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Developing a community-based intervention for Dutch older adults in a socioeconomically disadvantaged community

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Summary

Unhealthy eating and low levels of physical activity are major health risks, especially for older adults and people with a low socioeconomic status. The aim of this article is to describe the development of a community-based intervention aimed at promoting physical activity and healthy eating among people aged 55 years and over, in a socioeconomically disadvantaged community. The Intervention Mapping protocol was used to develop the intervention. We conducted a literature search, consultation with community partners and inhabitants, and a quantitative study, in order to obtain insight into the determinants of the target population and to identify appropriate theory-based methods and practical strategies for behavioural change. An assessment was performed of the problem with respect to health behaviour and the underlying determinants. Findings were translated into program, performance and change objectives which specify determinants related to behavioural change. Theory-based methods and practical applications were selected, resulting in a plan for adoption and implementation. The intervention included a local media campaign, social environmental approaches and physical environmental activities in the community, with an intermediating role for inhabitants and health professionals in the promotion of the campaign. An evaluation plan was produced to evaluate the effectiveness of the intervention. The Intervention Mapping protocol was a helpful instrument in developing a feasible, theory and evidence-based intervention tailored to a specific target population in the area of health promotion. The systematic and structured approach provided insight into the relationship between the objectives, methods and strategies used to develop the comprehensive intervention.

Key words: community-based intervention, older adults, socioeconomically disadvantaged community, Intervention Mapping
BACKGROUND

Unhealthy eating and low levels of physical activity are major health risks (WHO, 2002), especially for older adults and those with low socioeconomic status (SES). Regarding diet, low intake of fruit and vegetables is prevalent in older adults (Van Rossum et al., 2011). Moreover, levels of physical activity in older adults have been shown to be lower than those of younger people (Hildebrandt et al., 2010). Similarly, people with low SES also have been shown to have lower levels of physical activity (Hildebrandt et al., 2010) and to eat less fruit and vegetables (James et al., 1997; Giskes et al., 2006; Van Rossum et al., 2011) compared to those with higher SES. Their unhealthy lifestyles are among the causes of their lower life expectancy (WHO, 2002). Older adults with low SES are thus at particular risk because risks seem to be cumulative and extra attention needs to be paid to improving their lifestyles (McPhee et al., 2016).

Interventions targeting both physical activity and nutrition seem to be more effective than those targeting only one or the other (Clark et al., 2005; Batsis et al., 2017). This has been shown in older adults and in at-risk populations (McCamey et al., 2003; Clark et al., 2005; Wellman et al., 2007; Togami, 2008; Wendel-Vos et al., 2009). However, only a few studies targeted older people with a low SES (Burke et al., 2013). Preventive interventions can support older adults with a low SES to maintain or adopt a physically more active lifestyle and a healthy diet. This will not only prevent chronic diseases, but it can also result in more prolonged participation in social activities, improved health and a better quality of life.

One of the more important factors determining the impact of preventive interventions in populations is their reach, i.e. the proportion of the target group that is actually exposed to the intervention: older people and those with low SES are particularly hard to reach (Eakin et al., 2002; Cleland and Ball, 2010). Integrated community-based approaches have shown promise in improving the reach of preventive interventions focused on lifestyle, due to their focus on individual and on environmental determinants (Mummery and Brown, 2008). The involvement of the target group and close collaboration with local partners in public and private healthcare are essential for this approach to succeed (Nation et al., 2003; Keimer et al, 2011). Studies using an integrated community-based approach to increasing physical activity and healthy eating among older adults with low SES are scarce. Therefore, we aimed to develop such an intervention.

This paper describes the development of an integrated community-based intervention aimed at promoting physical activity and healthy eating in older people with a low SES. This specific target group is part of a larger community living in a socioeconomically disadvantaged area. In this area, the community intervention is segmented to older adults, aged 55 and over. The premise is that because older adults with low SES are part of this community they can be reached and influenced through this community. Thus, the intervention target group includes older adults, aged 55 and over, living in the eastern part of the province of Groningen in the north-eastern Netherlands. This semi-rural region is characterized by an ageing population and a high percentage of people with low SES. More than 40% of the population in this region is aged 50 or over, compared to 35% in the wider Dutch population (Broer et al., 2011). With respect to SES, defined as the highest achieved educational level, more than 55% of people in eastern Groningen achieved only low or medium-low educational levels, compared to nearly 40% nationwide (Broer et al., 2006). The intervention consists of a mix of concurrent intervention elements and was developed in close collaboration with people from the target group and local partners. The Intervention Mapping (IM) protocol was used to describe the process of developing the intervention (Bartholomew et al., 2011).

