

Effect evaluation of a comprehensive community intervention aimed at reducing socioeconomic health inequalities in the Netherlands

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SUMMARY

To date, comprehensive community health projects have not been evaluated in terms of their effect at the individual level, because outcomes are usually not defined at this level. In a community health project in the Netherlands, evaluation outcome mapping, a technique derived from intervention mapping, was used to identify distal as well as proximal programme objectives from which outcome measures could be derived. The intervention took place in a deprived area, where community members themselves defined stress, lack of area safety and parenting problems as the health-related problems they wanted to see addressed in the project. Local

organizations wrote and implemented an action plan. The effects among residents were studied in a quasi-experimental design. Although no significant effects on improved perceived health or health-related problems were found at the level of the residents, the problems identified and their assumed causes showed significant coherence. This study is believed to be of relevance to evidence-based health promotion theory and practice as it demonstrates that it is possible to conduct an individual effect evaluation in a comprehensive community approach without jeopardizing the process of the intervention.

Key words: comprehensive community interventions; effect evaluation; evidence-based health promotion; socioeconomic health inequalities

INTRODUCTION

Socioeconomic health inequalities are a well-known phenomenon in the Netherlands, as in other western countries (van Oers *et al.*, 1998). People in deprived areas, characterized by low incomes, low rates of home ownership, high unemployment and a large percentage of migrants, have an average lifespan that is 4 years shorter and enjoy 12 fewer healthy life years than their fellow citizens in better-off areas (Ruwaard and Elzinga, 1998). People in the lower socioeconomic strata have higher levels of medical consumption (van der Meer *et al.*, 1993), experience more health complaints and evaluate their health as poorer

than people in the higher socioeconomic strata (Bosma *et al.*, 2001).

Differences in health behaviours (such as smoking and physical activity) (Droomers, 2002) cannot account fully for socioeconomic inequalities (Lantz *et al.*, 1998). Other factors, such as unfavourable psychosocial and material circumstances, including unfavourable physical and social neighbourhood characteristics, also contribute to socioeconomic health inequalities (van der Meer *et al.*, 1993; Bosma *et al.*, 2001). To reduce socioeconomic health inequalities, therefore, not only unhealthy behaviour but also unhealthy

local environments need to be addressed. A community approach seems an obvious health promotion strategy to address both types of concerns. Freudenberg (Freudenberg, 1998) distinguishes between categorical and comprehensive community approaches.

Typical for categorical approaches are top-down programmes targeting one or a few diseases and focusing primarily on changing individuals' unhealthy behaviours. Environmental determinants are considered, but only as a means to achieve the desired behavioural change. The selection of diseases and behaviours is based on epidemiological concerns and existing funding options. Evaluation studies of categorical community approaches usually measure programme effects on individuals, e.g. reduced levels of smoking (Thompson *et al.*, 1993) or reduced risks of cardiovascular diseases (O'Loughlin *et al.*, 1999).

Typical for comprehensive approaches are programmes that target urban social problems affecting health and that aim to change unhealthy behaviour as well as environmental factors. The selection of problems is based on the local situation, with community members participating in the project's problem definition, organization or otherwise. Participation increases involvement in the community project. This is believed to be especially important when trying to reach people in deprived areas (Boutillier *et al.*, 2000). When community members themselves identify the problems they want to see tackled, they seldom prioritize epidemiologically identified problems. Also, proximal programme outcomes at the individual level are not formulated. Therefore, evaluation studies of comprehensive community projects primarily report on processes rather than programme effects on targeted individuals [e.g. (Eisen, 1994)]. Studying the latter, however, is not methodologically impossible.

This article describes an individual-level evaluation study of a comprehensive community intervention. The intervention aimed at reducing socioeconomic health inequalities by targeting health-related problems defined by community members themselves. An adapted version of the first step of the intervention mapping procedure (Bartholomew *et al.*, 2001) was used to determine evaluation outcome measures that fitted the unique, locally defined, health-related problems.

The intervention

In 1997, a comprehensive community health intervention was started in a deprived area called

'the Arnhemse Broek' in the Netherlands. This area has ~5000 residents and is a district of the city of Arnhem (140 000 residents). Although this may not seem a large city by international standards, Arnhem faces urban problems, especially in its deprived areas. In a city-wide health survey in 1996, the intervention area scored below the town's average on perceived health and above the town's average on the use of non-prescription medication, worries about respondents' own health and health complaints (Claessens *et al.*, 1997). Therefore, the Regional Health Authority (RHA) and the Local Social Service Institute (LSSI) jointly initiated the community health project entitled 'Arnhemse Broek, Healthy and Well'.

The first phase in the intervention involved drawing up a health profile. This was done based on the survey data for the area as well as comments on the survey results of community members. Forty residents and local workers provided these comments in two discussion meetings early in 1997. In the second phase, inspired by Lalonde's (Lalonde, 1974) division of health-related factors, the issues were selected according to three problem categories: (i) lifestyles, (ii) environmental factors and (iii) social factors. In late 1997, 125 community members were approached while they visited the community centre and asked to prioritize the health issues based on importance and desirability of change. Problems related to stress, safety and parenting were chosen.

