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REVIEW

Effectiveness of Community-Based Health Promotion Interventions in Urban Areas: A Systematic Review

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Abstract

Over the past few decades, a community-based approach was seen to be the "gold standard" for health promotion and disease prevention, especially in the field of socially deprived neighborhoods in urban areas. Up to the beginning of the 2000s, earlier reviews provide valuable information on activities in this context. However, in their conclusions they were limited to North America and Europe. Therefore, we conducted a systematic literature review on community-based health promotion and prevention programs worldwide. The Pubmed and PsycINFO databases were screened for relevant articles published between January 2002 and December 2018, revealing 101 potentially eligible publications out of 3646 hits. After a systematic review process including searching the reference lists, 32 papers met the inclusion criteria and were included in the review. Twenty-four (75.0%) articles reported improvements in at least one health behavior, health service access, health literacy, and/or a range of health status outcomes. Large-scale community-based health promotion programs, however, often resulted in limited or missing population-wide changes. Possible reasons are methodological limitations, concurrent context effects, and limitations of the interventions used. Our results confirm that community-based interventions are promising for health promotion and disease prevention but so far their potential is not fully realized. For the future, such interventions should aim at proximal outcomes and invest in community capacity building.

Keywords Community-based health promotion · Outcome evaluation · Neighborhood · Urban area

Introduction

Over the past few decades, considerable research effort and funding were invested to implement community-based policies or programs designed to reduce the risk of major chronic diseases in the population [1]. These programs often take place in an urban context due to the use of multicomponent interventions, such as training of health professionals, media campaigns or policy action, and mobilize the community around the issue of public health importance [2]. Specifically, the programs offer three potential advantages: First, community-based interventions do not primarily depend on the professional health care system. Second, the interventions can reach persons of all risk groups. Third, these interventions can also influence contextual factors that shape lifestyle, but are not under control of the individual [3].

Results from the evaluation of the impact of these programs are mixed, raising some concerns about their effectiveness and about the ability to evaluate their impact against marked contextual influences of decreasing risk factor prevalence, changes in health-related behavior, and shifts in social and cultural tastes [4]. The situation is particularly complex in a time when numerous programs are being set up to tackle inequalities, in particular health inequalities. In many disadvantaged areas, more than one program operates side by side, often with similar and overlapping objectives [5].

Review Registration The review was registered in the International Prospective Register of Systematic Reviews (PROSPERO) under the ID CRD42017074699.

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Nevertheless, the public health impact makes community-based intervention compelling, especially in subgroups that continue to suffer a disproportionate burden, such as low income and migrant groups [6].

In addition to a well-tailored and effective concept and implementation, community-based health promotion also requires participation in the sense of active commitment of residents and professionals. This involvement in the planning, implementation and evaluation of health promotion programs is considered a key note of health promotion and community capacity [7]. Health promotion policies cannot be imposed 'top down', but are necessarily (co-) determined by the interests of local stakeholders, and should aim at maximizing the participation in the design and direction of actions. A high degree of participation and collaborative partnership is expected to contribute to the effectiveness and sustainability of community-based measures [8, 9].

Socio-ecologic Framework

Recent approaches of community-based health promotion suggest programs that apply multi-component or complex interventions addressing different aspects of health. This seems to be the most promising strategy for changing risk behaviors as well as the physical and social environment in which behaviors are shaped [10, 11]. In this socio-ecologic paradigm of health, we can differentiate between 'user-addressed' activities which are provided in the community, and 'structural' interventions in which people from the community are actively involved, either in planning or in implementing the activities [12].

User-addressed interventions aim at direct changes on at least three different levels: the individual level (e.g. health education, training), interpersonal level (e.g. develop new social ties/support, lay health advisors), and community level (e.g. media advocacy, environmental change) [13]. Therefore, not only unhealthy behavior, but also unhealthy environments need to be addressed to reduce general health problems and socioeconomic health inequalities. The impact of structural interventions is to build up community capacities (e.g. participation, local leadership, partnerships/networking, and resource mobilization), which indirectly promote the health outcome of the population [14, 15]. In this sense, structural interventions may enable user-addressed interventions, increase their effectiveness and ensure sustainability.

Socio-ecologic approaches assume that there are multiple determinants of health on different levels and that these have interactive and cumulative effects. Thus, interventions can be expected to be most effective and sustainable when all these factors/levels are targeted simultaneously. However, this may be impractical, and Stokols [16] recommends that interventions should focus at least on two levels. Furthermore, interventions addressing certain factors (e.g. healthy nutrition and physical activity) or singular settings (e.g. schools) have more successfully adopted a social ecological approach [11].

Current Evidence Gaps

The comprehensive review by Merzel and D'Afflitti [4] reflected the growing interest in addressing community-based health issues in the late 1980s and early 1990s. These included the Stamford Five-City Project [17], the Minnesota Heart Health Program [18], the Pawtucket Heart Health Program [19], and the North Karelia Project [20]. Apart from these large-scale programs in the USA and Finland, the review by Hills [5] largely focused on fairly small-scale UK interventions for health improvement. Both reviews found little evidence of many initiatives, projects and programs, and discussed crucial research challenges (e.g. need for intermediate outcomes, complexity and feasibility of interventions).