INTERVENTION MAPPING: RESEARCH METHODS AND THEORETICAL MODELS

IM is a protocollled process for collecting information and making effective decisions for health promotion intervention planning, implementation and evaluation, consisting of six fundamental steps. In the first step the health problem, the behavioural and environmental causes of the problem and the determinants of the behavioural and environmental causes are assessed. The second step describes the desired changes in behaviour, in the environment and in their determinants, translated into specified objectives. To achieve objectives, theory-based methods are selected and translated into practical applications in step three. Whereas a method is a theory-based technique for influencing the determinants of behaviours and environmental conditions, an application is a way of organizing, operationalizing and delivering the intervention methods. The fourth step concerns the concrete design of the intervention program based on information gathered and decisions made in the previous steps. In step five, a plan is made for program adoption, implementation and sustainability in the community. In the final step, a plan for the process and outcome evaluation is produced to evaluate the effectiveness of the intervention implementation.
Research methods
We applied three research methods to the IM process steps to gather relevant information: consultation of community partners and inhabitants, a quantitative study and a literature search. An overview of these steps is presented in Table 1. The research methods mentioned in the table and the underlying theoretical models are outlined further below. The Medical Ethical Committee of the University Medical Center Groningen evaluated the study protocol and considered it was not necessary to file it for ethical approval.

Consultation
We consulted 9 community partners and 34 inhabitants to obtain a comprehensive overview of the health problem, and its underlying causes. The partners consulted from various local organizations had to be familiar with the inhabitants and the health problems in the region. Subsequently, during the process, they were asked to comment on the development, adoption and implementation of the program. Six of the nine partners participated in a focus group specifically organized for this intervention. The group comprised a policy advisor from the municipality, a welfare organization coordinator, a Department for Sport coordinator, a home healthcare manager, a general practitioner and a company doctor from the home healthcare organization. The other three partners, key members of welfare organization and the Department for Sport, were consulted individually. The inhabitants, aged 55 and over, were consulted through focus groups and semistructured interviews. Everybody explicitly agreed participation in the study.

Quantitative study
We performed a quantitative study to gain further in-depth knowledge on older adults regarding their health behaviour and behaviour-related determinants. The information was obtained from a cross-sectional survey of the target population consisting of a postal questionnaire, including assessments of sociodemographic factors, the participants’ health behaviours and behaviour-related psychosocial determinants based on the I-Change model (see below). Participants gave their consent to participate in the study by completing the enclosed questionnaire. In the cross-sectional study, 244 adults aged 55 and over from a single municipality in eastern Groningen participated. Unfortunately, the response rate was only 41%, possibly indicating a selection that may have influenced the outcomes. Therefore, these data were interpreted in the context of the other sources of information.

Literature search
To contextualize the information obtained about health behaviour and behaviour-related determinants with knowledge from other studies, we conducted a literature search up to the end of 2010. Several sources were used: websites of several Dutch organizations provided reports on health and health behaviours, including information on the regional situation for which the intervention was developed. To compare this regional situation and to look for evidence of behavioural determinants in comparable populations, we also searched the international literature using the Ebscohost database. To identify appropriate theory-based methods and practical applications for

<table>
<thead>
<tr>
<th>IM step</th>
<th>Goal</th>
<th>Research method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Needs assessment</td>
<td>To assess the current situation regarding the health problem, behaviour, environment and determinants</td>
<td>Consultation, Quantitative study, Literature search</td>
</tr>
<tr>
<td>2. Matrices of change objectives</td>
<td>To define change objectives by combining performance objectives with determinants</td>
<td>Consultation</td>
</tr>
<tr>
<td>3. Theory-based methods and practical applications</td>
<td>To select theory-based methods and practical applications to change the determinants of health-related behaviour</td>
<td>Consultation, Literature search</td>
</tr>
<tr>
<td>4. Intervention program</td>
<td>To develop the layout and content of the intervention program</td>
<td>Consultation, Quantitative study</td>
</tr>
<tr>
<td>5. Adoption and implementation</td>
<td>To develop a plan to adopt and implement the program in the community</td>
<td>Consultation</td>
</tr>
<tr>
<td>6. Evaluation plan</td>
<td>To develop a plan with measurements for process and outcome evaluation</td>
<td>Process and outcome evaluation</td>
</tr>
</tbody>
</table>
interventions, a second literature search was performed up to mid-2011, using the Ebscohost database.