In spring 1998, locally active professionals from 20 organizations, ranging from the police to the environmental and public works services, and from the social service to youth work, formulated a health action plan listing activities and actions (see Table 1). Activities refer to operations in which community members could actively participate, while actions refer to operations by the professionals for the community. Different professionals accepted responsibility for implementation. The complexity of each identified problem called for a further division into eight themes. For each theme, separate committees were created. The themes concerning stress were: 'not being able to cope with stress', 'lack of physical exercise' and 'financial problems due to unemployment'. The themes for safety were: stimulating social contacts with neighbours to improve perceived social safety ('social safety'); improving traffic safety ('traffic safety'), as residents felt unsafe because of speeding cars and mopeds; and improving environmental safety ('environmental safety'), as dog dirt and litter were regarded as serious annoyances. Two themes dealt with parenting

Table 1: Planned and implemented activities and actions of the intervention

	Activity	Action
Coping with stress	<i>Course on coping with and handling stress</i>	
Exercise	Weekly aerobics lessons for women Weekly soccer hour for men Weekly 'course ball' for elderly Weekly preschoolers' and parents' keep-fit exercises One-off skeeler trips for local residents/youngsters/women	Weekly women-only hour in nearby swimming pool for immigrant women Purchase of 'course ball' material Distribution of information about exercise activities to GPs and physiotherapists GPs and physiotherapists inform clients about exercise activities in the area
Finances/income		Home visits for social activation of long-term unemployed <i>Spreading successful job stories among adolescent peers</i>
Lack of social safety	Soccer World Cup House Decorating contest Three area parties Multicultural meeting after Ramadan Celebration of closure of the intervention Adults and adolescents together allocating special sites for adolescents <i>Social skills training for adolescents</i> Children participating in fitting out playgrounds	Case management of troublemakers in housing Increased police visits to prevent housing trouble Tit-for-tat policy by police on youth crime Special sites allocated for adolescents <i>Crime prevention project by police in primary schools</i> Fitting out children's playground
Traffic	Weekly supervision in schoolyards after school hours for adolescent recreation Three annual days of traffic-free streets, so children can play safely in the streets <i>Traffic lessons in primary schools</i>	Articles in local newspaper on speeding Tit-for-tat policy by police on speeding Speed controls in area Announcing telephone number for complaints Articles on safe playing in local paper
Environmental	Residents keeping up flower beds in streets Weekly picking up of street litter by children's litter teams	Marking dog-walking sites Door-to-door flyer on dog-walking routes Re-installment of neighbourhood caretakers by housing corporations Storage of goods when tenants were evicted Extra refuse containers placed around area

Table 1: continued

	Activity	Action
Parenting problems 0- to 10-year-olds	<p>Early childhood development courses (26 lessons) for autochthon parents</p> <p>Primary schools and community centre theme week: 'When your child doesn't want to go to bed'</p> <p>Primary schools and community centre theme week: 'Healthy living, the area in motion'</p> <p>Needs assessment and feasibility study by local women for a woman and child centre</p> <p>Taking the initiative to start a woman and child centre</p>	<p><i>Setting up toy bank at community centre</i></p> <p><i>Paediatrician and paediatric nurse point out local activities during consultations</i></p>
11- to 18-year-olds	<p>Course (four evenings) informing parents of topics that interest their adolescent children</p> <p>Informative evening for immigrant mothers about adolescent behaviour</p> <p>Safe-sex education party</p> <p>Games evening about relationships and sex for girls aged 10–14 years</p> <p>Informational evening on drugs, for adolescents</p>	<p>Investigating options for local youth club</p> <p><i>Writing and implementing plan for local youth club</i></p> <p>Investigating opportunities for info-hour for local adolescents</p> <p>Intersectoral case management of adolescents causing problems</p>

GP, general practitioner.

Activities or actions in italic were planned but never implemented.

problems: 'parental problems relating to 0- to 10-year-olds' and 'parental problems relating to 11- to 18-year-olds'.

In June 1998, a 2-year action period began, in which 54 of the 63 activities and actions initially planned were implemented (Table 1). The initiators stimulated and assisted the responsible professionals. Except for seeding money, no funds were readily available.

METHODS

Mapping outcomes

Outcome measures could not be directly derived from the community's definition of health problems, but were determined by formulating so-called programme objectives according to the first step of Intervention Mapping procedure (Bartholomew *et al.*, 2001). Intervention mapping is a procedure in five steps for the systematic development, implementation and evaluation of health promotion programmes using a social ecological approach. The key to step 1 of the intervention mapping procedure is that programme objectives are defined for various associated levels distinguishing between proximal and distal programme objectives, namely quality of life, health problems, and behavioural and environmental determinants and their underlying factors. Alternatively, we used this procedure for evaluation purposes.

To conduct the intervention mapping exercise the research team met with the intervention team, which consisted of community organization representatives that had been present at the inventory sessions with the community members.

The team was stimulated to reiterate the earlier discussions with community and local workers. They were asked to formulate specific programme objectives for each of the four levels, starting with the quality of life level, which we restricted to perceived health and, subsequently, health problems related to perceived health, behaviours and environmental conditions related to the health problems mentioned, and factors associated with these conditions. Figure 1 presents an example of this systematic analysis.

In addition, based on community organization theory [e.g. (Minkler, 1998)], outcomes at the general level of the community were predicted.

Design and sample

A quasi-experimental pre-test-post-test control group design was used, with one experimental and two control areas. The reason for having two control areas was that one control area was adjacent to the intervention area and could be exposed to the intervention. The other control area was not fully comparable to the other areas in terms of area set-up. It was argued that possible irregularities caused by these factors would emerge if both control areas were included. All three are deprived areas in the city of Arnhem and were, a priori, demographically similar except for their size. The experimental area had ~5000 residents, while control areas I and II had ~7000 and ~9500 residents, respectively.