Overall, both reviews provide valuable information on activities in this field up to the early 2000s. However, they failed to take up a more international perspective, not being able to contribute to recent developments in the past 17 years. Community involvement has been boosted in many policy areas, supported by the current focus on health inequalities and the broader interest in community development [21].

Research Questions

The main goal of this paper is to assess what has been learned since the beginning of 2000s regarding the impact of community-based interventions on public health. The focus of our review is limited to urban areas due to complexity of the research field; it can also be assumed that the context for health promotion strategies in cities or urban neighborhoods is quite different than in rural areas [22]. Hence, we want to answer the central research question: What are the effects of multi-component health promotion activities on health behavior and health in urban areas? A sub-ordinated question concerns the issue to what extend the (in)effectiveness is associated with community participation as a key domain of capacity building [9, 14].

Methods

Protocol

We conducted a systematic review according to the preferred reporting items for systematic reviews and

meta-analyses (PRISMA) guidelines [23]. An additional checklist shows this in more detail (see Additional File 1).

Search Strategy

The search was limited to articles published in English and German during the period January 1, 2002, to December 31, 2018. The reason for choosing the years since 2002 is the above-mentioned review by Merzel and D'Afflitti [4]. They had already screened studies on the same topic 20 years before. Our review used the string (effectiveness OR efficacy OR efficiency OR benefit* OR outcome*) AND (neighbo* OR district* OR communit* OR urban OR residential area*) AND (health promot* OR disease prevention) in Pubmed and PsycINFO. Pubmed research resulted in 3171 publications, while PsycINFO came to 1131 entries; after duplicates were removed 3646 records remained (advanced search: title/abstract) (see Fig. 1). However, the vast majority of publications did not fulfill our further criteria of inclusion: (i) urban areas, (ii) intervention studies, (iii) focus on impact or outcome evaluation, and (iv) multi-component interventions, settings and outcomes.

Data Extraction and Synthesis

Screening followed a two-step process with articles filtered by title/abstract, and full text. First author of this review (SN) initially screened the potentially relevant studies. The second author (OK) independently reviewed articles retained for inclusion in the preliminary phase. In the case of a persisting difference of opinion, a third colleague reviewed the paper in order to reach a consensus between the two review authors. Full texts of the remaining 101 articles were read and checked for eligibility, of which 72 were excluded. Main reasons for exclusion were (please also see Fig. 1): no interventional study on health outcomes, no urban area, and the focus on a single intervention or sub-setting (e.g. school). After checking the bibliographical references of the 29 eligible primary studies, we took three additional studies into the review. Finally, we extracted data on characteristics of 32 included studies, including author and publication date, study research design, country, baseline sample size, quality of study, type of intervention, impacts/outcomes, and key results.

We did not conduct a meta-analysis because the included studies were too heterogeneous regarding methodological aspects (i.e. target populations, outcomes, measurement instruments, and statistical methods).