**Theoretical models**

The integrated community-based intervention was designed to influence the determinants, both individual and environmental, of the health behaviour, with a sound theoretical basis. Therefore, we used two complementary theoretical models: The Integrated Model for Change (I-Change Model) (De Vries et al., 2003) and the Analysis Grid for Elements linked to Obesity (ANGELO) model (Swinburn et al., 1999). By integrating these models, a broader perspective on behavioural change could be created.

**I-Change model**

The I-Change model integrates several social cognitive models and concepts concerning behavioural change, including the ASE-Model (De Vries and Mudde, 1998) and the Stages of Change Model (Prochaska and DiClemente, 1983). The motivational concepts, perceived benefits, social influence and self-efficacy are acknowledged as influencing the intention to change behaviour. These three core elements are in turn influenced by predisposing factors. The I-Change model also embraces awareness factors (knowledge, risk perception and cues for action) and information factors (the quality, channel and source of information on the behaviour change).

**ANGELO model**

The ecological ANGELO model is developed to frame the environmental determinants of behaviour resulting in high energy intake (nutrition) and low energy consumption (physical activity). Ecological models postulate that individual and environmental factors influence health behaviour (Sallis et al., 2008). In the ANGELO Model, four types of environmental factors (physical, sociocultural, economic and political) are combined with two levels of environmental influences (micro and macro level). The micro level consists of the behavioural settings (e.g. supermarkets and facilities for physical activity), in contrast with the macro level, which refers to higher levels of influence (e.g. industry and national policy). We only used the micro level in the current project because that concerns the context which directly affects older adults.

**INTERVENTION MAPPING: RESULTS**

Step 1: needs assessment

The basis of IM is a needs assessment including an inventory of the current health problem, and its behavioural and environmental determinants. This needs assessment results in the intervention program objectives; the desired changes in the behavioural determinants. The findings of the needs assessment inventory are outlined below.

Many older adults suffer from chronic diseases, such as cardiovascular diseases, diabetes and cancer, which are partly caused by overweight and unhealthy lifestyles, including low levels of physical activity and unhealthy eating (Eyre et al., 2004). Overweight is a major health problem in eastern Groningen, as it is elsewhere. In some of the municipalities of this Dutch region, more than 60% of the adults aged 19 and over are overweight. Two-thirds of overweight people have low levels of education. Regarding physical activity, more than 40% of the adults aged 19 and over in eastern Groningen do not achieve the recommended level of physical activity. Data about healthy eating, operationalized as sufficient consumption of fruit and vegetables, show that only one in four adults consume the recommended daily amount of fruit and about one in three adults adhered to the recommendations on vegetables consumption (Broer et al., 2011).

In addition to behaviour, environmental factors are also related to the health problem. Eastern Groningen is a mainly semi-rural area with relatively many older adults and people with low SES, and termed a shrinking region. A shrinking region has a declining number of inhabitants, due to (normal) mortality in combination with younger people leaving the region (e.g. for jobs or higher education), resulting in a selection of people with certain demographic characteristics, such as higher age and lower education. These demographic changes influence the demand for certain facilities (e.g. for swimming pools, healthcare services) which, in turn, may lead to less actual facilities in the region. The health of inhabitants in shrinking regions is worse than that of people in other parts of the Netherlands. Importantly, this health difference can only be partly explained by differences in age distribution or SES. Other possible explanations could be a decrease in the volume of health services in shrinking regions and changes in the living environment (Verweij and Van der Lucht, 2011).

To summarize, based on the information obtained from consulting partners and inhabitants, the quantitative study and the literature search, we conclude that relatively many older adults in eastern Groningen, especially those with low SES, suffer from health problems. A key cause of these health problems seems to be an unhealthy lifestyle with low levels of physical activity and unhealthy eating. The above analysis has led us to formulate the following program objectives in adults aged 55 and over, living in a socioeconomically
disadvantaged community in eastern Groningen: (i) increasing the overall level of physical activity, and; (ii) increasing the rate of healthy eating, specified as fruit and vegetable consumption (healthy eating has many aspects but for intervention feasibility reasons we chose to only target fruit and vegetable consumption).