Questionnaires

Questionnaires were sent to random samples of residents at three points in time: before (T1),

Lack of traffic safety

Discussions with community members revealed that they felt that cars and mopeds speeding in the area (level C) represented a threat to their perceived health (level D). It was assumed that to solve this, people who were speeding needed to adjust their driving style. Also, residents should report instances of speed limits being exceeded to the police, and residents should reproach speed limit offenders (level B, behaviour). Environmental factors assuming to contribute to the perception of speeding included the fact that little police surveillance on speeding was perceived and the fact that the local infrastructure provoked speeding by mopeds (level B, environment). It was decided that the latter factor was not amenable to change within the scope of this programme. These determinants of speeding also depended on hampering or promoting factors (level A): people had to trust that the police would take their complaints seriously before they would report anyone, and they would feel confident about reproaching neighbours that were speeding if they knew them personally.

Fig. 1: Example of a systematic analysis of problems.

halfway through (T2) and immediately after the action period (T3), i.e. June 1998, November 1999 and June 2000, respectively. For each area, cohort research samples of 800 people aged >14 years were selected from the population register. As the response rate at baseline was low, the questionnaire was also sent to a new sample of 700 people in the experimental area and new samples of 800 people in each control area at T2, again selected from the population register, excluding duplicates from the first samples.

Outcome measures

The questionnaires consisted of a maximum of 90 items (see Table 2). Where possible, existing, validated questionnaires were used, as specified below. However, most available questionnaires were clearly designed to investigate single topics and included too many items to be combined into one questionnaire investigating multiple topics. Therefore only one or some items were derived from these questionnaires and the validity of these measures is unclear. Moreover, many programme objectives were specific to the local situation, requiring new (non-validated) items to be developed. Mostly, unipolar and bipolar 4-point and 5-point adjective answering scales were used (see ranges in Table 2).

General community outcomes

In agreement with Felix and Berman (Felix and Berman, 1997), two items produced one score for 'perceived area improvement or decline' ($r = 0.81$). Like McQueen (McQueen, 2001) and Speer *et al.* (Speer *et al.*, 2001), we measured 'area involvement'. Three indicators of empowerment were measured in agreement with Zimmerman and Zahniser (Zimmerman and Zahniser, 1991).

Perceived health

As has been done in several other studies [e.g. (Penris and Vriends, 1997)], respondents were asked to: rate their own health; compare their current health status with that of 1 year ago; indicate their worry over their health; report non-prescription medication use; and report whether they suffered from headache, back or neck pains during the past 4 weeks.

Health problems and determinants

Stress was measured using four items derived from a larger validated questionnaire developed by Van der Ploeg *et al.* (Van der Ploeg *et al.*, 1980). The mean score of these four items produced one score of 'stress' (Cronbach's $\alpha = 0.84$). Four

items measuring different elements of 'coping' were derived from a larger validated questionnaire (Schreurs and van de Willige, 1988). As residents were assumed to have difficulty coping with stress in their contacts with agencies, three items addressed this specifically. As recreational exercise was assumed to reduce stress, four questions were included about exercise behaviour and facilities. Those considering themselves unemployed or (partly) disabled were asked four additional questions concerning their situation.

Five items measured perceived area safety, comparable to other safety and liveability surveys [i.e. (van der Brugge and Kees, 1996; Felix and Berman, 1997)]. The mean score of these five items produced one score for perceived area safety (Cronbach's $\alpha = 0.85$). Furthermore, respondents were asked if they 'felt at home in the area'. Eight items concerned social safety and the underlying environmental and behavioural factors. One of these also applied to traffic safety, which was further questioned using four items. With regard to environmental safety, four items were included and three additional items specifically addressed to dog-owners.

Regarding perceived parenting problems, the same questions were used for parents of 0- to 10-year-olds and those of 11- to 18-year-olds. To determine perceived parenting problems, three items were derived from a larger validated questionnaire on parenting stress (Abidin, 1983). The mean score of these three items produced one score of 'parenting problems' (Cronbach's $\alpha = 0.91$). Three items questioned behavioural and environmental factors related to parenting problems.

Other measures

The questionnaire also assessed gender, age, living alone or with others, education, and country of birth of mother and father. Respondents were defined as migrants when one or more parent was born abroad (CBS, 1998).

Questionnaires handed out in the experimental area at T2 and T3 measured exposure to the project in general, as well as to each activity or action. These measurements supported the process evaluation (Abbema E, Van Assema P, De Leeuw E, Ekkelmans M and De Vries NK, Assessing and understanding the process within a Dutch comprehensive community health intervention; submitted to *Health Education Research*).

Target group and response considerations

The questionnaire was kept as short and simple as possible. A first draft of the questionnaire was

Table 2: Outcome variables expressed as means or percentages, comparing samples T3(T1), T2(T1) and T3(T2)^a

