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DOI

10.1093/heapro/daad158

Published in

Health Promotion International

Document version

Accepted manuscript

This is the author's final accepted version. There may be differences between this version and the published version. You are advised to consult the publisher's version if you wish to cite from it.

Online publication date

27 November 2023

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Citation

Müllmann S, Gansefort D, Zeeb H, Brand T. Addressing community readiness to promote physical activity in older adults in Germany. *Health Promot Int.* 2023;38(6):daad158.

This is a pre-copyedited, author-produced version of an article accepted for publication in *Health Promotion International* following peer review. The version of record is available online at: <https://doi.org/10.1093/heapro/daad158>

Addressing community readiness to promote physical activity in older adults in Germany

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Declarations

Acknowledgments

We would like to thank Beate Schütte for managing the data collection and all student assistants for their support. In addition, we thank the study participants for their support.

Conflict of interest

All authors declare no conflict of interest.

Ethics information

This study was approved by the Ethics Committee of the University of Bremen, Germany, in February 2015 (reference number: 06-3) and April 2018 (reference number: 2018-03). All interviewees received written information about the study and gave informed consent for their data to be used.

Funding

This work was supported by the German Federal Ministry of Education and Research (BMBF; grant numbers 01EL1422A and 01EL1822A). The content of this article only reflects the authors' views and the funder is not liable for any use that may be made of the information contained therein.

Availability of data and materials

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

Author contributions

SM and TB drafted the manuscript. HZ and TB conceived and designed the study. SM and DG scored the interviews and coordinated the cooperative planning process, the intervention development, implementation and evaluation. TB analysed the data. All authors read and approved the final version of the manuscript.

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Abstract

Community-based approaches are promising to promote physical activity in old age. The community readiness (CR) model offers a structured approach to assess community capacities to address a certain health topic before and after implementing an intervention. The objective of this study is to assess whether community-based capacity building for physical activity among the elderly has a lasting effect on CR. Four communities (two sub-urban and two urban) in Northwestern Germany were randomly assigned to either intervention or control group. CR was assessed at three time points (2015, 2018, and 2020) by interviewing local key informants (n = 129). Community capacity building was carried out in the two intervention communities after baseline assessment and included the development and implementation of a local physical activity action plan for elderly. Overall CR scores were calculated and random effects regression analysis was performed to analyze group-by-time interaction. At baseline, the overall CR score was 4.62 (Standard deviation [SD] = 0.51) indicating that communities were in the preplanning stage of CR. CR scores in the intervention communities did not significantly increase at follow-up assessments compared to control communities (2018: 4.82, Coefficient -0.03, 95% Confidence Interval [CI] (-0.80; 0.73); 2020: 4.54, Coefficient 0.19, 95% CI: (-0.59; 0.97)). The process evaluation indicated several factors facilitating a successful cooperation with community stakeholders. These included building on existing networks, using a structured approach for developing and implementing a local physical activity action plan for older adults, providing financial support for implementing activities, and linking activities to existing community events.

Keywords

Community readiness, capacity building, primary prevention, physical activity, older adults

Contribution to Health Promotion

- Community-based approaches are promising to promote physical activity in old age.
- The Community Readiness Assessment offers a structured approach to assess community capacities before and after implementing activities promoting physical activity.
- Building on existing networks, providing financial support and linking activities to existing community events are facilitating a successful cooperation with community stakeholders.

- To avoid pitfalls key actors should familiarize themselves with the community (e.g., social structure), seek support from community stakeholders, and clarify responsibilities.

Main text

Introduction

Physical activity is a key contributor to healthy ageing and the prevention of non-communicable diseases such as cardiovascular diseases, type 2 diabetes or cancer (Lee *et al.*, 2012). In Germany, only one fifth of adults aged 65 years and above meet the WHO recommendations for endurance (at least 150 minutes of moderate-to-vigorous physical activity per week (WHO, 2020)) and strength training (at least twice a week (WHO, 2020)) (Finger *et al.*, 2017). To motivate older adults towards initiating or maintaining a physically active lifestyle interventions that act on different levels of the socio-ecological model (e.g., individual, social, and environmental level) are required (Boulton *et al.*, 2018). Community-based approaches have the potential to address these different levels to improve health and promote physical activity (Baker *et al.*, 2015). Building community coalitions and networks, training of health professionals and stakeholders and strengthening competence and awareness in the target population are essential for building community capacities with regard to the promotion of physical activity (Ubert *et al.*, 2017, Bopp and Fallon, 2008, Cooper *et al.*, 2021). In particular, community coalitions can help to improve access to otherwise underserved population groups (Anderson *et al.*, 2015).