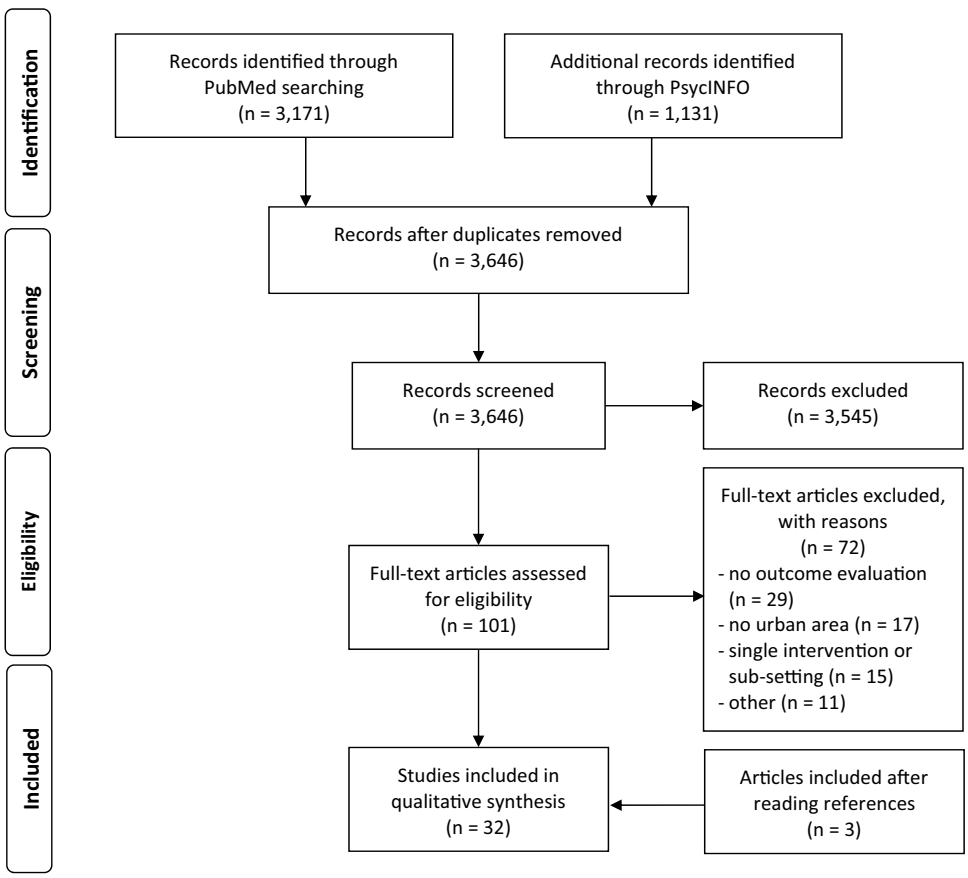

Fig. 1 Flow diagram

Patient and Public Involvement

There was no direct patient or public involvement in this review.

Findings

Characteristics of the Studies

Of the 32 studies included in this review, 11 were conducted in Europe [24–27, 29–35], 9 in Asia [37–45], 7 in North America [46–50, 52, 53], 2 in Australia [54, 55], and there was one each in Central [56] and South America [57], and Africa [58] (see Table 1). The studies used various designs, including RCTs (n = 5) [30, 42, 45, 48, 49], cluster randomized trials (n = 7) [31, 34, 35, 38, 44, 52, 58], quasi-experimental designs (n = 12) [24, 26, 27, 29, 33, 35, 41, 43, 50, 54–56], pre-post-tests without control group (n = 7) [32, 39, 40, 46, 49, 50, 57], and secondary analysis (n = 1) [25]. The sample sizes at baseline varied from 69 to 16,228, with study populations having a variety of ethnic, cultural and socioeconomic backgrounds.

Twenty-nine studies focused on the improvement of health behaviors (e.g. physical activity, nutrition, smoking), nine studies examined self-reported health outcomes, eight included health literacy, and 15 studies additionally examined clinical/anthropometric outcomes. Sixteen articles reported on interventions at three levels of community-based interventions (individual-level, group-level, community-level), 15 at two levels of interventions, and one at one level. Interventions for building community capacities were mentioned in 23 studies, including civic participation, leadership, partnership/networking, organizational development, resource mobilization and evaluation.

Included studies were assessed for risk of bias using the 'quality assessment tool for quantitative studies' developed by the effective public health practice project (EPHPP) [59]. Studies were scored against six criteria (selection bias, study design, confounders, blinding, data collection method, withdrawals and drop-outs), and the number of weak ratings was summed up to give a global quality score. Of the 32 studies reviewed, 14 (43.8%) were found to be of strong quality [26, 30, 34, 35, 37, 42–44, 48, 51, 54, 56–58], 13 (40.6%) of moderate quality [24, 27, 29, 32, 33, 38, 39, 41, 45, 47, 50, 53, 55], and five (15.6%) were weak in quality [25, 31, 40, 46, 49]. Amongst all of the studies, the most (37.5%) showed poor ratings in withdrawals and drop-outs. An additional file shows this in more detail (see Additional File 2).

Effectiveness of Interventions

Out of the 32 studies that met our inclusion criteria, 24 (75.0%) reported small to medium improvements in at least one outcome parameter, including all programs in low and middle income countries [24, 25, 30, 32, 35, 37–47, 49, 50, 53–58]. Among these relatively successful interventions were education and counselling services (n = 17), peer education projects (14), exercise provision (11), health promotion policies (10), media campaigns (6) and 'walkability' initiatives to enhance the physical environment (5). Regarding health outcomes that were most affected by community-based interventions, we found physical activity (11), clinical/anthropometric parameters (9), and nutritional behavior (6). Furthermore, all studies involving only one specific risk group within a community (e.g., the elderly [41, 48, 56], people with development disabilities [50] or metabolic syndrome [45, 46]) showed substantial improvements through selective or indicated interventions.

Large-scale community programs, however, often resulted in limited or no population-wide changes in primary health outcomes [27, 29, 33, 34, 50, 54]. Here, statistically significant effects particularly referred to social conditions as secondary outcomes (e.g. promote a ´sense of community´ or increased perception that people in the neighborhood keep together). In contrast to a low level of evidence at the area level, an additional process evaluation revealed that the sub-group of participants in any activities reported that the projects improved their perceived health and mental well-being [60]. Likewise, an intervention success is the finding that most community capacities (e.g. participation and community structures) were growing, but this process required a significant "up front" time investment before health outcomes data demonstrate change [51].

Discussion

This is the first review since 2002 that gives a systematic overview of the effectiveness of community-based interventions in urban areas worldwide. Despite the high number of studies that found positive effects, the impact of the interventions seemed to be rather limited. This holds especially true for large-scale community programs. In the first part, we will discuss the reasons for this in the light of our main findings. The second section will address participation as a key component of community capacities and health promotion. The third section points out the limitations of our systematic review.