	Respondents in original sample: T3 versus T1						Respondents in original sample: T2 versus T1						Respondents in original plus additional sample: T3 versus T2					
	Experimental area (n = 100)		Control area I (n = 94)		Control area II (n = 123)		Experimental area (n = 267)		Control area I (n = 149)		Control area II (n = 173)		Experimental area (n = 240)		Control area I (n = 304)		Control area II (n = 337)	
	T1	T3	T1	T3	T1	T3	T1	T2	T1	T2	T1	T2	T2	T3	T2	T3	T2	T3
Demographic variables																		
Age (mean)	42.5		43.4		52.4 ^a		42.7		40.4		49.7 ^a		44.0		46.8		53.1	
Sex (% female)	67.7		67.0		61.7		66.5		65.5		58.7		63.2		66.8		60.2	
Educational level (% low)	43.0		41.5		67.5 ^a		44.9		41.6		65.9 ^a		40.0		44.1		68.8 ^a	
Years of residence (mean)	15.0		13.7		18.4		14.3		12.2		17.5		13.4		16.9		20.3 ^a	
Migrant (%)	13.3		16.1		22.5		16.1		19.6		24.7		14.0		17.7		21.3	
General community outcomes																		
Area involvement [1 (not at all) to 5 (very much)]	2.63	2.66	3.01	3.02	2.91	3.00	2.74	2.72	2.84	2.84	2.94	2.94	2.66	2.71	2.92 ^a	2.94	3.04 ^a	2.95
Area improvement/decline [1 (declined) to 5 (improved)]	2.66	2.70	3.02	2.80	2.30	2.35	2.84	2.61	3.01	2.92^b	2.37	2.44	2.55	2.73 (I ^b , II ^b , M)	2.73	2.65	2.38	2.45
Active participation [1 (not at all) to 5 (very)]	1.63	1.54	1.67	1.66	1.70	1.76	1.60	1.66	1.56	1.51	1.68	1.75	1.70	1.62	1.65	1.71	1.65	1.71
Club membership (% yes)	30.9	30.0	28.7	31.9	37.2	33.6	28.7	33.3	33.8	29.7	37.1	30.7	35.1	34.6	32.7	34.0	31.8	32.8
Influence in area matters [1 (none) to 5 (much)]	1.97	2.04	2.07	2.23	1.88	1.94	1.98	2.13	2.01	2.07	1.90	2.00	2.02	2.04	2.09	2.16	2.01	1.96
Mutual support [1 (no support) to 4 (support)]	2.70	2.61	2.74	2.72	2.67	2.56	2.71	2.60	2.71	2.59	2.64	2.49	2.61	2.64	2.62	2.65	2.49	2.60
Perceived health																		
Rating own health [1 (very poor) to 5 (excellent)]	3.81	3.66	3.90	3.73	3.75	3.59	3.84	3.72	3.86	3.82	3.80	3.62	3.74	3.75 (II ^b , H)	3.65	3.61	3.65	3.63
Comparing health now with past year [1 (worse) to 5 (better)]	3.07	2.89	3.11	2.93	2.92	2.89	3.06	2.80	3.10	3.00^b (^b L)	2.88	2.96	2.95	2.99	2.99	2.98	3.00	2.95
Worrying about health [1 (very often) to 4 (never)]	3.01	3.09	3.04	3.05	2.93	2.93	3.01	2.97	3.06	2.99	2.98	2.98	3.05	3.07	2.92	2.98	2.98	2.98
Non-prescription medicine use [1 (almost daily) to 6 (never)]	5.15	4.93 (I ^c , W)	5.10	5.20	5.06	4.82	5.10	4.82	5.21	5.24^b (L, E)	5.10	4.98	5.02	5.00 (II ^b , L)	4.98	5.08	4.92	4.87^c (H)
Headache, back or neck pain (% with less than two symptoms)	35.4	41.2	15.7	18.7^d (L)	27.7	23.7^d (L)	33.1	26.0	20.0	20.0	28.1	20.9	34.2	37.6	26.1	26.0	20.1	25.1^d (L)

Table 2: continued

	Respondents in original sample: T3 versus T1						Respondents in original sample: T2 versus T1						Respondents in original plus additional sample: T3 versus T2					
	Experimental area (<i>n</i> = 100)		Control area I (<i>n</i> = 94)		Control area II (<i>n</i> = 123)		Experimental area (<i>n</i> = 267)		Control area I (<i>n</i> = 149)		Control area II (<i>n</i> = 173)		Experimental area (<i>n</i> = 240)		Control area I (<i>n</i> = 304)		Control area II (<i>n</i> = 337)	
	T1	T3	T1	T3	T1	T3	T1	T2	T1	T2	T1	T2	T2	T3	T2	T3	T2	T3
Health problem																		
Stress [1 (often) to 4 (never)]	3.20	3.12	3.36	3.25	3.30	3.34	3.18	3.11	3.32	3.26	3.31	3.27^b (M)	3.21	3.20	3.15	3.17	3.34 ^a	3.33
Behavioural/environmental conditions																		
Discussing problems with relatives [1 (never) to 4 (often)]	2.74	2.71 (II ^b)	2.79	2.73	2.48	2.36	2.69	2.69	2.76	2.73	2.53	2.61	2.70	2.69	2.73	2.72	2.61	2.46
Avoiding difficult situations [1 (often) to 4 (never)]	3.22	3.16	3.40	3.28	3.32	3.13	3.19	3.15	3.34	3.19	3.29	3.22	3.12	3.12	3.11	3.12	3.22	3.22
Preoccupied with problems [1 (often) to 4 (never)]	2.97	3.02	3.08	3.02	3.02	3.08	2.96	2.94	3.05	3.03	3.03	2.93	2.99	3.01	2.93	3.01	3.00	3.08
Solving problems resolutely [1 (never) to 4 (often)]	2.89	2.89 (II ^b , H)	2.78	2.92	2.55	2.47	2.81	2.95	2.76	2.79	2.66	2.67	2.83	2.82	2.76	2.80	2.59	2.49
Satisfaction with contact agencies [1 (dissatisfied) to 5 (satisfied)]	3.73	3.78	3.80	3.64	3.84	3.73	3.78	3.89 (II ^b)	3.70	3.76	3.80	3.61	3.80	3.72	3.77	3.61	3.74	3.72
Pleasant contacts with agencies [1 (unpleasant) to 5 (pleasant)]	3.35	3.60	3.53	3.44	3.44	3.48	3.47	3.55	3.42	3.52	3.40	3.50	3.55	3.54 (I ^b , W)	3.52	3.45	3.60	3.48
Stress as a result of contacts with agencies [1 (often) to 4 (hardly ever)]	3.53	3.55	3.59	3.50	3.54	3.48	3.50	3.51	3.57	3.61	3.54	3.55	3.55	3.56	3.49	3.43	3.55	3.50
Frequency of physical exercise [1 (seldom/never) to 7 (almost daily)]	4.62	4.28	4.74	4.53	4.24	4.58^b	4.48	4.38	4.66	4.46	4.45	4.49^b (E)	4.42	4.38	4.56	4.64	4.41	4.49^b
Acquainted with attractive facilities (% yes)	21.6	26.3	37.1	34.8	45.7	59.0^d	22.2	25.1	32.9	33.6	49.1	55.5^d	24.2	21.7	26.6	29.9^b	50.1	49.7^d
Factors of influence																		
(Dis)advantage of exercise [1 (more disadvantages) to 5 (more advantages)]	4.53	4.42	4.40	4.28	4.18	4.33	4.41	4.45 (II ^c)	4.41	4.39	4.25	4.26	4.33	4.44	4.39	4.36	4.25	4.28
Actively searching for employment ^e [1 (not actively) to 4 (very actively)]	1.78	1.59	2.40	1.68	1.50	1.30	1.71	1.64	2.11	1.70	1.56	1.45	1.74	1.60	1.74	1.69	1.44	1.58

