

## Determinants of participation in a health education and exercise program on television

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### Abstract

**Background.** The daily television program ‘the Netherlands on the Move’ (NOM-tv), which primarily targets people aged over 55 (estimated Dutch 55+ population: 4 million), was designed as part of a national campaign for promoting physical activity. The aim of the study was to identify the determinants of exercise participation and viewing NOM-tv.

**Methods.** The method used was baseline test by quota digit dialing in the country ( $n = 988$ , stratified age 35+ and 55+), and follow-up after 7 months ( $n = 362$ ). The main outcome measures are: intention and actual participation in exercises. The determinants are: attitude, social influences, self-efficacy, age, sex, education, knowledge about the health effects of exercise, habits, stage of change in exercising, and perceived barriers. The backgrounds were: marital status, living situation, mental health and vitality.

**Results.** NOM-tv attracted at least 21% of the physically non-active people at baseline to viewing and increased knowledge. The best predictors of intention to participate were: attitude, social influences, self-efficacy, age and gender. Actual participation was best predicted by age (higher), gender (female), intention, knowledge, and the (lower) number of perceived barriers.

**Conclusions.** NOM-tv is a successful (high number of viewers) and relatively cheap way of getting inactive, older people—especially women—to exercise.

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**Keywords:** Aging; State of change; Behavior; Self-efficacy; Attitude

### Introduction

Regular moderate physical activity is known to be associated with enhanced health and reduced risk of all-cause mortality and chronic diseases [1,2]. Awareness of these facts has led to a consensus about the minimal daily physical activity that is beneficial for people’s

health [3,4]. “Thirty minutes of at least moderately intense physical activity on five, but preferably all days of the week” is the current recommended level. Unfortunately, only 47% of people in the Netherlands aged 35 to 50 years fulfil this physical activity norm, and this falls later in life: to 46% in the 50–65 category and 41% in the 65+ category [5]. From a few studies on mass media [6,7] it is known that physical activities could be increased by using these kind of channels. At the request of the Dutch government, a national campaign was launched in 1995 to increase people’s general level of physical activity [8]. One part of this strategy was the introduction in 2000 of a national television program called ‘The Netherlands on the Move!’ (NOM-tv). NOM-tv was designed specially for people aged 55 and over.

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Fig. 1. The Netherlands on the Move! television concept. The program is broadcast on weekdays at 6.45 a.m. and 9.08 a.m. on one of the Dutch public channels (Nederland 1). In the 15 minutes that the program lasts, there are five physical activity blocks: (1) warming-up; (2) co-ordination; (3) cardio-fitness; (4) strength; and (5) cooling-down. In between the exercise blocks of 1.5 to 2.5 minutes, health education is provided. A sport physician talks about the positive effects of regular physical activity and advance on injury prevention. A dietician talks about healthy food and refers to a special recipe on the programs special website (<http://www.gezondheidsplein.nl/gp/gp.php?type=nl-beweging>). Different physical activities and sports are highlighted by showing short features. In the meantime, the six participants are stepping on the spot. Two instructors (a man and a woman) take turns to lead the exercises. Once a week, the program includes a diary with tips on local and national physical activity events viewers could participate in. Another element of the program is the health-related question. The answer to this question is provided later in the program. The health education elements differ each day, but return in a weekly cycle.

However, because television companies were not very interested in this age group, the program was labeled as exercise for the 35+ age group. In addition to low-intensity exercises, the program provides healthy-lifestyle tips (see Fig. 1 for a description of the program).

The research questions at the start of the program were:

- What are the characteristics of viewers and non-viewers?
- What are the determinants of the behavioral intention to exercise more?
- What determines the actual exercise behavior in general?
- What determines the participation in NOM-tv?

The last two questions were answered using the theoretical ASE (Attitude, Social influence, Efficacy) model [9,10] for behavioral change (including background variables). This model is based on the social learning theory [11], the health belief model [12] and the model of Fishbein and Ajzen [13] on reasoned action. We added the Triandis model [14], which mainly focuses on the role of exercising habits. Finally, we added the transtheoretical model for exercising developed by Prochaska and Marcus [15] (see Fig. 2).

**Methods**

*Design of the study*

A cohort study was carried out on an age stratified quota sample (random digit dialing throughout the Netherlands) of people aged 35 years and over. This was done by making random telephone calls during daytime (9–17.00 h) until 1045 people (the target number of participants was 1000, 500 aged between 35 and 55 and 500 aged 55 and over) agreed to participate in the first interview at baseline (before the television program started). It was explained that a new program with exercises on TV started at short notice. Because the telephone call was during daytime, only people that are normally home were reached (1 out of 20 contact attempts was successful). This was the potential target group. However, this approach and the fact that we had to explain that the research was about a new television program, had consequences for the generalizability to the Dutch population as a whole. This will be discussed later.