Step 2: formulation of change objectives
In this step, performance and change objectives were defined to obtain the program objectives formulated in the previous step (increasing fruit and vegetable consumption and increasing physical activity). Performance objectives to increase fruit and vegetable consumption were five preparatory behaviours: decide to eat more fruit and vegetables, choose fruit and vegetables, buy fruit and vegetables, prepare fruit and vegetables and search for support (such as contacting a dietician) to increase fruit and vegetable consumption. Thus, we assume that when these behaviours are successfully performed, actual fruit and vegetable consumption will follow. Performance objectives to increase physical activity were: decide to increase PA, and decide how to increase PA [PA in ADL, PA needing some equipment (e.g. walking shoes) and PA using facilities (e.g. going to the gym)]. Again, engaging in these behaviours was assumed to lead to more actual PA. The all-in-all seven specified preparatory behaviours were inspired by research on the planning of dietary changes (de Bruijn et al., 2017; van Osch et al., 2009) and the result of consultations with partners and inhabitants. Because the intervention targeted all adults of 55 years of age and older, in all their varying environmental, social and physical circumstances, the performance objective were not further specified. To stimulate these seven preparatory behaviours, interventions should target the determinants of these preparatory behaviours.

The determinants of the relevant health behaviours can be split into individual and environmental ones. The I-Change model integrates several social cognitive principles and models, and specifies knowledge, awareness, attitude, self-efficacy and social norms as psychological determinants. Consultation of community partners also suggests that social norms are an essential determinant of unhealthy eating and physical inactivity and the preparatory behaviours in the target population. In addition, a low priority to health, which is more frequent in people with low SES than those in with higher SES, could also play a role (Lynch et al., 1997; Pampel et al., 2010). This means that people pay less attention to their health and their health behaviour, not only because of low health literacy but also because of low motivation.

With regard to the environment, people in eastern Groningen were shown to be satisfied with their living environment in general (Broer et al., 2011), and specifically with the availability of facilities in the areas of physical activity and healthy eating. Facilities are defined as physical places, equipment, organized activities and professionals capable of providing support with regard to physical activity and healthy eating and the preparatory behaviours. Despite this positive evaluation of the availability of facilities, relatively few people used them because of the financial costs or having no-one to accompany them, which is a matter of social support.

To target each of the preparatory behaviours with our intervention, the determinants must be specified for each of the behaviours. In Table 2 the change objectives are specified regarding the psychological and environmental determinants of the behaviour, mainly based on our theoretical models (as only limited empirical evidence regarding the seven specified preparatory behaviours was available). The change objectives are formulated as the psychological or environmental end states that are needed to increase the chance that the specified behaviour will occur.

Step 3: theory-based methods and practical applications
Theory-based methods and practical applications were selected in the third step to modify the determinants specified in the step 2. Theory-based methods are theoretical principles of general techniques or processes for influencing the determinants of behaviours and environmental conditions. Practical applications are specific techniques for the practical use of theory-based methods in ways that fit the intervention population and the context in which the intervention will be conducted (Bartholomew et al., 2011).

The selected methods were derived from the literature, whereas the applications developed were based on the quantitative study and on consultation of partners and inhabitants as members of the target population. These were selected because they could provide relevant information about the current situation in their region, could offer feedback about the cultural adaptation of the program and were involved in the implementation of the program.

A community-based approach was chosen to increase healthy eating and physical activity by influencing individual and environmental determinants. In disadvantaged communities, the effect of interventions which alter sociocultural environmental aspects is likely to be greater than the effect of individual approaches (Cleland et al., 2012). Therefore, we developed a broad and
### Table 2: Performance and change objectives