Hopeful(less)ness about own situation ^c [1 (hopeless) to 5 (hopeful)]	1.78	2.65	3.50	3.00	2.35	2.59	1.82	2.54	3.05	2.97	2.30	2.66	2.93	3.09	3.12	3.12	2.60	2.66
Participation in job schemes in past year ^c (<i>n</i> yes)	0	1	1	3	3	1	1	5	3	5	4	5	6	6	12	12	9	6
Willingness to participate in job schemes ^c [1 (definitely not) to 5 (definitely yes)]	3.14	2.22	3.33	2.37	2.19	1.96	2.80	2.07	3.29	2.50	2.19	2.00	2.43	2.39	2.48	2.33	2.19	2.40
Health problem: safety																		
Perceived area safety [1 (unsafe) to 5 (safe)]	4.05	4.01	4.11	4.02	3.84	3.95	4.08	3.86	4.12	4.10^b	3.91	3.88	3.92	4.08 (I ^c , L)	3.93	3.91	3.91	4.02^c (H)
Feeling at home [1 (not at all) to 5 (very much)]	3.66	3.60	3.76	3.86	3.86	3.80	3.73	3.60	3.74	3.81^b	3.83	3.81	3.62	3.68	3.76	3.72	3.93	3.85
Social safety																		
Afraid of groups of adolescents [1 (often) to 4 (never)]	3.19	3.11	3.20	3.11	3.04	3.15^b (W)	3.13	3.07	3.26	3.21	3.10	3.06	3.08	3.14	3.07	3.12	3.13	3.19
Number of people known by first name (mean)	13.9	15.5	24.0	15.8	22.1	24.3	14.5	14.4	22.8	17.9	22.9	24.2	14.4	14.5	18.6	16.3	21.1	20.5
Number of adolescents known by first name (mean)	8.2	8.3	12.0	17.3	10.8	11.6	8.5	7.9	12.8	13.3	10.7	9.3	7.9	8.4	9.5	10.5	10.3	10.9
Behavioural																		
Effort by council in area safety [1 (clearly insufficient) to 5 (amply sufficient)]	2.82	2.78	2.88	2.69	2.82	2.90	2.79	2.52	2.79	2.68	2.82	2.73^b	2.70	2.86	2.57	2.65	2.79	2.90
Environmental conditions																		
Frequency of chats with neighbours [1 (seldom/never) to 7 (daily)]	5.11	5.21	5.66	5.26	5.90	5.85	5.24	4.96	5.53	5.32	5.73	5.63^b	4.89	5.07	5.35	5.37	5.72	5.77
Participation in area activities [1 (never) to 4 (often)]	1.35	1.24	1.41	1.44	1.42	1.41	1.35	1.26	1.38	1.35^b	1.44	1.48^b	1.32	1.26	1.40	1.36	1.43	1.44^c
Participation in multi-cultural activities [1 (never) to 4 (often)]	1.52	1.44	1.79	1.76	1.51	1.76	1.52	1.39	1.68	1.84	1.59	1.49	1.35	1.34	1.62	1.61	1.57	1.55
Sufficient places for adolescents [1 (clearly insufficient) to 5 (amply sufficient)]	2.63	2.63	2.38	2.73	2.90	2.98	2.75	2.62	2.53	2.48	2.84	2.97	2.61	2.71 (II ^b , W)	2.70	2.85	2.92	3.12
Satisfaction with facilities for adolescents [1 (not satisfied) to 5 (satisfied)]	3.06	2.79	2.57	2.67	2.67	2.90	3.07	2.86	2.70	2.79	2.63	2.83	2.77	2.85	2.76	2.79	2.80	2.94

