.9	1.4	
<b>Health</b>			
<b>Chronic disorders</b>			
0	25.5	27.1	Ns
1	31.5	28.9	
2	24.0	23.5	
≥3	19.0	20.6	
<b>Perceived state of health</b>			
Excellent/very good	20.5	25.1	Ns
Good	60.6	56.7	
Moderate/bad	18.9	18.2	
(Sub) clinical depression (CESD-20 ≥16) <sup>a</sup>	13.1	11.6	Ns
Feelings of loneliness (DJG ≥3) <sup>b</sup>	10.7	9.4	Ns
<b>Health behaviour</b>			
Smokers	20.1	17.4	Ns
Overweight (BMI >25) <sup>c</sup>	53.5	56.2	Ns
Insufficient exercise (<5 days a week 30 min) <sup>d</sup>	17.5	16.7	Ns
Alcohol abuse (>1 glass a day) <sup>e</sup>	43.2	46.5	Ns
<b>Motivational</b>			
Intention to change		Mean score	Mean score
Stop smoking	4.19	3.77	Ns
Lose weight	4.41	4.23	Ns
Increase exercise	4.30	4.17	Ns
Decrease alcohol use	4.18	4.38	Ns
<b>Attitude towards</b>			
Stop smoking	3.59	3.43	Ns
Lose weight	4.23	4.20	Ns
Increase exercise	4.18	4.48	<0.05
Decrease alcohol use	3.87	3.79	Ns
<b>Self efficacy to</b>			
Stop smoking	3.45	3.37	Ns
Lose weight	3.74	3.84	Ns
Increase exercise	3.82	3.97	Ns
Decrease alcohol use	4.14	4.13	Ns

Regarding these risk behaviours, attitude towards changing behaviour was measured by questions like "How important is it to you to decrease your alcohol consumption? (1 = very unimportant, 2 = unimportant, 3 = not unimportant or important, 4 = important, 5 = very important)".

## 2.5. Statistical analysis

The SPSS version 17.0 was used for the analyses. Pearson's chi-squared tests were used for dichotomous or categorical variables and *t*-tests were used for continuous variables to compare baseline characteristics of intervention and comparison group, as well as the characteristics of response and non-response group. Intervention and comparison group were compared for outcome measures by calculating risk estimates. Because no baseline differences were found, no adjustments were made. Dropouts were considered to be unsuccessful in primary and secondary outcomes.

## 3. Results

### 3.1. Sample characteristics

Of the 1147 invited participants, 614 (54%) completed the baseline questionnaire. Response rate at baseline was higher in the intervention than in the comparison group (58.8% vs. 48.3%,  $p < 0.05$ ). Of all invited participants, 511 (45%) also completed the second questionnaire (Fig. 1). Mean age of the study population was 63.3 (SD 5.18) years and 84% had a health risk. At baseline, there were no significant differences in demographics, health, and health behaviour between the two groups. Also, except for attitude towards increasing physical activity, no motivational baseline differences were found (Table 1).

### 3.2. Dropout

There was no difference in the dropout rate between intervention and comparison group (16.9% vs. 16.2%, ns). Dropout was higher among participants from Surinam-Hindu/Moroccan/Turkish origin (34.3%,  $p < 0.01$ ), and those with a lower education level (33.8%,  $p < 0.01$ ), a lower net income (22.8%,  $p < 0.01$ ), singles (21.4%,  $p < 0.01$ ), with insufficient physical activity at baseline (28.6%,  $p < 0.05$ ), and with feelings of loneliness (26.2%,  $p < 0.05$ ). In the intervention group, dropout was significantly higher among smokers (28.8%,  $p < 0.01$ ) and those with a bad or moderate perceived health at baseline (31.3%,  $p < 0.01$ ).

### 3.3. Outcomes on awareness and compliance

#### 3.3.1. Cardiometabolic risk

Two-thirds of the participants at high risk for cardiometabolic diseases were aware of having received at least one healthy lifestyle advice, with no differences between the two groups (Table 2). Awareness was highest for alcohol. Overweight participants in the PRIMUS group

Note to Table 1

\* Chi-square statistics: ns =  $p > 0.05$ .

<sup>a</sup> 20-item version of the CES-D. Thomas JL, Jones GN, Scarinci IC, Mehan DJ, Brantley PJ. The utility of the CES-D as a depression screening measure among low-income women attending primary care clinics. The Center for Epidemiologic Studies-Depression. *Int J Psychiatry Med* 2001;31(1):25–40.

<sup>b</sup> de Jong GJ, van Tilburg T. [A shortened scale for overall, emotional and social loneliness]. *Tijdschr Gerontol Geriatr* 2008 Feb; 39(1):4–15.

<sup>c</sup> Body mass index ( $\text{kg}/\text{m}^2$ ) (Van Binsbergen JJ, Langens FNM, Dapper ALM et al. *NHG Standaard Obesitas*. Huisarts en Wetenschap 2010; 53: 609–25.)

<sup>d</sup> Wendel-Vos GC, Schuit AJ, Saris WH, Kromhout D. Reproducibility and relative validity of the short questionnaire to assess health-enhancing physical activity. *J Clin Epidemiol* 2003 Dec; 56(12):1163–9.