Since communities differ in their attitudes and capacities to address a certain health topic, the Community Readiness (CR) model can be applied to tailor community-based physical activity interventions for older adults to the local context (Oetting *et al.*, 2001, Stanley, 2014). The CR model is a stage model that comprises nine stages of change ranging from one (no awareness) to nine (professionalization) (Oetting *et al.*, 2001). Depending on the stage of CR, different strategies to enhance CR should be implemented in the community. For instance, if a community has a low CR it is recommended to raise awareness of the health issue in the target population, to build a local working group to discuss the health issue and to develop strategies to build community capacities. The stage of CR can be assessed through the Community Readiness Assessment (CRA) which consists of structured interviews with local key informants on five dimensions of CR (Stanley, 2014): 1. *Community efforts and knowledge of efforts*, 2. *Leadership*, 3. *Community climate*, 4. *Community knowledge of the issue*, and 5. *Resources* (table 1).

[Insert – Table 1. Dimensions of community readiness – here]

The CRA was applied in several studies addressing different health topics (e.g., substance use, obesity, HIV/AIDS) and populations (e.g., children) to plan future intervention efforts or to evaluate programs (Kostadinov *et al.*, 2015). As community-based approaches need time to unfold their potential and to introduce changes on a structural level the monitoring of CR before and after implementing an intervention can provide insights if and when changes in the community occur. To date, the application of the CRA for assessing changes in CR over time is still rare. In a systematic review by Kostadinov and colleagues (Kostadinov *et al.*, 2015), six out of 40 included studies applied the CRA at multiple time points, only three of these included a control group and none of the studies focused on the promotion of physical activity in old age. The objective of this paper is to assess whether community-based capacity building for physical activity among the elderly has a lasting effect on CR. This paper is part of the Ready to Change (RTC) project which examined how the CR model can be used for implementing and evaluating community-based approaches to physical activity promotion in adults aged 65 years and above (Brand *et al.*, 2016). RTC is a sub-project of the German prevention research network “Physical activity and health equity: primary prevention for healthy ageing (AEQUIPA)” (Forberger *et al.*, 2017) which aimed to promote physical activity for healthy aging and was funded by the German Federal Ministry of Education and Research between 2015 and 2022.

Methods

Study design

A controlled study design with a baseline and two follow-up CR measurements was chosen to assess whether community capacity building for physical activity promotion among older adults led to an increase in CR (figure 1). The baseline CR assessment in 2015 included 23 communities in the Northwestern part of Germany (Gansefort *et al.*, 2018). Communities were defined as small-scale geographical areas where people live under the same political administration such as neighborhoods, city districts or towns. Communities were selected based on the proportion of older residents using population data from local and regional statistics offices. The baseline assessment revealed that the included communities were in the preplanning or preparation phase according to the CR model, meaning that there was already some awareness and action for physical activity promotion among the elderly, but no coherent strategy to address this issue was put in place (Gansefort *et al.*, 2018). After the baseline assessment four communities (two sub-urban and two urban) which displayed the lowest CR scores were selected. Each

one of the two sub-urban and urban communities were randomly assigned to the intervention group or the control group. In the intervention group community capacity building was promoted between 2016 and 2020 while the control group received only written feedback from the CR assessments. The follow-up CR assessments were carried out in 2018 and 2020. Ethical approval was obtained from the ethics committee of University of Bremen, Germany, in 2015 (reference number 06-3) and 2018 (reference number 2018-03).

[Insert – Figure 1. Flowchart study design – here]

Setting and participants

While the four communities were of similar population size (approximately 30,000 inhabitants), population density varied from 6,162 persons per km² in one urban community to 206 persons per km² in one of the sub-urban community (figures from 2021). Regarding the socio-demographic make-up, the proportion of older adults (i.e., 65 years and above) was about 25% in all four communities. However, the two urban communities faced higher degrees of deprivation (unemployment rate about 14% compared to 3% in sub-urban communities) and diversity (up to 50% of the population with a migration background in urban communities). The two sub-urban communities are located in about 30 km distance from Bremen, which is one of the largest cities in Northwestern Germany with around 570,000 inhabitants. The two urban communities were city districts of Bremen. Both contain smaller neighborhoods that are part of a special funding scheme for disadvantaged areas in Bremen (“Wohnen in Nachbarschaften” [“living in neighborhoods”]). The funding scheme exists since 1998 and works with an integrated approach in which a local community coalition decides about which social projects and activities are funded. This means that community coalitions were already in place, although these coalitions did not focus on physical activity among older adults. In the two sub-urban communities no community coalitions existed.