Table 1 Studies analyzing community-based health promotion interventions in urban areas

Author, Year	Study design and country	Quality of study[a]	Individual-level intervention	Group-level intervention	Community-level intervention	Capacity building	Impact and outcomes	Key findings
Abbema et al. (2004) [24]	Quasi-experimental, Netherlands (n of experimental area: 323; control area I: 322; control area II: 342)	2	Course on coping with stress; physical exercises; traffic lessons in schools; childhood development courses for parents	Social skills training for adolescents; multicultural meetings; local parties; home visits for social activation of long-term unemployed	Mass media; speed controls; crime prevention project in schools; marking dog walking sites; refuse containers; fitting out children's playground	Survey data; public discussion meetings; professional networking; health action plan	Perceived area improvement or decline; perceived health; health problems and determinants	Of the total 47 effects with $p < .05$, 14 were in favor of the experiment-al area; overall, the magnitudes of the effects were small (in %)
Alagiyawanna et al. (2017) [37]	Cluster randomized, Sri Lanka (n of women in intervention group: 367; control group: 360)	1	Health education sessions for women	Support groups; training of field staff, volunteers and school-children	Distribution of education material to community organizations	Not reported	Self-reported second-hand smoke (SHS) exposure; knowledge and attitudes towards SHS	Significantly lower proportion of women with SHS exposure in the intervention group; higher knowledge of the health risks of SHS, attitudes and right to smoke free living
Balaji et al. (2011) [38]	Cluster randomized, India (n of the urban intervention and control area: 1860 youths)	2	Health information material	Peer education; teacher training	None	Interviews with youths, parents, teachers, heads of institutions	Knowledge, attitudes, behavior related to emotional health; self-harm; substance use; RSH; violence; help seeking	Substantial reductions in adverse outcomes, e.g. depression (OR .57, 95% CI .41–.79), physical violence (OR .59, 95% CI .40–.87), substance use (OR .63, 95% CI .45–.89)
Bazzano et al. (2009) [46]	Pre-post-test (no control group), USA (n = 85 adults with development disabilities)	3	Education and exercise sessions	Peer-mentors	None	Focus groups with clients	Changes in weight, BMI, abdominal girth, access to care, self-reported nutrition, physical activity, life satisfaction	Positive outcomes of significant weight loss, improved nutrition, exercise frequency, self-efficacy (in %)
Blair et al. (2006) [25]	Secondary analysis of child dental data, UK (n of pilot district 1: 285; pilot district 2: 539; control district: unknown)	3	Parent workshops; 'Get Cooking' classes; weaning fair	Nurseries' staff training; 'training the trainers', consultation groups	Health snacks policies; dental health songbooks, events, decoration; free toothpaste and toothbrush distribution	Locality based questionnaires; oral health action teams	D_3MFT index for decayed, missing and filled teeth	Mean D_3MFT decreased from 5.5 to 3.6 (district 1) and from 6.0 to 3.6 (district 2); no indication of any background trend

Table 1 (continued)

Author, Year	Study design and country	Quality of study[a]	Individual-level intervention	Group-level intervention	Community-level intervention	Capacity building	Impact and outcomes	Key findings
Bolton et al. (2017) [54]	Quasi-experimental, Australia (n of intervention group: 2408 children and adolescents, 501 adults; control group: 3163 children and adolescents, 318 adults)	1	None	Target group awareness of key project messages	Implementation policies (e.g. physical activity and healthy eating in schools); increasing water, fruit and vegetable consumption	Stakeholder commitment; network and partnership development; community-directed needs assessment	Anthropometry (weight, waist, BMI); health-related behaviors; quality of life; school environment	Gains in community capacities, but few impacts on environment, policy or individual knowledge, skills, beliefs and perceptions; effect sizes in small-to-moderate range
Bukman et al. (2017) [26]	Quasi-experimental, Netherlands (n of intervention group: 117; control group: 103)	1	Dietary advice; weekly sports lessons	Group meetings	None	Not reported	Cardio-metabolic risk factors (obesity related factors, blood pressure, blood markers); physical activity; dietary intake; quality of life	Apart from the obesity-related measures (e.g. BMI) and fibre intake no significant improvements were observed
De Henauw et al. (2016) [27]; De Bourde-audhuij et al. (2016) [28]	Quasi-experimental, 8 European countries (n of intervention group: 8482 children; control group: 7746)	2	Educating children on a healthy lifestyle	School: food and physical activity opportunities; involving parents in children's lifestyle	Multimedia and public relations campaign; free access to table water; safe outdoor playing and cycling; environmental and policy changes	Involvement of community partners	Anthropometry; body fatness; dietary intake; physical activity; parent–child-relationship	Difference in changes between control and intervention was not statistically significant; few significances were found in country-specific analyses
De Heer et al. (2015) [47]	Pre-post-test (no control group), USA (n of five study cohorts: 753)	2	Comprehensive outreach program on heart-healthy behavior	Walking groups; dance classes; cooking classes; grocery store tours; coffee talks	Free use of parks and recreational facilities	'Promotoras de Salud'; three intervention partners located in the area	Clinical measures (including height, weight, waist/hip circumference, blood pressure); health behaviors (exercise, diet, smoking)	Significant improvement in health behavior, e.g. intake of daily servings of fruits and vegetables (from 33.3 to 67.4%; $p < .001$); for clinical indicators, weight, waist and hip circumference decreased