<table>
<thead>
<tr>
<th>Performance objectives</th>
<th>Individual determinants</th>
<th>Environmental determinants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Knowledge</td>
<td>Awareness</td>
</tr>
<tr>
<td>Decide to eat more fruit and vegetables</td>
<td>Has knowledge on the benefits of fruit and vegetable consumption</td>
<td>Is conscious of own level of fruit and vegetable consumption</td>
</tr>
<tr>
<td>Choose fruit and vegetables</td>
<td>Has knowledge on the types of fruit and vegetables</td>
<td>Is able to mention advantages and disadvantages of different types of fruit and vegetables</td>
</tr>
<tr>
<td>Buy fruit and vegetables</td>
<td>Has knowledge on the availability of affordable fruit and vegetables</td>
<td></td>
</tr>
<tr>
<td>Prepare fruit and vegetables</td>
<td>Has knowledge on preparation of fruit and vegetables</td>
<td>Is motivated to invest time and effort in fruit and vegetable consumption</td>
</tr>
<tr>
<td>Search for support to increase fruit and vegetables consumption</td>
<td>Has knowledge on facilities for advice and support from professionals for increasing fruit and vegetable consumption</td>
<td>Is able to mention advantages of using facilities</td>
</tr>
<tr>
<td>Decide to increase PA</td>
<td>Has knowledge on the benefits of PA</td>
<td>Is conscious of the own level of PA</td>
</tr>
<tr>
<td>Decide how to increase PA</td>
<td>Has knowledge on: -Possibilities in ADL to increase PA -Equipment needed to engage in PA -Facilities and activities related to PA -Facilities for advice and support from professionals for increasing PA</td>
<td>Is able to mention advantages of increasing PA in ADL, with or without using equipment or facilities</td>
</tr>
</tbody>
</table>
multifaceted approach, as recommended by other researchers (Jepson et al., 2010; Carson et al., 2011; Cleland et al., 2012; Olanrewaju et al., 2016), including mass-media elements (Marshall et al., 2004; Wakefield et al., 2010). Collaboration with local community organizations and participation of the target population during development and implementation were important elements to establishing a more appropriate culturally adapted intervention and to create a social basis (Ronda et al., 2004; Dharod et al., 2011).

Two features of the planned community intervention determine the use of several methods (see Appendix): First, to reach the community members various potentially effective approaches were used: a mass-media approach (Marshall et al., 2004; Wakefield et al., 2010), a socioecological approach (Stokols, 1996) and a physical environmental approach (Thornton et al., 2017; see Table 3 for an overview). The composition of these channels can be conceptualized as a community intervention (Wandersman and Florin, 2003). Second, seven determinants (five psychological, one social and one environmental) were targeted, some through several channels (see Appendix). Because for a part different methods are appropriate for different channels, this led to the application of several methods in the intervention: The selected methods included persuasive communication (guiding individuals to adopt an idea, attitude or action by using arguments or other means) (McGuire, 2001), tailoring (matching the intervention components to the participant’s previously measured characteristics) (Bandura, 1977; Weinstein and Sandman, 2002), modelling/vicarious learning (providing an appropriate model which is reinforced for the desired action) (Bandura, 1977, 1986), feedback (informing individuals of the extent to which they are accomplishing learning or performance) (Bandura, 1977), empowerment (guiding individuals to gain more control over their lives) (Minkler and Wallerstein, 2008), facilitation (creating an environment which makes an action easier or reduces the barriers to action) (Bandura, 1986) and mobilizing social support (prompting behavioural change to provide instrumental and emotional social support) (Cohen, 1988; Heany and Israel, 2008). An overview of the methods and the related theories and developed applications is presented in the Appendix.

**Step 4: intervention program development**

The fourth step concerns the design and application of the program plan based on the results of the previous steps. Local partners and inhabitants were consulted to determine preferences for program design. The cultural adaptation of the program is essential (Bartholomew et al., 2011). Therefore, appropriate channels for delivery and themes were chosen to reach the target population (see Table 3). Because of the effectiveness study design, which included a control group in an adjacent area (for details, see step 6), only local delivery channels could be used, not regional or national ones.

The program used two types of channels to reach the local community. First, local newspapers, a local radio station and a website were used to disseminate a message widely in the community. Second, two types of mediating social channels were developed: (i) local ambassadors (peers), and; (ii) local healthcare professionals. Peers play an important role in influencing individuals’ beliefs and behaviour. People from the same age group, living in the same local community and with comparable health status were asked to act as ambassadors in this campaign. Through personal delivery of the message by local peers, the impact of this message on a recipient can be expected to increase. This is particularly true of healthcare professionals, who have confidential relationships with their clients or patients.

Subsequently, the program components and accessory materials were developed in collaboration with potential implementers and potential program participants. The materials were designed with the help of professionals in the field of graphic design and language. To check whether the program materials and messages were sufficiently culturally adapted and whether people from the target population could identify themselves with the role models, we pretested the printed materials in focus groups.

The integrated program was part of ‘Goud Leven’ (GL), internationally denoted as Groningen Lifestyle Intervention for Seniors (GLIS). ‘Goud’ has a dual meaning: it means ‘good’ in the local dialect of Groningen and simultaneously ‘gold’ in mainstream Dutch. ‘Leven’ is Dutch for ‘life’ or ‘living’. The methods mentioned in the previous step were structured into three main program components: a local media campaign, promotional activities in the local community and individual advice and support from local healthcare professionals. The media campaign was implemented in January 2012 in a local community, the municipality of Veendam, and mainly promoted by peers and local healthcare professionals. The intervention period included an intensive 3-month stage, which involved all the program components, followed by a low intensity 6-month stage, during which the intervention was continued in part only.