Participants in the CR assessment were so called key informants who are connected to the topic physical activity promotion among older adults such as representatives from senior citizen advocacy groups, civil and public services, local public authorities, or sports clubs. Key informants were identified via online searches or recommended by other local key informants. For each community, it was aimed to recruit at least one key informant from senior citizen advocacy groups, civil and public services (e.g., employees of meeting centers for older adults or adult education centers), local public authorities (e.g., major, officers for senior and/or social affairs), and sports clubs (e.g., chairperson of the club).

Community readiness assessment

The CRA is based on semi-structured interviews which are carried out with key informants in the community. The interview guide was adapted from the CR manual (Stanley, 2014) to the topic of physical activity promotion among older adults. The interview consists of about 40 questions addressing the five CR dimensions and some basic demographic questions (Gansefort *et al.*, 2018, Gansefort *et al.*, 2020). Most of the questions have a closed answer format which allows for an easy scoring process as described in the CR manual (Stanley, 2014). The open-ended questions can be used to gather more in-depth information about existing structures and activities in a community. This information for example was used to identify population groups that were regarded as hard-to-reach. Based on the recommendations in the CR manual, baseline assessment was conducted with a number of four to six key informant interviews per community. In order to check the validity of the assessment, the sample size was extended to 12-15 interviews in each community for the follow-up assessments in 2018 and 2020 (Muellmann *et al.*, 2021). Some key informants were therefore interviewed at all three time points, whereas other only participated at one or two time points. Reasons for non-participation among the key informants were occupational change, retirement, health issues, or unwillingness to participate. All interviews were conducted face-to-face or via phone by trained interviewers. Interviewers were not blinded to the condition of the communities. Interviews were audio-recorded and transcribed verbatim.

Community capacity building

The community capacity building was carried out in the two intervention communities between 2016 and 2020. Community capacity building activities were implemented following the recommendations from the CR manual, which describe specific actions to increase CR depending on the level of CR readiness (e.g., for the preplanning stage it is recommended to present information at local community events, to review existing efforts in the community, or to conduct local focus groups for developing strategies) (Stanley, 2014). In a first step, the interviewed key informants in the two intervention communities were contacted to find out whether they were interested to participate in a working group to promote physical activity in older adults. The aim was to include at least one key informant from senior citizen advocacy groups, civil and public services, local public authorities, and sports clubs in the working group. In a first group meeting the results of the CRA and further steps to set up an action plan for physical activity promotion among older adults were discussed with the local stakeholders. The results of the baseline CRA gave an overview of strengths, weaknesses and hard-to-reach groups for physical

activity promotion among older adults in the intervention communities (supplement table S1). In the subsequent meetings of the working group a community-specific action plan considering the stage of CR and identified strengths, weaknesses and hard-to-reach groups was developed and implemented by using the cooperative planning process (Rütten, 2001). The cooperative planning process is a structured participatory approach to involve stakeholders in planning and decision-making processes consisting of three phases:

- 1) Initial phase for forming a planning group (scientific partner and community stakeholders, policy-makers and others)
- 2) Planning phase for brainstorming (one meeting), prioritizing of ideas (one meeting), development of goals and actions (one to three meetings)
- 3) Implementation phase and monitoring of actions (meetings take place as required)

Process evaluation

Working group meetings in the intervention communities were documented in written form by the research team. The documentation included a list of participants to gain information which key informant groups (e.g., sports clubs) attended the meeting, the agenda and aim of the meeting, a look back to the previous meeting, and a group activity or discussion round to work on the community-specific physical activity action plan. Local key informants were invited to actively participate in the meetings during the cooperative planning process. In the planning phase key informants were invited to bring in own ideas for promoting physical activity among older adults in their respective community. For the prioritization of ideas key informants assigned stickers to the ideas they perceived as most important. The ideas judged as most important ideas were selected to derive concrete community activities. Therefore, smaller working groups were formed based on the interests and expertise of key informants. The small working groups prepared concrete activities including implementation steps and a timeframe and presented the results to the overall group in the following working group meetings. If all key informants agreed, the activities were implemented. All working group participants were treated equally and differing opinions were openly discussed. The role of the research team was to coordinate and moderate the working group meetings. The documentation of the working group meetings was sent to the participants after each meeting and was the basis for the community-specific physical activity action plan. Experiences in implementing community activities were discussed with stakeholders and adaptations to the community-specific action plan were made accordingly. In addition, the research team used the documentation to identify factors that facilitate or hinder a successful cooperation with community stakeholders and institutions. Implemented

activities were evaluated by using participant observation (e.g., assessing number and age range of participants, documentation of event execution such as communication between course provider and participants) or asking participants and stakeholders for (written) feedback (e.g., for participants: how have you heard of the event, what did you like or dislike about the event, would you plan to visit such an event again in the future).