The interview was carried out by trained interviewers at a call center, supported by the BLAISE CATI program (Computer Assisted Telephone Interview) [16]. Shortly after the interview in January 2000, broadcasting of NOM-tv commenced. After 7 months (in July) the follow-up interviews were carried out approaching the same participants as at baseline. Before the start of each interview, informed consent was asked.

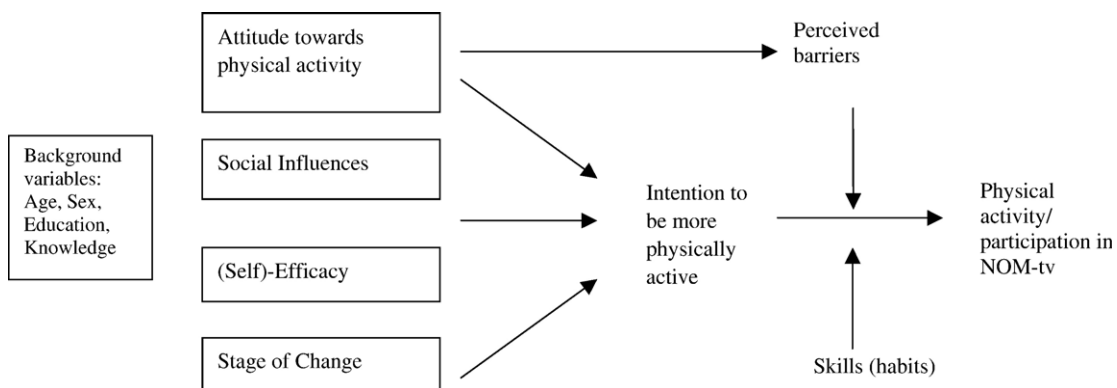


Fig. 2. The ASE model for behavioral change in physical activity (modified after De Vries [9,10]).

### Questionnaire

The questionnaire consisted at baseline of:

- Background variables: age in years, gender, marital status, level of education, living situation. The mental health and vitality sub-scales from the RAND-36 [17,18] were used, with scores varying from 0% to 100% (100 = most healthy).
- Behavioral intention: “Do you plan to be more physically active in the short term?”, “Do you intend to do the NOM-tv exercises at home?” The answer categories were 1 = no, absolutely not, to 4 = yes, definitely.
- Attitude towards physical activity. Three questions about taking more exercise were used: relaxing (+1), neutral (0), stressful (−1); fun, neutral, boring; healthy, neutral, unhealthy; the same three questions were repeated in the follow-up, in addition to a question about the respondents’ attitudes to participation in NOM-tv. The attitude score ranged from −3 (negative attitude) to +3 (positive attitude).
- Social influences regarding physical activity: “How do you think people in your environment will react if you exercise more?” (or participate in NOM-tv exercises). Answer categories were: positive +1, neutral 0, negative −1. This was multiplied by the score for the question “Is the opinion of others about this topic important to you?” (score no = 0, yes = 1).
- Self-efficacy. At baseline the following questions were asked: “Do you think you will be able to be more physically active? (answer categories ranged from 0 = ‘I am sure I cannot’ to 10 = ‘I am sure I can’) and “Do you think you are able to do the NOM exercises 3 times a week?” (answer categories ranged from 0 = ‘I am sure I cannot’ to 10 = ‘I am sure I can’).
- Knowledge about the importance of physical activity and exercising (6 questions such as “A daily walk will keep you healthy”, answers: 1 = correct, 0 = not correct/I do not know). Maximum sum score was 6.
- Exercise history (habits): 0 = no experience in doing exercises, 1 = more than 5 years ago, 2 = between 1–5 years ago, 3 = less than 1 year ago. Additionally we asked if people were used to participate in the exercises of a radio program in the early morning hours (answers yes or no).
- Current physical activity status, using the stage of change model for exercising [15,19]: precontemplation (1 = not physically active, no plans for next 6 months); contemplation (2 = not physically active but considering being active in the next 6 months); preparation (3 = sometimes physically active, but not on a regular basis); action (4 = physically active for less than 6 months); maintenance (5 = regular physically active for more than 6 months). The respondents were also asked if they were physically active according to the norm of 30 min daily at least 5 days a week (answer ‘yes’ or ‘no’).
- Number of perceived barriers. A number of questions looked at several potential barriers: ‘no time’, ‘no interest’,

‘not used to’, ‘too expensive’, ‘no progress’, ‘feeling unhealthy’, ‘other problems’. Answer categories were 1 = agree and 0 = disagree. Sum score for 7 questions.