Table 1 (continued)

Author, Year	Study design and country	Quality of study[a]	Individual-level intervention	Group-level intervention	Community-level intervention	Capacity building	Impact and outcomes	Key findings
Flowers et al. (2002) [29]	Quasi-experimental, UK (n of intervention city: 1245; control city: 1031)	2	Gay-specific GUM services	Peer-led sexual health promotion	Free-phone `hotline'	Not reported	Hepatitis B vaccination; HIV testing; UAI casual; negotiated safety; knowledge of own HIV status; knowledge of partner's HIV status	Logistic regression analysis failed to identify any demonstrable intervention effects on five key sexual health behaviors
Fox et al. (2010) [53]	Randomized controlled trial, USA (n of intervention group: 288 aged 65 + ; control group: 264)	1	Personalized counseling on fall risks with care plan; educational materials and information about local resources	Training public health nurses (PHN); group teleconference	None	Not reported	Falls; physical function (balance and chair stand test)	No significant differences between both groups in falls by time and for physical function
Gustafsson et al. (2012) [30]	Randomized, single blind controlled trial, Sweden (total n: 459 adults aged 80 and older)	1	Preventive home visit	Multi-professional senior group meetings with one follow-up home visit	None	Intervention team: occupational therapist, physiotherapist, nurse, social worker	Change in frailty, self-rated health, and ADLs	Both interventions delayed deterioration of self-rated health (OR = 1.99, 95% CI = 1.12–3.54); senior meetings were the most beneficial intervention on ADL
Hillier et al. (2011) [31]	Cluster randomized, UK (n of the intervention site: 69 adults; control site: 59)	3	Motivational interviewing; brief negotiation techniques	Training of lifestyle helpers from local health authority, voluntary organizations and university	None	Not reported	Diet, physical activity, and anthropometric data	ANCOVA revealed no significant intervention effect on any of the diet and physical activity outcomes; weight and BMI remained fairly consistent
Hoeft et al. (2016) [48]	Single group, pre-post-test, USA (n = 105 parents of a child aged 0–5)	3	Curriculum on parents' dental health knowledge and skills	Lay health advisors ('promotoras')	Toothbrushes and toothpaste for all family members	Not reported	Oral health knowledge; self-reported behaviors around dental visits and diet	Statistically significant improvements in four out of seven aspects of toothbrushing ($p < .01$)

Table 1 (continued)

Author, Year	Study design and country	Quality of study[a]	Individual-level intervention	Group-level intervention	Community-level intervention	Capacity building	Impact and outcomes	Key findings
Jemmott III et al. (2014) [58]	Cluster randomized, South Africa (n of the intervention neighborhood: 537 men aged 18-45; control neighborhood: 569)	1	Exercises; games; brainstorming	Training of male facilitators; role playing; group discussion	None	Not reported	Physical activity; fruit-vegetables intake	Model-estimated probability of meeting physical-activity guidelines was 51.0% in the health-promotion intervention and 44.7% in matched control (OR 1.34; 95% CI 1.09–1.63)
Jiang et al. (2013) [39]	Pre-post-test (no control group), China (n = 1269 adults)	2	None	None	Walking friendly 'Healthy Trail'; nightly illuminated signs; theme park; mass media; BMI calculate rulers, salt spoons, and oil jugs for healthy lifestyle	Multi-sector working group for consultancy, management, execution, and technical guidance; leadership by district government	Physical activity; health conditions (incl. weight, blood pressure, blood glucose, cholesterol)	Time on weekly physical activity increased; indicator values of physical check-ups and biochemistry enhanced ($p < .05$ or $< .01$ for all measures)
Lorentzen et al. (2007) [32]	Pre-post-test (no control group), Norway (n = 1497)	2	Low-threshold physical activity programs	Outdoor walking groups; dancing class	Program promotion (e.g. TV, radio, poster); labelling of walking paths; improved street lighting; snow clearing; gritting of pavements and walking paths during winter	Participation of local political, lay leaders, local health and welfare workers in the planning and implementation; incorporation in the strategic plans of the community	Physical activity behavior; psychosocial mediators (e.g. social support, perceived control); anthropometry	Participation in walking groups and aerobic exercise, and having seen the poster were significantly related to changes in physical activity (β: .12–.21; $p < .01$); relations were partly mediated by changes in psycho-social factors
Luten et al. (2016) [33]	Quasi-experimental, Netherlands (n of intervention group: 430 older adults; control group: 213)	2	None	Local peers and healthcare professionals were involved	Local media campaign (e.g. posters, radio spots, flyers, healthier lifestyle guide)	Stakeholders (e.g. professionals, older adults) were involved in the development and implementation of the intervention	Physical activity; healthy eating; reach (have heard of or seen elements of the program)	No significant differences in changes to any outcome except for transport-related physical activity at 3 and 9 months follow-up