Statistical analysis

A nine-point rating scale (ranging from one = no awareness to nine = professionalization) was used to score each interview to provide a CR score for each dimension and an overall CR score. Scoring of interviews was conducted by two researchers independently using the instructions of the CR manual (Stanley, 2014). The scorers were not blinded to the condition of the communities. Discrepancies between the two scorers were resolved by discussion until a consensus was reached. Random-effects generalized least square regression analysis was applied to analyze group-by-time interaction, using readiness scores at the interviewee level. All statistical analyses were performed with Stata 16 (Stata Corp., College Station, TX, USA).

Results

Participants

In total, 129 interviews were conducted at three time points (2015: n = 20, 2018: n = 55, 2020: n = 54). Eleven participants were interviewed at all three time points, 39 participants were interviewed twice, and 17 participants were only interviewed once. In all four communities, the change of interviewees was comparable. Three interviews (2018: n = 1, 2020: n = 2) could not be scored due to missing information and were excluded from the analysis. In the second follow-up, 34 (63%) participants were women and mean age was 60.7 years (age range 27-87 years). Participants were representatives from senior citizen advocacy groups (n = 6), civil and public services (n = 25), local public authorities (n = 4), and sports clubs/facilities (n = 19).

Change in community readiness over time

Baseline and follow-up CR scores are shown in table 2. At baseline, the overall CR score was 4.62 (Standard deviation [SD] = 0.51) indicating that the communities were in the preplanning stage. In the two follow-up assessments, the overall CR score did not change, it was 4.82 (SD = 0.65) in 2018 and 4.54 (SD = 1.17) in 2020. Intervention and control communities were scored at all three time points in the preplanning stage except the urban intervention community which improved from the preplanning to the preparation stage in 2020 (table 2). The dimension-

specific CR scores over time showed an increase in the *Leadership* dimension by one stage from the preplanning to the preparation stage (2015: Score 4.76, SD = 0.84, 2020: Score 5.91, SD = 2.36). CR scores in the dimensions *Community efforts and knowledge of efforts*, *Community climate*, *Community knowledge of the issue* and *Resources* remained stable in the preplanning stage of CR. The dimension-specific CR scores by community remained stable over time in both intervention and control communities, with fluctuations around one stage of CR. Only for the urban intervention community two of the five dimension-specific CR scores (*Leadership* and *Resources*) increased by two stages over time (supplement table S2).

[Insert – Table 2. Mean CR scores at baseline (2015) and follow-up (2018 and 2020) assessment – here]

The random effects generalized least square regression analysis (table 3) showed no significant changes in the overall CR score in intervention communities at follow-up assessment compared to control communities and baseline assessment (2018: -0.03, 95% Confidence Interval [CI] (-0.80; 0.73); 2020: 0.19, 95% CI: (-0.59; 0.97)). In addition, no significant changes in dimension-specific CR scores were observed for intervention communities at follow-up compared to control communities and baseline assessment (supplement table S3).

[Insert – Table 3. Comparison of change over time in overall CR score between intervention and control group (random effects regression analysis – here)]

Process evaluation

In total, ten working group meetings were held in each intervention community. One of the working groups was linked to a pre-existing stakeholder network for older adults (urban intervention community) whereas the other working group was newly formed (sub-urban intervention community). In both working groups at least one key informant from the four key informant groups (i.e., senior citizen advocacy groups, civil and public services, local public authorities, and sports clubs) was represented. Attendance at the working group meetings varied from four to ten (urban intervention community) and three to eight (sub-urban intervention community) key informants, respectively. Furthermore, the two working groups developed differently during the capacity building process. In the urban intervention community participation in the working group meetings was high and stable over time because the stakeholders were convinced of the importance of the topic and already had ideas on how to promote physical activity

among elderly in the community. In the sub-urban intervention community relevant stakeholder groups (i.e., from local sports clubs and senior citizen advocacy groups) were only represented in the beginning of the capacity building process because there were not convinced about the importance of the topic. The cooperative planning process was perceived by both working groups as useful step-by-step approach to develop and implement a physical activity action plan. However, some stakeholders perceived this approach as too strict and lengthy because tangible results for the target group were produced at a late stage of the process. In both working groups, financial support for the implementation of community activities was utilized and perceived as most helpful. Training stakeholders (e.g., on evaluation methods) was not considered as necessary by the stakeholders.

Examples for implemented activities of the community-specific action plans in the two intervention communities are shown in table 4. The implemented activities included talks at community events as well as the implementation and funding of community activities for older adults (e.g., intercultural dance project, trial course boule) in both intervention communities, the conduction of a survey in cooperation with students from the University of Bremen to identify older residents' needs for local health promotion services (urban intervention community), and the cooperation with the regional sports association and local sports clubs to train exercise instructors in the area of senior sports (urban intervention community).