**Step 5: adoption and implementation**

Step five of IM involves developing a plan to adopt, implement and sustain the program in the community over
time. The formation of a linkage system, which connects the program developers with the implementers, is expected to promote program adoption and implementation (Bartholomew et al., 2011). Developers and implementers are different people in this project. The developers are members of the research team, project partners, and community partners (see above). The implementers are community partners (e.g. municipality staff members, the Foundations Well-being Veendam and Team Sport and the local radio representative), and healthcare professionals (i.e. GPs, physiotherapist and a dietician). These implementers were responsible for executing the planned intervention elements through the channels listed in Table 3, ranging from distributing the posters, conducting the radio interviews, to organizing the Lifestyle Meeting. Their concrete tasks in the coordinated implementation depended on their job and profession, and were agreed upon in meetings and further contacts.

We formed a group with a mix of developers and implementers who meets two or three times a year at the various project stages. During the intensive intervention stage, the intervention was coordinated by a member of the research team in collaboration with the project leader, who was also acting as a policy officer at the local home healthcare organization. To increase sustainability, the input of the research team was reduced after the intensive stage. During the low-intensity stage, the project leader became responsible for the coordination of the implementation and the sustainability of the program with the research team moving to the background. After the study period, the coordination of the program was continued, supported by one of the project partners in collaboration with the implementers. The implementers were informed by newsletters four times a year during the various stages of the intervention. A meeting was organized at least once a year, which was accessible to all local implementers to provide an update on the intervention process and the results achieved. To increase the individual support for the intervention, face-to-face meetings were planned once a year between the project members and the implementers.

Step 6: evaluation plan
In the final step of the IM, a plan for process and outcome evaluation was developed to evaluate the effects of the intervention implementation, which contained process and effect measurements. The process evaluation was primarily based on Rogers’s diffusion of innovations model, including monitoring of the intervention delivery, participation, comprehension, satisfaction, level of use, fidelity and institutionalization (Rogers, 2003). Process evaluation questions were developed for community members and healthcare professionals. This information was collected through focus groups, interviews with key actors and self-administrated questionnaires. To evaluate the effectiveness of the intervention, a quasi-experimental study design with an intervention group and a comparable control group in an adjacent region was used. A total of 1000 adults aged 55 and over in the intervention region and 500 in the control region were planned to be invited to participate in this study. The main outcome measures were changes in physical activity and healthy eating. These behaviors were assessed in both regions using validated instruments, at baseline (T0), 3 months later (T1) and at follow-up (T2), six months after T1. In addition, process data were collected regarding the health-related and individual determinants applied at these points in time. The actual outcomes of the community intervention have been published (Luten et al., 2016a,b).

DISCUSSION
This is the first study to describe the developmental process, components and evaluation of an integrated community-based intervention for encouraging healthier lifestyle in older adults in a socioeconomically disadvantaged community, using the IM protocol. The intervention was developed in collaboration with local community organizations, local professionals and the target population. The intervention included a local media campaign combined with social and physical environmental approaches tailored and culturally adapted to the needs of the target population. These are important aspects when aiming to increase the effectiveness of such an intervention (Müller-Riemenschneider et al., 2008).

Older people in a socioeconomically disadvantaged community were the target population of our intervention, not only older adults with low SES. Although older adults with low SES have shorter life expectancies compared to older adults with high SES (WHO, 2009), we aimed to reach as many individuals from this community as possible, thereby leading to social processes (i.e. social influence) and related environmental changes (e.g. availability of health foods) that would also influence the older low SES individuals for the good.

Using IM helped to develop a feasible theory and evidence-based intervention, tailored to a specific target population in the area of healthy lifestyle promotion. Interventions based on the IM procedure can select the most promising theoretically derived strategies for a given problem, instead of focusing on a single theory (Lippke
### Table 3: Overview of channels and actual applications in the community intervention