Table 1 (continued)

Author, Year	Study design and country	Quality of study[a]	Individual-level intervention	Group-level intervention	Community-level intervention	Capacity building	Impact and outcomes	Key findings
Malekafzali et al. (2010) [40]	Pre-post-test (no control group), Iran (n = 204 elderly)	3	Home visits and face-to-face elderly education; referral to physicians; pamphlets; exercising session	Training of local volunteers; meeting with experts	None	Participation of regional stakeholders and key persons; survey for needs assessment	Mental health; group activities; leisure time; nutrition;	Effects particularly applied to women (e.g. vegetable intake, Aerobic exercises, life satisfaction) ($p < .05/.01$)
Meng et al. (2009) [49]	Randomized controlled trial, USA (n of the intervention group: 382 elderly; control group: 384)	2	Patient education; individualized health promotion and disease self-management coaching	Physician care management	None	Not reported	Physical function; health care expenditures	Reduced physical functional decline by 54% ($p = .03$)
Mohammadi-fard et al. (2009) [41]	Quasi-experimental, Iran (n of both the two intervention areas and one reference area: 12,514)	2	Direct educational program (incl. 10 distinct projects with different target groups)	Health professional education and involvement	Mass media; legislation and coordination; policy making; availability of food choices; smoke free areas	Inter-sectional co-operation and collaboration; supervision by high council; marketing and organizational development; research and evaluation	Dietary behavior (e.g. fat and meat consumption, global dietary index); physical activity; tobacco use; stress management	Highly significant improvement in fat/meat consumption and global dietary index was found in the intervention areas ($p < .001$)
Navarro et al. (2013) [56]	Quasi-experimental, Domenican Republic (n of mother–child dyads in 8 intervention areas: 266; n in 8 control areas: 337)	1	Educational meetings on health and nutrition; home visits	Training of community volunteers ('counselors')	None	Coordination with national and international health organizations	Mean length-for-age; prevalence of stunting; mean BMI-for-age; prevalence of BMI-for-age	Results on length and stunting were not statistically significant; lower risk of overweight by intervention (OR .43; 95% CI .23–.77)
Pazoki et al. (2007) [42]	Randomized controlled trial, Iran (n of the intervention groups: 170 women; control groups: 165)	1	Information material; exercise for healthy heart	Training volunteer trainers	None	Participating community members, academic researchers, health care providers, and policy-makers; community advisory board	Physical activity; healthy heart knowledge and awareness; blood pressure and sample; BMI; waist/hip circumference	Significantly greater decrease in systolic blood pressure (−10.0 mmHg); heart-healthy awareness and knowledge score at posttest 6.26% higher

Table 1 (continued)

Author, Year	Study design and country	Quality of study[a]	Individual-level intervention	Group-level intervention	Community-level intervention	Capacity building	Impact and outcomes	Key findings
Phillips et al. (2014) [34]	Cluster randomized, UK (n of 20 intervention neighborhoods: 2061 adults; 20 control neighbor-hoods: 2046)	1	Maps of facilities and opportunities for healthy activities/lifestyle; physical activity sessions; mental health and 'happiness' workshops	Training for volunteers as core support group; healthy cooking classes; learning network for professionals; intercultural and intergenerational approaches to improve social cohesion	Community gardens and redevelopment of greenspaces; availability of healthy food	Community consultation and participation in decision making; partnerships with local and city-wide organizations; Big Lottery Well-being Fund	Portions of fruit and vegetables; intensity of physical activity; mental well-being; social outcomes	No evidence of impact on primary outcomes: healthy eating (RR: 1.04, 95% CI 0.93–1.17); physical activity (RR:1.01, 95% CI 0.88–1.16); abnormal GHQ12 (RR:1.15, 95% CI 0.84–1.61); WEMWBS (mean diff.: − 1.52, 95% CI − 3.93 to 0.88)
Lytvyak et al. (2016) [50]; Raine et al. (2010) [51]	Quasi-experimental, Canada (n of four intervention areas: 4761 adults; control areas: 9775)	1	Leisure activities to encourage people to be active	Promote social inclusion; connect local people with local growers	Walking and cycling trails; community gardens; food security initiatives; access to recreation facilities; healthy choice restaurant	Networking; regular tele-conferences; team meetings; ANGELO framework	Self-perceived health; social conditions; behavioral indicators; anthropometric outcomes; clinical measures	BMI showed no change, and neither were there significant changes in behaviors relative to secular trends; most significant outcomes were social conditions
Sarrafzadegan et al. (2012) [43]	Quasi-experimental, Iran (n of intervention area: 6175; reference area: 6339)	1	Education about healthy cooking; healthy lifestyle training for high risk groups	Education of health professionals; training health workers	Mass media; no-smoking regulations; healthy snacks in schools and kindergardens	Inter-sectoral cooperation and collaboration; community participation; marketing and organizational development; research and evaluation	Lifestyle behaviors; physical examination; blood collection	The prevalence of hypercholesterolemia and hypertriglyceridemia decreased in both females and males ($p < .001$)