[Insert – Table 4. Examples for implemented activities of the community-specific action plans – here]

The implemented community activities were evaluated positively by the participants. Participants liked that the activities were especially for older adults, close to their home and free of charge. However, participants stated that there is a lack of information about existing physical activity offers for older adults in the community. Stakeholders stated that most of the implemented activities were primarily attended by community members who anyway participate in such events. In the survey on older resident's needs for local health services 135 adults aged 60 years and above participated. The majority (70%) were aware of community offers for older adults (e.g., in the area physical activity or culture) and half of them reported to use at least one of the activities offered in the community. Barriers for participation included limited health, lack of motivation, poor accessibility and no interest or time. The results of the survey were discussed in one of the working group meetings and possible recommendations for actions were derived (e.g., compiling and regularly updating a list of free of charge health services in the

community). A whole-day workshop to train exercise instructors in the area of senior sports was conducted in 2019 and 2020. Subsequently, the workshop was transformed into an evidence-based educational concept, which is aimed at exercise instructors who would like to expand their knowledge as well as at exercise instructors who are planning a physical activity offer for older adults for the first time (material available at <https://www.aequipa.de/materialien/rtc.html>).

Discussion

This study aimed to analyze changes in CR over time to gain information on the overall impact of community-based capacity building activities for the promotion of physical activity in the elderly. At baseline, both intervention and control communities were in the preplanning stage of CR. Although many activities were carried out to foster capacity building, intervention communities did not move to a higher stage of CR at follow-up assessments in 2018 and 2020 compared to control communities. Compared to previous studies examining CR in a long-term perspective, the majority reported increases in overall or dimension-specific CR scores from baseline to follow-up (for instance in (Heath *et al.*, 2021, Whelan *et al.*, 2019, Paltzer *et al.*, 2013, Frerichs *et al.*, 2015)). However, only three studies included a control group (Stallones *et al.*, 2008, Millar *et al.*, 2013, Slater *et al.*, 2005). In the study by Millar and colleagues (Millar *et al.*, 2013) community capacity to promote healthy eating and physical activity was assessed in intervention and control schools using the CRA. Significant increases in CR were found at follow-up for intervention but not control schools. A study that used the CRA to assess the impact of a participatory community-media intervention to prevent youth substance use found significant increases in CR in the intervention group only for the dimension *Knowledge of the issue* (Slater *et al.*, 2005). Slater and colleagues argue that the intervention might only have had an impact on the individual but not the community level. The third study focused on the prevention of traumatic brain injury and found an increase in CR at follow-up in both intervention and control communities (Stallones *et al.*, 2008). The authors concluded that these might be due the fact that the CRA itself raised awareness for the topic and started a process of change in the respective communities. In our study we experienced similar effects with control communities starting to develop and implement activities to promote physical activity in older adults as a result of the CRA (e.g., community exercise day for older residents).

Instability of the leadership in the local network may have influenced the results of our study. Åhström and colleagues (Åhstrom *et al.*, 2016) explained the stagnation of CR scores in their study by large employee turnovers in some of the communities (e.g., new staff that has to be

introduced to the project, job change of key persons, and change in leadership) and changes in the organizational system of communities. We had similar experiences in the two intervention communities. In the sub-urban intervention community it was difficult to convince all key stakeholders about the importance of physical activity promotion in old age resulting in participant changes in the local working group. In addition, there were competing interests of local stakeholders which made it difficult to bring all of them together. In the urban intervention community, the community stakeholders were convinced of the importance of physical activity promotion in old age and well-established community networks exist. However, due to a prolonged illness of one of the key stakeholders, the collaboration with the community stalled. A challenge for cooperating with communities and community stakeholders in the field of physical activity promotion for older adults was the low priority of the topic due to other concerns in the community (e.g., poverty in old age) as well as acute issues (e.g., corona pandemic). In addition, even through good collaboration among stakeholders and advertisement of community activities through community stakeholder networks, not all in the CRA identified hard-to-reach groups (i.e., old men) were reached sufficiently by the implemented community activities. One explanation is that in the working group no stakeholder was involved who actively worked with old men. On the other hand, migrants were reached well (e.g., for the intercultural dance project for seniors) because a local migrant organization was part of the working group. For successful building community capacities, the prevailing structures in the communities have to be considered and all relevant stakeholders have to be brought on board. There needs to be awareness that change processes in communities take a long time and may not be sufficiently represented in the results of the CRA at the end of the capacity building process. The implementation of community activities promoting physical activity in old age such as talks or physical activity offers (e.g., trial course boules, intercultural dance project) had no impact on the dimension-specific CR scores (*Community efforts and knowledge of efforts*, *Community knowledge of the issue*) in neither the urban or sub-urban intervention community. However, in the urban intervention community with an already existing stakeholder network the more intensive collaboration of stakeholders during the capacity building process was reflected in an increase by two stages in the CR score for the dimension *Leadership* in 2020 compared to baseline. In addition, the dimension-specific CR score *Resources* increased by two stages in the urban intervention community in 2020. This could be explained by the intensified collaboration of stakeholders and efforts to bundle resources such as community rooms for physical activity promotion in old age. However, no change was observed in the sub-urban intervention community. The provision of financial resources during the capacity building process was well

received, but did not result in long-term funding of newly initiated physical activity offers. This probably requires targeted actions that were not a central part of the collaborative work in our project.