<table>
<thead>
<tr>
<th>Channel Type</th>
<th>Description</th>
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<tbody>
<tr>
<td>Local media campaign</td>
<td>Seven different posters were developed displaying a photo of a role model (peer) promoting healthy habits concerning physical activity or healthy eating. The slogan below the photo states their motives for activity or eating healthily. For example: 'I walk every day because I want to feel fit.' Furthermore, the name and logo of the project and a link to the website were displayed on the poster. In total, 350 posters were printed (50 of each poster) and displayed in general public places, such as municipality offices, the social service office, social welfare offices, libraries, shopping centres and healthcare settings such as general medical practices, physiotherapy practices, dietician practices, home healthcare offices and sports centres. During the intervention period, the posters were checked and replaced when necessary.</td>
</tr>
<tr>
<td>Radio spots</td>
<td>Seven role models (most of them also on the poster) recorded a radio item in which they explained in detail the motives for their health behaviors. Each item started with a short introduction of the person followed by their description of what 'Goud Leven' meant for them. Two of the items were in the local dialect. The items were broadcast 600 times during the first three months of the intervention period at different times of the day by the local radio station (Radio Parkstad).</td>
</tr>
<tr>
<td>Radio interviews</td>
<td>In addition to broadcasting the radio items, the local radio station allocated time to the project during a radio program. To this end, they produced an interview with a role model, local professional or person involved in the project every week, with 14 interviews in total. Furthermore, news and programs for local activities were mentioned in the broadcast.</td>
</tr>
<tr>
<td>Advertorials and press reports</td>
<td>Three advertorials and three press reports were published in local newspapers. The advertorials provided information about the health benefits of sufficient physical activity and healthy eating, advice to increase physical activity and healthy eating levels and recommendations to visit local facilities and healthcare professionals focusing on physical activity and healthy eating. The reports provided information on the official start of the project, announcements about the 'GL Market' and the project's progress. Furthermore, every week an overview of local activities for older adults was shown on the municipality page.</td>
</tr>
<tr>
<td>Newsletters</td>
<td>A newsletter for older adults from the local community was distributed by peers, healthcare professionals and the GL website every 3 months, to inform older adults about the project's progress and upcoming local activities and events. People from the target population were also able to apply for the digital version of the newsletter. In addition, a special newsletter was developed for local healthcare professionals, providing more detailed information about the background and progress of the project and the research, but also about upcoming local activities and events focused on physical activity and healthy eating to forward to their patients and clients.</td>
</tr>
<tr>
<td>Leaflets</td>
<td>Leaflets were printed to provide details of the monthly physical activities for people aged 50 and over, organized by the local Departments for Sport and Social Welfare, for the GL Market and for the GL Lifestyle Meeting. Each leaflet was printed 200 times and distributed by the ambassadors and professionals to the target population.</td>
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<tr>
<td>GL Guide</td>
<td>The guide was presented as a mini-magazine, both informative and pleasant to read. The GL Guide provided information about physical activity and healthy eating, such as the health benefits of sufficient physical activity and healthy eating and suggestions about how to increase physical activity and healthy eating levels. In addition, an overview of local activities, exercise facilities and professionals for advice and support in increasing physical activity or healthy eating was presented. The guide also contained role model stories about the ambassadors. The guide was completed with recipes for healthy meals for every season. The GL guides were sent to every household with at least one older adult, aged 55 and over, and was also available from public municipality offices, the social services office, welfare service offices, libraries and healthcare practices. In total, 6000 GL guides were printed and a digital version was published on the project website.</td>
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</tbody>
</table>
It provides a structured framework for the processes of intervention development, implementation and evaluation, with an explicit link between the change objectives on the one hand and the methods and corresponding strategies used on the other hand. Furthermore, a broad perspective on the problems and related factors is provided because of the extensive development using various kinds of resources. Whether interventions based on IM are more effective than interventions based on other behavioural change frameworks is not clear yet. However, it is suggested that interventions are more likely to be effective when underpinned by a theoretical framework (Cleland et al., 2012).

A limitation of IM is that it is less feasible for a cluster of behaviours. Focusing on several preparatory behaviours that all will contribute to the program objective behaviours (i.e. healthy eating and physical activity) increases the number of change objectives. It is suggested that the IM protocol ideally is applied to unidimensional behaviours, because it can become unwieldy when applied to multidimensional ones (Kwak et al., 2007). In the present study we chose to elaborate on seven preparatory behaviours that had to be translated into change objectives, which became a challenge when processing them into the subsequent steps of the process, in which they were linked to specific media. An alternative could have been to focus on translating the performance objectives into theoretical steps, followed by strategies to change the objectives (Kwak et al., 2007). The complexity of the rational process of IM became enormous, and because of the seven behaviours, the multiple channels that were used, the present report can only present the main lines of thinking and deciding according to the IM protocol.