<sup>e</sup> Adams WL, Barry KL, Fleming MF. Screening for problem drinking in older primary care patients. *JAMA* 1996 Dec 25; 276(24):1964–7.

**Table 2**  
Results after a model-based 3-stage health behaviour change intervention for older people at risk (the PRIMUS study, 2010–2011, The Hague).

	Awareness <sup>a</sup>			Compliance <sup>b</sup>		
	Received advice (%)	RR	(95% CI)	Followed-up advice (%)	RR	(95% CI)
Received/followed-up at least one advice						
At risk in the intervention group (n = 274)	67.5	0.98	0.87–1.10	46.0	1.43	1.12–1.79
At risk in the comparison group (n = 230)	69.1	1		32.2	1	
Behaviour-specific advice (for people at risk)						
Lose weight (when BMI > 25)						
At risk in the intervention group (n = 169)	58.6	1.02	0.85–1.23	41.4	1.61	1.16–2.21
At risk in the comparison group (n = 155)	57.4	1		25.8	1	
Decrease alcohol use (when drinking >1 glass a day)						
At risk in the intervention group (n = 142)	62.7	0.97	0.81–1.16	32.4	1.66	1.09–2.54
At risk in the comparison group (n = 128)	64.8	1		19.5	1	
Increase physical activity (when BMI >25 and >5 days/week 30 min PA)						
At risk in the intervention group (n = 136)	33.1	2.24	1.38–3.66	13.2	2.31	1.00–5.33
At risk in the comparison group (n = 122)	14.8	1		5.7	1	
Increase physical activity (when <5 days/week 30 min PA)						
At risk in the intervention group (n = 54)	46.3	0.89	0.59–1.33	14.8	2.17	0.61–7.71
At risk in the comparison group (n = 44)	52.3	1		6.8	1	
Quit smoking (when smoking)						
At risk in the intervention group (n = 66)	47.0	0.73	0.52–1.01	15.2	2.42	0.71–8.34
At risk in the comparison group (n = 48)	64.6	1		6.3	1	

RR - relative risks; CI - confidence interval; BMI - body mass index (length/(weight \* weight)); PA - physical activity.

<sup>a</sup> Awareness is defined as advice received because of unhealthy lifestyle.

<sup>b</sup> Compliance is defined as self-reported follow-up after given referral advice.

were more often aware of having received an advice to increase physical activity even though they were sufficiently physically active at baseline.

40% of the participants at cardiometabolic risk reported compliance with at least one cardiometabolic referral advice. Compliance in the PRIMUS group was 1.4 times higher than in the comparison group, particularly regarding advice on physical activity (only for overweight participants), to lose weight, and to decrease alcohol consumption (Table 2). In the PRIMUS group, compliance with advice was highest among participants that needed to lose weight.

At the final measurement, when indicated for advice/intervention, participants in the PRIMUS group more often met the norm for alcohol use (23.9%<sub>Intervention(I)</sub> vs. 12.5%<sub>Comparison(C)</sub>,  $p < 0.05$ ).

### 3.3.2. Mental health risks

20% of the participants at high risk for mental health problems was aware of having received at least one advice concerning this risk, in both groups (21.3%<sub>I</sub>, 20.8%<sub>C</sub>, RR 1.03, 95% CI 0.41–2.06). Awareness was lowest among participants with a high risk score for loneliness (8.6%<sub>I</sub>, 11.5%<sub>C</sub>, RR 0.72, 95% CI 0.13–3.89, respectively).

Compliance with at least one mental health referral advice was 9.2%. Compliance was almost twice as high in the intervention group (not significant: 11.5%<sub>I</sub>, 6.2%<sub>C</sub>, RR 1.94, 95% CI 0.48–7.96). Compliance was lowest among participants with a high risk score for loneliness (6.6%).

The percentage of participants not exceeding the mental health norms at the final measurement, but exceeding them at baseline, was 23.9% (no difference between the two groups).

## 4. Discussion

This study assessed the effects of a preventive health consultation (PRIMUS-PHC) on awareness of and compliance with advice and interventions in older people. A distinction was made between cardiometabolic risk and mental health risk.

Two-thirds of the participants with an increased cardiometabolic risk were aware of having received at least one advice regarding a behaviour related to that risk. They were most aware of advice regarding alcohol use, which could be explained by their unfamiliarity with the Dutch public health guideline on drinking alcohol among older people (Adams et al., 1996). Overall, there were no marked differences in advice awareness between the intervention group (advice during PRIMUS-PHC) and the comparison group (advice by post). However, there was a higher awareness of the advice to increase physical activity

among the overweight PHC group. This could be because several overweight patients had reported being sufficiently active on the HRA: consequently, they did not receive advice about physical activity when in the comparison group. In the PHC group, the NPs observed and interviewed the participants, which could have resulted in a changed risk assessment regarding physical activity; an advantage of actual interaction with the patient. Nonetheless, in both groups, one-third of the patients at increased cardiometabolic risk were not aware of having received some advice. Interestingly, the awareness among individuals with a higher risk of depression or loneliness of having received advice was much lower than that for cardiometabolic risk. Maybe questions regarding advice for subclinical depression and loneliness were not recognized as such by the participants, because the advice was related to a specific symptom, such as insomnia or lack of contacts. Therefore, the question “Did you get any advice concerning your depressed feelings?” might have been wrongly answered positively, when being advised about e.g. insomnia. Nevertheless, it could be that this lack of awareness is because patients do not identify themselves as being at increased risk of depression. In a study among older patients (>74 years) with depressive symptoms, only a small percentage of the depressive patients (19%) started a course, and the main reason for their not participating was not feeling depressed (van der Weele et al., 2012a; van der Weele et al., 2012b).