This is the first study that used the CRA to examine the overall impact of community capacity building activities for the promotion of physical activity in older adults. The CRA provides a systematic, step-by-step guideline to examine CR and to derive recommendations for actions to support communities to achieve a higher level of CR. For the CRA in 2018 and 2020 we extended our sample to 12-15 interviews per community to validate the results of the assessment instrument (Muellmann *et al.*, 2021). However, in some communities it was challenging to identify up to 15 key informants who could provide information on physical activity promotion in older adults. Overall, the cooperation with different local stakeholders (e.g., local authorities, public services) was positive and we were able to base our work on already existing community networks (e.g., working group for elderly). Nevertheless, our study has several limitations. The CRA is very time-consuming with resources needed for adapting the interview guide, conducting, scoring, and analyzing the interviews. This might be relevant due to the fact that the CRA may be used outside the research context by the communities themselves to gain information on the level of CR for a health topic. Therefore, further aims of the RTC project were to develop a practitioner manual and a short-version of the CRA to support practitioners and community stakeholders to conduct the CRA on their own (material available at <https://www.aequipa.de/materialien/rtc.html>). Another limitation is that response bias may have occurred as key informants answered from their own point of view and these answers might not be truly reflect the situation in the community.

Conclusion

The CRA provides a structured approach to obtain an overview of community-based physical activity promotion in old age and to act as a starting point for initiating capacity building activities. Summarizing the experiences made during the capacity building process factors facilitating a successful cooperation with community stakeholders are a) to build on existing structures or networks, b) to use a structured approach for developing and implementing a local physical activity action plan for older adults, c) to provide financial support for implementing activities and d) to link activities to existing community events. To avoid obstacles and pitfalls in mobilizing communities it is important for key actors to familiarize themselves with the community (e.g., history, statistical data, administrative, political and social structures, current community

issues, existing offers for physical activity promotion in old age), to seek support from local stakeholders, and to clarify responsibilities and financing options.

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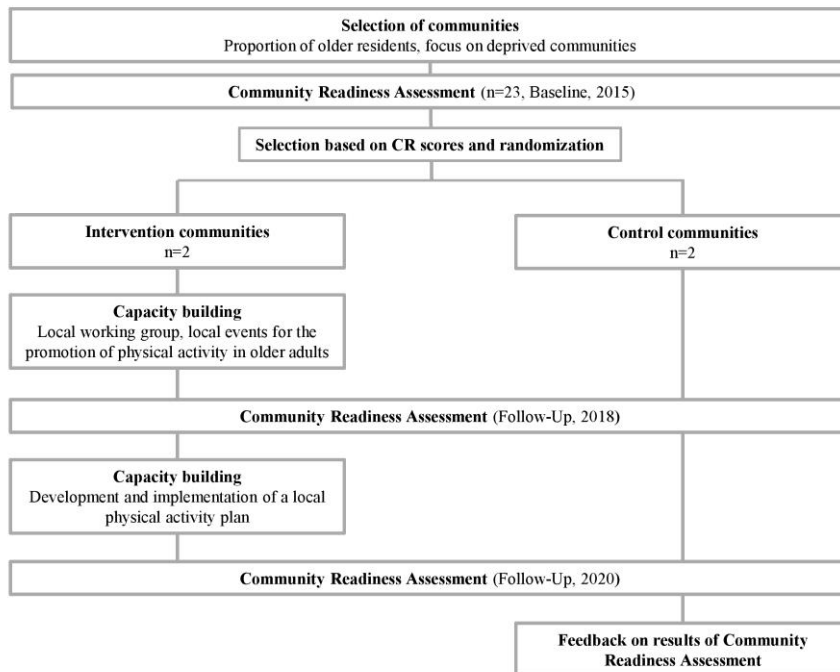