Table 2: continued

	Respondents in original sample: T3 versus T1						Respondents in original sample: T2 versus T1						Respondents in original plus additional sample: T3 versus T2					
	Experimental area (<i>n</i> = 100)		Control area I (<i>n</i> = 94)		Control area II (<i>n</i> = 123)		Experimental area (<i>n</i> = 267)		Control area I (<i>n</i> = 149)		Control area II (<i>n</i> = 173)		Experimental area (<i>n</i> = 240)		Control area I (<i>n</i> = 304)		Control area II (<i>n</i> = 337)	
	T1	T3	T1	T3	T1	T3	T1	T2	T1	T2	T1	T2	T2	T3	T2	T3	T2	T3
Traffic safety																		
Safe to play in streets [1 (unsafe) to 5 (safe)]	2.53	2.37	2.51	2.42	2.54	2.63	2.63	2.44	2.49	2.55^b (M)	2.64	2.62	2.46	2.48	2.36	2.45	2.81	2.75
Speeding cars/mopeds [1 (speeding) to 4 (no speeding)]	2.07	1.94	2.15	2.12	2.04	2.11	2.17	1.93	2.08	1.99^b (Y)	2.06	2.05	1.92	1.93	1.96	2.04	2.08	2.11
Factors of influence																		
Sufficient police control [1 (highly insufficient to 5 (amply sufficient)]	2.16	2.25	2.20	2.18	2.37	2.35	2.24	2.14	2.17	2.08	2.41	2.24	2.14	2.25	2.08	2.19	2.30	2.32
Reproaching speeders [1 (never) to 4 (often)]	1.79	1.64	1.55	1.58	1.82	1.75	1.77	1.74	1.62	1.75	1.77	1.75	1.69	1.65	1.66	1.59	1.74	1.77
Taken seriously when complaining to police [1 (very seriously) to 4 (not seriously)]	1.88	1.96	1.84	1.89	1.84	1.94	1.90	1.92	1.82	1.77	1.85	1.86	1.91	1.96	1.89	1.94	1.91	1.91
Environmental safety																		
Amount of dog dirt [1 (a lot) to 5 (little)]	2.47	2.54	1.98	2.10	2.80	2.89	2.47	2.47	2.08	2.09	2.73	2.80	2.52	2.59 (I ^b)	1.92	2.04	2.81	2.98^b
Amount of litter [1 (a lot) to 5 (little)]	2.19	2.06	2.22	2.20	2.55	2.48	2.42	2.23	2.21	2.19	2.47	2.52	2.27	2.16	2.03	2.03	2.61	2.57
Behavioural/environmental conditions																		
Feeling responsible keeping area clean [1 (very) to 5 (not at all)]	3.54	3.28	3.28	3.37	3.29	3.29	3.46	3.41	3.25	3.27	3.32	3.34	3.25	3.25	3.32	3.40	3.27	3.26
Reproaching others to remove litter (% yes)	31.0	32.7	22.6	29.3	36.7	33.3	30.7	29.1	26.2	27.7	34.9	33.3	30.3	29.4	30.7	32.1	33.7	31.5
Using dog-walking sites ^f [1 (always) to 4 (never)]	2.64	2.70	2.75	2.71	3.08	3.55	2.52	2.82	2.82	2.82	3.00	3.12	3.00	2.64	2.64	2.54	3.07	3.08

Factors of influence																		
Dog owners knowing dog-walking sites ^f (% yes)	66.7	69.2	84.2	92.3	92.9	91.3	74.1	72.7	81.8	97.0	89.7	83.8^b	76.9	76.9	90.9	92.7	80.6	88.3
(Dis)advantages of dog-walking sites ^f [1 (more disadvantages) to 5 (more advantages)]	3.50	2.46	3.35	3.92^b	3.55	3.71^b	3.37	2.81	3.40	3.45	3.30	3.47	3.35	2.96	3.48	3.58	3.59	3.47
Health problem: parenting problems																		
Parenting problems ^g [1 (often) to 4 (never)]	3.17	3.20	3.50	3.05	3.27	3.16	3.16	3.20	3.47	3.36	3.24	3.20	3.33	3.22	3.13	3.13	3.32	3.26
Behavioural/environmental conditions																		
Talking about parenting with peers ^g [1 (never) to 4 (often)]	2.55	2.35	2.06	2.43	2.00	1.97^b	2.46	2.24	1.94	2.08	2.00	1.98	2.39	2.37	2.36	2.50	2.04	2.09
Participating in parenting support activities ^g (% yes)	30.0	15.0	20.0	14.3	21.2	13.8	25.7	34.4	10.3	18.2	23.3	22.0	21.8	11.1	21.6	15.4	26.1	23.5
Factors of influence																		
Supportive talks with peers ^g [1 (little) to 5 (a lot)]	3.00	3.47	2.92	3.05	2.73	2.88	3.24	3.20	2.95	2.93	2.82	3.08	3.27	3.25	3.21	3.20	2.98	3.05
														(I ^b , Y, M)				

^aBaseline differences between the experimental area and the particular control area for T1 and T2.

^b $p < 0.05$; ^c $p < 0.01$; ^d $p < 0.001$.

^eRange of percentages of respondents unemployed or incapacitated: 13.0–39.8% at T3 versus T2; 13.8–35.6% at T2 versus T1; and 25.7–35.7% at T3 versus T2. (At T1, unemployment/incapacitated status was not asked for separately, but as part of employment status, resulting in underestimation.)

^fRange of percentages of respondents with dog: 13.4–23.8% at T3 versus T1; 13.5–23.4% at T2 versus T1; and 11.1–19.1% at T3 versus T2.

^gRange of percentages of respondents with children <19 years of age living at home: 19.3–29.4% at T3 versus T1; 22.9–27.6% at T2 versus T1; and 19.0–25.0 at T3 versus T2.

Values in bold indicate a significant effect in favour of the area represented by the specific column: bold values in the column representing control areas I or II are always in favour of the control areas. Bold values in the columns representing the experimental area are in favour of the experimental area compared with the referred control area.

The roman numbers I or II refer to the relevant control areas.