In the present study, awareness did not necessarily mean that persons complied with the cardiometabolic or mental health advice. Although both groups were equally aware of having received some advice, the PHC group more often stated to comply with at least one of the cardiometabolic advices; they more often followed-up the advice to lose weight, increase physical activity when overweight, and reduce alcohol consumption. Largely in line with this compliance with cardiometabolic advice, the PHC group also more often stated to be successful in losing weight and decreasing alcohol use. Motivational interviewing interventions can motivate adults or older persons to change specific behaviours (van Keulen et al., 2011; Burke et al., 2003; Dunn et al., 2001). In the present study, although the effects on compliance and success were relatively small, the relative risks are in line with those found in a meta-analysis (Lundahl et al., 2013). The PRIMUS intervention did not induce awareness of depressive feelings. However the compliance for those aware of advices on depressive feelings is comparable to those aware of advices on other health risks. About half of the older persons that were aware complied.

In a clinical setting, interventions for behaviour change mainly focus on one specific behaviour and less on multiple behaviours (Prochaska

and Prochaska, 2011). A study by Butler et al. focusing on multiple behaviours found no significant effects on behaviour change 3 months after adult patients visited a clinician trained in behaviour change counselling (Butler et al., 2013); however, a significantly larger percentage of patients in the intervention group than in the comparison group, reported that their physician had initiated discussion about a change in health behaviour. This increased awareness of being engaged is reflected in our findings of the patients being relatively highly aware of being advised. In the present study, this increased awareness was found both in the intervention and comparison group, suggesting that it is not only the physician's training that is responsible for the awareness of receiving advice. An explanation for this difference between studies can be attributed to the recruitment strategy and information provided to the comparison group. Whereas Butler et al. recruited patients when visiting the PCP for a wide range of acute and chronic concerns and the comparison group received usual care, our PRIMUS patients were recruited via a screening approach and the comparison group received advice about their unhealthy behaviours by post (Butler et al., 2013). Using a screening strategy for recruitment, with those returning the screening questionnaire being included in the study, probably leads to a specific selection of patients, i.e. the more motivated and health-conscious patients are more likely to respond (van Dijk et al., 2009). Also, the health-conscious participants are more likely to recall being advised about their health behaviours. Nevertheless, the percentages of successfully changing any behaviour reported by our PHC group was comparable to the percentages found by Butler et al. (Butler et al., 2013). In contrast, the percentages in our comparison group were much lower than found by Butler et al., suggesting that awareness alone is not sufficient for changing behaviour and additional personal counselling is required to increase the intention to change.

#### 4.1. Limitations and considerations

Although an RCT is a suitable method for assessing awareness and compliance with advice, some bias cannot be excluded, e.g. inviting people to participate may have resulted in a more health-conscious study population, although even in this group a large majority had one or more health risks for cardiovascular diseases. Present study gives an indication of the results that can be expected when inviting and counselling elderly patients via a screening approach. Even in this health-conscious group, because a large majority had cardiometabolic risk factors, lifestyle changes are still recommended. Nevertheless efforts should be developed to also reach individuals less likely to participate in a HRA, at least to support them in making an informed decision regarding participation or not.

Although the PHC group more often stated to comply with the advice to increase physical activity and quit smoking these differences were not significant: the number of smokers and participants with limited physical activity was too small to demonstrate a possible underlying success.

Characteristics of the NPs providing the counselling might have led to variations in the effect between the general practices. Some NPs were probably more skilled in motivational interviewing than others; future studies should take these types of characteristics into account.

The use of self-reported data may have led to socially desirable answers; however, since the same questionnaire was sent to both groups, their answers are likely to be equally affected by such bias.

#### 4.2. Implications

Inviting elderly persons for a health risk assessment followed by a PHC with motivational interviewing led to increased compliance with advice and to some small changes in behaviour, at least on the short term. In particular, the advice on weight loss and reducing alcohol use were followed-up. Although the changes were relatively small they are relevant, especially because only about two-thirds of our population

were aware of their risk. Improvement might be achieved by continuing to increase awareness among those at risk. A periodical screening approach together with counselling in the usual care of elderly patients may help achieve this. This partly fits the recommendation that counselling should focus on persons at higher risk for cardiovascular diseases (Moyer, 2012).

With regard to screening and counselling for depressive symptoms, a different instrument is needed to assess awareness and compliance with advice related to the specific symptoms of depression.

#### Conflict of interest

The authors declare there is no conflict of interest.

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