Figure 1. Flowchart study design

Table 1. Dimensions of community readiness

Dimension	Description
Community efforts and knowledge of efforts	Knowledge of the community about current programs on the issue (e.g., how many community members have heard of efforts, can name efforts, know who the efforts are for, know the effectiveness of the efforts)
Leadership	Leadership's attitude toward the issue (e.g., prioritization of the issue, passive or active leadership support for the issue and efforts)
Community climate	Community's attitude toward the issue (e.g., prioritization of the issue, passive or active community support for the issue and efforts)
Community knowledge of the issue	Knowledge of the community about the issue (e.g., how much know community members about causes, symptoms, or prevention of the issue, what misperceptions exist among community members about the issue)
Resources	Resources being used or could be used to address the issue (e.g., what resources such as time, money, personnel, rooms, are allocated in the community to address the issue)

Table 2. Mean CR scores at baseline (2015) and follow-up (2018 and 2020) assessment

Characteristics	Baseline (2015)	Follow-Up (2018)	Follow-Up (2020)
	Mean (SD)	Mean (SD)	Mean (SD)
Overall	4.62 (0.51)	4.82 (0.65)	4.54 (1.17)
Group			
Intervention	4.59 (0.44)	4.85 (0.75)	4.67 (1.25)
Control	4.64 (0.59)	4.79 (0.54)	4.41 (1.09)
Community			
Intervention urban	4.60 (0.31)	4.96 (0.83)	5.15 (1.33)
Control urban	4.45 (0.81)	4.81 (0.61)	4.39 (1.30)
Intervention sub-urban	4.58 (0.59)	4.71 (0.65)	4.12 (0.91)
Control sub-urban	4.83 (0.14)	4.78 (0.48)	4.42 (0.84)
CRA-Dimension			
Community efforts and knowledge of efforts	4.98 (1.07)	5.02 (1.03)	4.01 (1.55)
Leadership	4.76 (0.84)	4.85 (1.07)	5.91 (2.36)
Community climate	4.43 (0.93)	4.60 (0.86)	4.23 (1.67)
Community knowledge of the issue	4.49 (0.69)	4.39 (1.05)	4.09 (1.23)
Resources	4.43 (0.61)	5.34 (1.16)	4.64 (1.55)

CR: Community readiness, CRA: Community readiness assessment, SD: Standard deviation

Table 3. Comparison of change over time in overall CR score between intervention and control group (random effects regression analysis)

Factors	Overall CR score Coefficient (95% CI)
Time	
Baseline	Reference
Follow-Up (2018)	0.22 (-0.32; 0.76)
Follow-Up (2020)	-0.16 (-0.71; 0.39)
Group	
Control	Reference
Intervention	0.08 (-0.64; 0.79)
Group-by-time interaction	
Baseline	Reference
Follow-Up (2018)	-0.03 (-0.80; 0.73)
Follow-Up (2020)	0.19 (-0.59; 0.97)

Unstandardized regression coefficients, number of observations: 126, number of groups: 66, group variable: fall; CI: Confidence interval, CR: Community readiness

Table 4. Examples for implemented activities of the community specific action plans in the two intervention communities

Activity (community)	Aim (CR dimension addressed)	Target population	Evaluation
Talks and information desk on the topic „Physical activity promotion in old age“ at community events (S, U)	To increase knowledge about physical activity in the community (4)	General population	Feedback from stakeholders
Trial course boules in cooperation with a local sports club (S)	To increase physical activity of older community residents, to offer physical activity class free of charge (1, 4, 5)	General population	Feedback from stakeholders
Rollator day in cooperation with the public transportation system (e.g., getting on and off buses and trams with rollator and wheelchair) (U)	To train disabled older adults (1, 5)	Disabled older adults	Written feedback from participants
Intercultural dance project for seniors (U)	To increase physical activity of older community residents, to offer physical activity class free of charge (1, 4, 5)	Migrants, social disadvantaged older adults	Participant observation, written feedback from participants
Senior bathing day in cooperation with the local public swimming pool (U)	To inform about existing physical activity classes in the community (1, 5)	General population, social disadvantaged older adults	Written feedback from participants
Acquisition of an outdoor backpack (e.g., map for community walking routes, card game with exercise tips) (S)	To inform about existing physical activity classes in the community, to increase physical activity of older community residents, to offer physical activity class free of charge (1, 4, 5)	General population, social disadvantaged older adults	Feedback from stakeholders
Postcard campaign to advertise local physical activity programs (S)	To inform about existing physical activity classes in the community (1)	General population	Feedback from stakeholders
Survey of older residents to identify needs for local health promotion services (U)	To tailor community-based health promotion activities to the needs of older residents (3)	General population	Feedback from stakeholders
Cooperation with the regional sports association and local sports club to train exercise instructors in the area of senior sports (U)	To train exercise instructors in physical activity promotion for older adults (2, 5)	Exercise instructors	Written feedback from participants

CR: Community readiness, S: Sub-urban intervention community, U: Urban intervention community, 1: Community efforts and knowledge of efforts, 2: Leadership, 3: Community climate, 4: Community knowledge of the issue, 5: Resources