Table 1 (continued)

Author, Year	Study design and country	Quality of study[a]	Individual-level intervention	Group-level intervention	Community-level intervention	Capacity building	Impact and outcomes	Key findings
Schuit et al. (2006) [35] and Ronda et al. (2004) [36]	Quasi-experimental, Netherlands (n of intervention region: 3000; reference region: 895)	1	Nutrition education; healthy activities	Creating walking and bicycle clubs	Mass media; food labeling; public–private collaboration with the retail sector; smoke-free areas	Partnership with city council and adjacent municipalities, research institute, social work and healthcare organizations	CVD risk factors; risk behavior; psychosocial determinants	The adjusted difference in mean change was significant in BMI, waist circumference, blood pressure and (in women) serum glucose; some significant effects in fat intake, fat intake awareness and intentions for physical activity
Schulz et al. (2015) [52]	Cluster randomized, USA (n of intervention group: 695 Non-Hispanic Black and Hispanic residents; control group: not reported)	2	None	Training and support lay health promoters (CHP); walking group	Walkability (e.g. improvements to parks and greenways, safety environment)	Long-standing collaboration among community groups, health service providers, and academic researchers	Physical activity (steps); CVD risk factors	Significantly more steps ($p < .001$), associated with better risk factors; no difference by ethnicity or SES
Simões et al. (2017) [57]	Natural experiment at three points in time, Brazil (n = 2370, 3,824, and 3825)	1	Hypertension and obesity screening; guidance on body weight and diet	Free physical activity classes offered by trained physical educators	Re-engineered and beautified public spaces (e.g. small parks and plazas)	Infrastructure for program operation by financing construction and/or rehabilitation of spaces	Leisure-time and transport; smoking; exposure in the PA program	For women, the odds of recommended leisure-time physical activity is higher for those living in program cities (OR = 1,10/1.46)
Tran et al. (2017) [44]	Cluster-randomized, Vietnam (n of the intervention group: 214 adults with metabolic syndrome; control group: 203)	1	Information booklet; resistance band; education sessions	Training walk leaders; walking group	None	Not reported	Physical activity; dietary behaviors	Significant increase in moderate activity ($p < .05$), walking ($p < .001$), and a decrease in mean sitting time ($p < .001$); some improvements in dietary behaviors
Wright et al. (2006) [55]	Quasi-experimental, Australia (n of experimental region: 600 young people; comparison region: 600)	2	Mental health advice	Training workshops for lay professionals; navigator training	Media campaign; website; information line video; service provider links	Focus groups with young people and parents; telephone survey; project development group with key service providers	Recognition and help-seeking; social support and social norms; early identification of depression	Significant results in perceived suicide risk, help-seeking rate, prevalence estimate, and self-identified depression

Table 1 (continued)

Author, Year	Study design and country	Quality of study[a]	Individual-level intervention	Group-level intervention	Community-level intervention	Capacity building	Impact and outcomes	Key findings
Zeng et al. (2016) [45]	Randomized controlled trial, China (n of the intervention group: 6897 adults with diabetes or hypertension; control group: 1916)	2	Individual counseling sessions	Peer support groups led by trained community volunteers	Brochures, broadcasting educational videos, and hosting lectures about psycho-somatic health	Coordination and provision by local administrators, clinicians, public health workers, counselors, and volunteers	Severity of depression and anxiety; quality of life; control of diabetes and/or hypertension	Improvements in depressive/anxiety symptoms, and mental score of the SF-12 ($p < .001$); no change in rates of uncontrolled diabetes or hypertension

ADL activities of daily living, *ANCOVA* analysis of covariance, *BMI* Body Mass Index, *CHD* coronary heart disease, *CI* confidence interval, *CVD* cardiovascular disease, D_3MFT decayed missing filled teeth, *GHQ12* general health questionnaire 12, *OR* odds ratio, *RR* risk ratio, *RSH* reproductive and sexual health, *SES* socioeconomic status, *SF-12* short form 12, *UAI* unprotected anal intercourse, *WEMWBS* Warwick-Edinburgh Mental Wellbeing Scale

[a]1 = strong (no weak rating), 2 = moderate (one weak rating), 3 = weak study quality (two or more weak ratings); global rating according to EPHPP [56]

Explanations for the Limited Evidence

One of the major explanations might be that the interventions were not sufficient enough to result in measurable effects. Most activities were provided on a modest scale (low intervention "dose"), not all interventions were feasible or acceptable, and some reached only small groups [24, 29, 33, 34, 38, 51]. Activities and actions also dealt with many diverse topics, which made a cumulative effect unlikely [24]. Furthermore, the implementation phase may have been too short as some of the planned activities had not been completed at the time of the follow-up study. It is known that such a process takes time and needs to be intense at different levels [24, 27, 29, 33, 34, 51].