Interaction effects are indicated by ‘H’ (higher educated), ‘L’ (lower educated), ‘W’ (women), ‘M’ (men), ‘Y’ (the younger half of the respondents) and ‘E’ (the elder half of the respondents).

adjusted on the basis of the comments of several experts and a trial group of 10 people similar to the target group.

To improve the response rate, the questionnaire was sent out accompanied by a letter that was signed by the local alderman for health and welfare and the director of the RHA. Also, gift vouchers worth approximately €23 were raffled among quick responders at each measurement. The questionnaire could be returned in a postage-paid envelope or be handed in to collectors, who came round 10 days after the questionnaire had been sent. They left reminders when addressees were not at home. At T3, a small present was included to stimulate response. As they were the largest group of migrants, people of Turkish nationality were offered the opportunity to respond in Turkish.

Analyses

All analyses were conducted with SPSS 11.0. Chi-square analyses were used to detect differences in response. Logistic regressions were done to identify potential dropout bias: a binary dependent variable (attendance versus dropout) was created, and area, gender, age, education (low versus intermediate/high), and being a migrant or not, were included as independent variables. Baseline differences between the experimental area and the two control areas were analysed using logistic regression with area (experimental versus control) as the binary dependent variable. Independent variables included age, gender, education and being a migrant or not, and some key outcome measures: level of area involvement, rating of respondent's own health and stress score, safety score and parenting problems score.

Descriptives of the experimental respondents at baseline were studied. Post-test differences between experimental and control areas were tested using linear and logistic regression on all outcome variables. All these analyses were adjusted for differences in the previous measure of the outcome variable. Every dependent variable was analysed six times, i.e. the experimental area was compared with each control area separately and three measurement comparisons were made: T2 was compared with T1 using respondents in the original sample who had only completed two questionnaires, T3 was compared with T1 using respondents in the original sample who had completed all questionnaires, and T3 was compared with T2 using the respondents

in the original sample complemented by the additional sample that completed the second and third questionnaires. These are denoted below as T2(T1), T1(T3) and T3(T2), respectively. The main independent variable included in these analyses was area (experimental versus control area). In addition, gender, age and education were included, separately as well as in interaction with area. When significant interactions were found, simple effect analyses were performed. Age was dichotomized using the median. All analyses were done using the so-called top-down procedure. First, all independent variables were included in the model, after which non-significant predictors were eliminated hierarchically and stepwise from the model.

Finally, to test the supposed association between outcomes at different levels, Pearson's correlations were calculated for the variables at T1 among respondents in the experimental area.

RESULTS

Response, dropout and baseline differences

Response rates varied across the samples (Table 3). Excluding undeliverable questionnaires and those that were returned without the identification label, the mean total response at baseline was 43.3% ($n = 987$). At T2, the mean total response was 47.0% ($n = 1497$) and that at T3 was 57.8% ($n = 881$). Thirty-eight questionnaires were excluded because >50% of the key items had not been completed. The total number of respondents included in the key analyses was $n = 1995$.

No differences in initial response were found between the areas. The large number of dropouts was found to be significantly younger, less educated and more often male than those who completed all measurements, except for the respondents in the additional sample, where dropouts did not differ in sex ratio from those who completed all measurements.

At baseline, respondents from the experimental area were found to be younger and more highly educated than respondents from control area II. This was found in both the original sample (T1) and the additional sample (T2). For the latter sample, additional baseline differences were found in lower area involvement of the experimental respondents compared with those in both control areas, and experimental respondents reported lower levels of stress than those of control area II.

Table 3: Response data

	Net distributed T1 (<i>n</i>)	Net response T1 [<i>n</i> (%)]	Net distributed T2 (<i>n</i>)	Net response T2 [<i>n</i> (%)]	Net distributed T3 (<i>n</i>)	Net response T3 [<i>n</i> (%)]
Experimental area						
First sample	766	323 (42.2%)	301	167 (55.5%)	170	100 (58.8%)
Additional sample			688	276 (40.1%)	254	140 (65.3%)
Control area I						
First sample	772	322 (41.7%)	301	149 (49.2%)	154	94 (61.0%)
Additional sample			780	366 (46.9%)	344	210 (62.5%)
Control area II						
First sample	764	342 (44.8%)	326	173 (53.1%)	168	123 (73.2%)
Additional sample			787	366 (46.5%)	351	214 (61.0%)
Total (<i>n</i>)	2302	987 (42.9%)	2883	1497 (51.9%)	1441	881 (61.1%)

Baseline results: experimental area

At baseline, respondents in the experimental area reported little involvement with their area, little decline in the area and low participation in community matters. They did not perceive having much influence on area matters and perceived some mutual support among neighbours. The respondents were fairly optimistic about their health and reported that it had not changed over the past year. They sometimes worried about their health and one-third had had head, neck or back complaints in the last 4 weeks. On average, non-prescription drugs were used less than once a month. Respondents did not report severe stress at baseline, and they felt fairly safe and at home in their area. Parents reported that they sometimes experienced parenting problems.

Post-test differences between the areas

We found 17 differences between the areas that could be attributed to a subgroup and 30 overall area effects with $p < 0.05$ (see Table 2). The effects were found at all levels and concerning all themes. Of the total 47 effects, 14 were in favour of the experimental area. Overall, the magnitudes of the effects were small.