Supplement

Table S1. Reported strengths, weaknesses and hard-to-reach groups in the intervention communities at baseline

Strengths
Physical activity is recognized for promoting communication and social contact
Variety of physical activity classes (e.g., Nordic walking, dancing)
Professional supervision in physical activity classes
Physical activity classes partly free of charge

Weaknesses
Lack of knowledge of physical activity classes
Too few facilities
Only German language physical activity classes
Lack of trained exercise instructors

Hard-to-reach groups
Migrants (e.g., from the former CIS states, Poland, Turkey)
Social isolated older adults
Social disadvantaged older adults
Disabled older adults
(single) Men
Low educated older adults

Table S2. Dimension-specific CR scores over time by community

	Dimension-specific CR scores				
	Mean (SD)				
	<i>Community efforts and knowledge of efforts</i>	<i>Leadership</i>	<i>Community climate</i>	<i>Community knowledge of the issue</i>	<i>Resources</i>
Intervention urban					
Baseline	5.00 (0.64)	5.50 (0.92)	4.10 (1.55)	4.55 (0.51)	3.85 (0.65)
Follow-Up (2018)	4.92 (1.08)	5.47 (0.96)	4.56 (1.13)	3.80 (0.84)	6.05 (1.43)
Follow-Up (2020)	4.13 (2.02)	7.44 (1.91)	4.83 (2.19)	4.21 (1.24)	5.16 (1.74)
Control urban					
Baseline	4.05 (1.28)	4.50 (0.68)	4.90 (0.95)	4.25 (0.79)	4.55 (0.60)
Follow-Up (2018)	4.73 (0.94)	4.77 (1.00)	4.62 (0.85)	4.62 (1.33)	5.54 (1.13)
Follow-Up (2020)	3.86 (1.38)	5.75 (2.58)	4.00 (1.89)	3.77 (1.23)	4.71 (1.64)
Intervention sub-urban					
Baseline	5.25 (1.21)	4.20 (0.62)	4.30 (0.48)	4.55 (1.07)	4.60 (0.42)
Follow-Up (2018)	5.33 (1.05)	4.11 (1.07)	4.36 (0.72)	4.77 (1.16)	4.98 (0.62)
Follow-Up (2020)	4.00 (1.62)	4.48 (1.71)	3.80 (0.95)	4.41 (1.53)	4.17 (1.21)
Control sub-urban					
Baseline	5.60 (0.58)	4.85 (0.72)	4.40 (0.38)	4.60 (0.38)	4.70 (0.48)
Follow-Up (2018)	5.10 (1.05)	4.83 (0.89)	4.83 (0.71)	4.52 (0.47)	4.67 (0.72)
Follow-Up (2020)	4.02 (1.28)	5.68 (2.31)	4.33 (1.23)	4.00 (0.87)	4.35 (1.47)

CR: Community readiness, SD: Standard deviation

Table S3. Comparison of change over time in dimension-specific CR scores between intervention and control group (random effects regression analysis)

Factors	Dimension-specific CR scores				
	<i>Community efforts and knowledge of efforts</i>	<i>Leadership</i>	<i>Community climate</i>	<i>Community knowledge of the issue</i>	<i>Resources</i>
Time					
Baseline	Reference	Reference	Reference	Reference	Reference
Follow-Up (2018)	0.06 (-0.79; 0.90)	0.14 (-0.95; 1.22)	0.11 (-0.76; 0.98)	0.21 (-0.53; 0.94)	0.58 (-0.25; 1.40)
Follow-Up (2020)	-1.04 (-1.89; -0.20)	1.08 (-0.03; 2.20)	-0.46 (-1.35; 0.43)	-0.46 (-1.35; 0.43)	0.05 (-0.80; 0.89)
Group					
Control	Reference	Reference	Reference	Reference	Reference
Intervention	0.15 (-0.92; 0.22)	0.14 (-1.29; 1.58)	-0.36 (-1.45; 0.72)	0.27 (-0.65; 1.18)	-0.15 (-1.21; 0.92)
Group-by-time interaction					
Baseline	Reference	Reference	Reference	Reference	Reference
Follow-Up (2018)	-0.06 (-1.25; 1.12)	-0.13 (-1.68; 1.42)	0.15 (-1.09; 1.40)	-0.61 (-1.64; 0.42)	0.60 (-0.56; 1.77)
Follow-Up (2020)	-0.03 (-1.23; 1.18)	0.20 (-1.38; 1.77)	0.59 (-0.68; 1.85)	0.16 (-0.88; 1.20)	0.28 (-0.91; 1.47)

Unstandardized regression coefficients, number of observations: 126, number of groups: 66, group variable: fall; CI: Confidence interval, CR: Community readiness