The fact that small to moderate effects were found might also be due to limitations in the study designs and other methodological issues. The high non-response and drop-out rates—caused by decreasing interest of target groups or population movement—may have threatened the population validity, and this could result in either an under- or overestimation of true effects [24, 27, 34]. Furthermore, a large number of program outcomes resulted in the use of self-reported, not always validated measures with possibly reduced sensitivity [24, 34, 51].

Thirdly, possible effects may have been masked by contextual or 'spill-over' effects, both in the intervention and the control areas. Examples are a city-wide renovation project in adjacent areas [24, 33] or other community-oriented health promotion activities launched by local, regional or national authorities or by other stakeholders that may have an impact on other communities, e.g. media campaigns and sickness funds' initiatives [34]. More fundamentally, people in deprived areas, characterized by low socio-economic status, high unemployment and a large percentage of migrants, have restricted options and scope for action. This can overlay the effectiveness of community-based health promotion interventions [24].

It seems likely that the impact of interventions is to some extent proportional to the magnitude of the problem that is being addressed [27]. If the prevalence of health problems is below the population threshold, it may well be that the set of activities implemented in a program fails to have the intended effect. Thus, effects of community-wide interventions that comprise more 'low risk' than 'high risk' target-groups will be much smaller than typically expected from selective or targeted health interventions [33]. In other words, the more selective, not community-wide the interventions were, the larger the changes in the outcomes [40, 49].

Participation in Socially Deprived Areas

In the following, we will examine the components of community participation that have been studied and found

to lead to effective intervention delivery. As mentioned above, 23 out of 32 projects used such capacity building strategies. Most of the reviewed articles did not include detailed information regarding the specific nature and outcomes of community participation. However, it is seen as a key note that interventions, especially in socially deprived areas, are the more successful the more they involve the environments of the target group, and the more the target group is involved in the planning, implementation and evaluation [15]. Community participation not only follows democratic ideals, but enhances the "utility" of health promotion by fostering commitment and a synergy of action and outcome [61].

In a systematic review by Milton [62], however, no evidence was found for impacts of 'community engagement' on health and service quality, but on non-health-related outcomes, such as housing, social capital/cohesion and empowerment. A qualitative study of the 'Well London' project participants (defined as residents who received activities) described a similarly positive impact of the project activities. In terms of the implementation process, this study clearly showed two key findings: First, changes at neighborhood-level did not lead to benefits among those who did not directly participate in project activities. Second, the social and physical environment of the neighborhoods was crucial for understanding people's participation in the project activities and the extent of the intervention effects [60].

A recent review by Cyril et al. [63] examined community engagement levels according to a "ladder of participation" from informing residents to organizing themselves. They found a relation between low levels of community engagement (e.g. provide information to the public, consultation/hearings) and poor health outcomes in three studies. In contrast, studies ensuring high levels of community engagement (e.g. partnerships, codetermination, and decision-making power) resulted in positive health outcomes.

Similarly, for practice and participative research, it is true that while there is much known about motivations for citizen participation, this is also largely compatible with the goal of promoting good health [64]. Unfortunately, this does not guarantee that more democracy or less social inequality will be achieved [65]. Too little is generally known about the silent majority, their needs and interests. For example, a methodically demanding study of a random sample of 1160 Swedish citizens found that those who had previously used other forms of participation more frequently participated in neighborhood development processes, which may lead to an over-representation of certain particular interests [65, 66]. This may imply that the program objectives were not supported by all community members [24].

Limitations of the Review

Initial searches of databases identified several thousand references, but the small number of eligible studies suggests that few outcome evaluations have been published in peer-reviewed journals in the last two decades. Thus, the review described here is possibly not exhaustive in spite of searching the reference lists of the included studies. Our search strategy may not have revealed a complete list of all studies describing community-based interventions in urban areas in the relevant time period because of limitations of the Pubmed and PsycINFO search systems. It is likely that some health promotion projects are documented in 'grey literature' (e.g. unpublished reports and papers pending publication, conference abstracts). Thus, publication bias may have led to an overestimation rather than an underestimation of positive results.

Conclusion

Though the review is possibly not exhaustive, it captures major recent community-based health promotion interventions in urban areas, allowing for a systematic assessment of their impact on health outcomes. Our results confirm that community-based interventions are promising for health promotion and disease prevention but so far, their potential is not fully realized. For the future, it is recommended to plan, implement and evaluate interventions in the long term and in a participative manner with various sociodemographic groups and stakeholders of the neighborhood. These interventions should aim at proximal outcomes (e.g. risk behavior, sense of community) rather than distal outcomes (e.g. health status, life satisfaction) as well as the initial time investment in community capacity building.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

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