Correlations

Pearson's correlations between perceived health and scores on the stress, lack of area safety and parenting problems measures were $r = 0.21$, 0.16 and 0.28 , respectively. The last of these correlations was not significant due to the small number of respondents for this item. Significant correlations were found between the scores on the stress, lack of area safety and parenting problems

measures and their behavioural and environmental determinants, ranging from $r = 0.19$ between stress and the frequency of exercise to $r = 0.84$ between parenting problems and discussing parenting problems with peers. Significant correlations were also found between outcome measures at the level of behavioural and environmental determinants and their underlying factors, ranging from $r = 0.20$ to $r = 0.96$, except for the outcome measures on dog-walking sites and their underlying factors.

Overall, higher and more significant correlations were found between variables at adjacent levels than between variables at non-adjacent levels.

DISCUSSION

Our results failed to prove the effectiveness of the comprehensive community intervention. Some positive, but even more negative effects were detected at all levels, touching on all themes. Further analysis in the intervention area among exposed respondents (i.e. those reported to have heard or seen at least one activity or action) in comparison with non-exposed respondents did not yield any additional information.

One explanation might be that the intervention was not effective enough to yield measurable effects. Most activities were organized on a modest scale and reached only small groups. Also, activities and actions were distributed over many topics, which made a cumulative effect unlikely. Furthermore, the action period might have been too short, as some of the planned activities had not yet been implemented at the time of our second post-test. Finally, possible effects may have been masked by secular trends in the control areas, such as an area-wide renovation project.

The fact that no effects were found might also be due to limitations in our study design. The high non-response and attrition rates may have threatened the population validity, which could explain the low evidence for health problems at baseline. Similar to our own findings, non-response and attrition in general are highly associated with less educated migrants and the young (van der Meer *et al.*, 1993).

Although a cohort design has been recommended to measure population changes over time, it may also enhance dropout bias (Koepsell *et al.*, 1992). To avoid this, we controlled for the variables that were affected by dropout.

Furthermore, the large number of programme outcomes identified made primarily single-item measurements necessary. Often, items were derived from available multiple item (validated) measures and these adapted measures were not tested for construct validity. In addition, many new non-validated items were used, in particular to measure the proximal programme objectives, which were specific for the local situation. When there was a choice between a validated measure that did not fit the programme objective and new items that did fit the objective, the latter were chosen. Measuring concepts more thoroughly using existing questionnaires in separate randomized groups within each area was impossible due to small area sizes. The frequent use of non-validated, single-item measures may have reduced the sensitivity of the questionnaire.

As the response at baseline was low, we increased the power of the study by additional sampling, although this complicated the interpretation of the outcomes. Despite these additional respondents, the power remained limited for variables that were only measured among subgroups.

Another explanation for the absence of measured effects may be that we used delegates to participate in the outcome mapping procedure. It may be that the proximal programme objectives yielded causes and outcomes that were not supported by all community members. This can be avoided by using a more action-based approach to the evaluation research, involving residents directly.

We cautiously conclude, however, based on the correlations found, that realistic assumptions were made in the outcome mapping procedure about the causes of the health problems identified. Therefore we consider the evaluation outcomes mapping procedure to represent the major benefit of this evaluation study. These outcome measures were used to develop a

questionnaire that fitted the specific local situation. Furthermore, we do not think that the fact that only part of the community participated in the problem definition sessions caused false selectivity, as these problems of liveability, safety and parenting issues have also been found elsewhere (Stuuroop, 1991; de Haes *et al.*, 2002).

Finally, in terms of the overall design of the study, it might be argued that a community intervention trial should preferably include several experimental areas [Mackenbach JP and Gunning-Schepers LJ (1997)]. However, our one-group-per-condition design represents more the rule than the exception [e.g. (Macallan and Narayan, 1994; Karlsson, 1999)].

We tried to compare our findings with other community intervention studies, but found no other combination of comprehensive community projects and effect studies at the individual level. Instead, three combinations of types of research and community projects were found: (i) health educational interventions combined with research focusing on the community as a level for multi-level analyses; (ii) categorical community interventions with individual effect evaluation and/or process evaluation studies; and (iii) comprehensive community intervention with process evaluation research or effect studies at the organizational or community level. The present study demonstrates that a combination of a comprehensive community intervention with an effect study at the individual level is also possible, although no large effects were shown. However, when other types of large community projects were considered [e.g. ASSIST (Kegler *et al.*, 1998), Heartbeat Wales (Tudor-Smith *et al.*, 1998) or the joint analyses of three US Heart Health Programs (Winkleby *et al.*, 1997)], none of them were known to have had effects at the individual level.

We agree with other authors in the field of health promotion [e.g. (Rootman *et al.*, 2001; Rychetnik *et al.*, 2002)] that evaluation methods should be combined to allow as many evaluative goals as possible to be achieved. Therefore, overall conclusions on the success of the community intervention studied will be based not only on the results of the present study, but also on the results of a process evaluation (Abbema E, Van Assema P, De Leeuw E, Ekelmans M and De Vries NK., Assessing and understanding the process within a Dutch comprehensive community health intervention; submitted to Health Education Research.) and an effect study at the organizational level (Abbema E, De Leeuw E,

Van Assema P and De Vries NK, manuscript in preparation). However, if future interventions want to address socioeconomic health inequalities in comprehensive community approaches, the study presented here could be an example of the way to measure effects at the individual level.

CONCLUSION

Although the intervention being studied did not address epidemiologically defined health risks but health issues defined by laypersons, we were able to conduct sound evaluation research. To this end, we developed a method of evaluation outcome mapping, a technique derived from intervention mapping. We think that this method could be a relevant contribution to both evidence-based health promotion research and practice. While the procedure does not solve all of the validity issues, its strength lies in the option of producing outcome measures for evaluation without delaying or jeopardizing the intervention process.

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