A second limitation is that the application of IM requires time and a financial budget. The gathering of
relevant information, the development of the actual intervention components and the intensity and duration of the intervention were influenced by the time-related and financial contexts. Furthermore, a large number of decisions were taken at the various phases of the process. Ideally, community members would be involved in all these considerations, but in daily practice it was the project team who usually decided. We do not know whether this influenced effectiveness negatively, but we do know that this is common in practice.

A future challenge could be the long-term continuation of the intervention, which largely depends on the stakeholders’ abilities and financial capacity. The persistent commitment of professionals and organizations in the project, supported by the stakeholders’ staff, are essential conditions for successful continuation. Related to the continuity of the interventions is the possibility to implement structural environmental changes that might support PA, as research suggests that the built environment (e.g. neighbourhood walkability) can stimulate PA in older adults (Barnett et al., 2017).

CONCLUSIONS

The GL project included an integrated community-based intervention program for encouraging healthier lifestyle in older adults in a socioeconomically disadvantaged community using the IM protocol. The intervention program was based on individual and ecological models of behavioural change as well as on formative research, including consultation of community partners and inhabitants, a quantitative study of the target population and literature search. The development of an integrated community-based intervention for a hard-to-change population appeared an extensive process. The use of the IM protocol made this explicit as it made us reflect on every single decision. For the present multifaceted intervention targeting several behaviours, the development was complex and time-consuming. In addition, many decisions were made within practical constraints. Whether the intervention is effective in improving health behaviour has been assessed in the planned and conducted evaluation study (Luten et al., 2016a,b).

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REFERENCES

De Vries, M. and Mudde, A. N. (1998) Predicting stage transitions for smoking cessation applying the attitude-social


Developing a community-based intervention for Dutch older adults


## APPENDIX: OVERVIEW OF METHODS AND POSSIBLE APPLICATIONS FOR CHANGING DETERMINANTS

<table>
<thead>
<tr>
<th>Determinants</th>
<th>Methods</th>
<th>Related theories</th>
<th>Application examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual determinants</td>
<td>Knowledge</td>
<td>Persuasive communication</td>
<td>Visibility of the project (name and logo)</td>
</tr>
<tr>
<td></td>
<td>Persuasive communication</td>
<td>Persuasion Communication Model (McGuire, 2001)</td>
<td>Transfer of knowledge by peers and healthcare professionals</td>
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<tr>
<td></td>
<td>Tailoring</td>
<td>Trans-theoretical Model (Prochaska and DiClemente, 1983); Precaution Adoption Model (Weinstein and Sandman, 2002)</td>
<td>Comprehensibly formulated knowledge, taking into account aspects of health literacy, culture and legibility</td>
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<tr>
<td></td>
<td>Awareness</td>
<td>Modelling/vicarious learning</td>
<td>Pictures of peers as role models</td>
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<tr>
<td></td>
<td>Social Cognitive Theory</td>
<td>(Bandura, 1986); Theories of Learning (Lippke and Ziegelmann, 2008)</td>
<td>Similarity in role model characteristics with target group for age, health status and area</td>
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<tr>
<td></td>
<td>Feedback</td>
<td>Theories of Learning (Lippke and Ziegelmann, 2008)</td>
<td>Healthcare professionals reflect on lifestyle of older adults</td>
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<td></td>
<td>Attitude</td>
<td>Modelling/vicarious learning</td>
<td>Pictures of peers as role models</td>
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<td></td>
<td>Social Support</td>
<td>Mobilize Social Support</td>
<td>Role model stories: experiences of role models with changing behaviour</td>
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<td>Theories of social networks</td>
<td>and social support (Heany and Israel, 2008)</td>
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<td>Environmental</td>
<td>Social norm</td>
<td>Pictures of peers as role models</td>
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<td>Self-efficacy</td>
<td>Persuasive communication</td>
<td>Models mention their reasons for being physically active or eating healthily</td>
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<td>Social Support</td>
<td>Empowerment</td>
<td>Healthcare professionals discuss with members of target group about perceived barriers and how to overcome them</td>
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<td></td>
<td>Empowerment theories</td>
<td>(Minkler and Wallerstein, 2008)</td>
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<td></td>
<td>Physical environment</td>
<td>Facilitation</td>
<td>Distribution of healthy products</td>
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<td></td>
<td>Social Cognitive Theory</td>
<td>(Bandura, 1986)</td>
<td>Facilitation of safe and user friendly infrastructure</td>
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