At follow-up, the following items were added:

- Television viewing (Seen NOM-tv in last three months? Satisfaction with NOM-tv?).
- Participation in NOM-tv exercises. Non-viewer = 0, viewer, but participated only sometimes in the previous 3 months = 1, viewer and participates 1 or 2 times a week = 2, viewer and participates 3, 4, or 5 times a week = 3.
- Perceived increase or decrease in physical activity. “Did you increase or decrease your physical activity in the last 6 months?” Answer categories are 1 = a lot less; 2 = a little less; 3 = the same; 4 = a little more; 5 = a lot more.

### Statistical analysis

Differences between viewers and non-viewers at baseline were tested with chi-square tests (nominal variables), Mann–Whitney (ordinal variables) and *t* tests (numerical variables). Alpha was 0.05.

The ASE model was tested using an ENTER regression model (checked for mediation by stepwise entrance). Models were tested with the behavioral intention at baseline as the dependent variable (broken down into the intention to exercise more in general and towards doing specific exercises while watching NOM-tv). Independent variables were specific attitude at baseline, specific social influence at baseline, specific self-efficacy at baseline, stage of change at baseline, knowledge at baseline, age in years, gender (1 = male, 2 = female), and educational level (categories varying from high = 1 to low = 3).

The model was also tested separately with behavior in terms of perceived physical activity increase or decrease and the actual level of participation in NOM-tv exercises (both at follow-up) as dependent variables. The independent variables were attitude at follow-up, social influence at follow-up, self-efficacy at follow-up, stage of change at follow-up, knowledge at baseline, age in years, gender, level of education, and number of perceived barriers at follow-up. Exercise habits were used as a proxy for skills. The percentages of explained variances, partial correlations (contribution of the variable to the model after correction for all other variables), *t* value and *P* values are reported. To test the levels of knowledge between groups of NOM-tv viewers, we applied one-way ANOVA with post hoc comparisons. SPSS 11.5 [20] was used in all analyses.

### Results

At baseline, 1045 persons were interviewed, yielding 988 valid records. The background characteristics of the respondents at baseline are given in Table 1. In our sample

Table 1  
Background characteristics of respondents at baseline and follow-up

Variable	Baseline		Total ( <i>n</i> = 988)	Viewers ( <i>n</i> = 196)	Non-viewers ( <i>n</i> = 166)	Total ( <i>n</i> = 362)	<i>P</i> value (test viewers vs. non-viewers)
	Age category 35–54 ( <i>n</i> = 499)	Age category 55+ ( <i>n</i> = 489)					
Age in years ( <i>M</i> , <i>SD</i> )	45 (5.4)	67 (8.3)	56 (13.2)	59 (12.6)	54 (13.8)	57 (13.1)	<0.001
Sex (% woman)	73% <sup>a</sup>	65% <sup>a</sup>	69%	76%	69%	73%	0.07
Marital status							NS
(married) Living together	93%	65%	79%	76%	81%	78%	
Divorced	3%	5%	4%	6%	5%	5%	
Widowed	2%	28%	15%	17%	11%	15%	
Never lived together	2%	2%	2%	1%	3%	2%	
Education							NS
High	29%	21%	25%	21%	23%	22%	
Medium	47%	37%	42%	41%	45%	43%	
Low	25%	43%	34%	38%	32%	35%	
Living situation							NS
House with stores	90%	42%	81%	75%	81%	77%	
House without stores	8%	50%	12%	18%	12%	16%	
House with special care	<1%	5%	4%	4%	5%	4%	
Living in a private house	<1%	–	<1%	<1%	–	<1%	
Others	2%	3%	2%	3%	2%	3%	
Mental Health (RAND 36) <sup>b</sup> ( <i>M</i> , <i>SD</i> )	78 (14.9)	76 (16.1)	77 (15.6)	74 (14.7)	77 (14.5)	75 (14.7)	0.05
Vitality (RAND 36) <sup>b</sup> ( <i>M</i> , <i>SD</i> )	65 (17.4)	65 (17.7)	65 (17.5)	63 (16.2)	65 (16.5)	64 (16.3)	NS
Number with stage of change < action	167	161	328	70	49	119	NS

<sup>a</sup> Reference values general population following official Dutch statistics: age 35–54, 49% women; age 55+, 55% women.

<sup>b</sup> Reference values general population: Mental Health 77, Vitality 66 (van der Zee and Sanderman [18]).

women were clearly overrepresented, especially in the younger age group. At follow-up after three telephone attempts, 36% (*n* = 353) were not reached. Of the persons that answered the call (635 of 988 persons which had agreed previously to participate), 362 respondents agreed to a follow-up interview (total response rate 362/988 = 37%; response rate among people reached 362/635 = 57%). In the follow-up interview, 196 respondents were NOM-tv viewers and 166 were not (see Table 1 for background characteristics).

A difference between the viewers and non-viewers was age (viewers were on average 5 years older, *P* < 0.001). Viewers had poorer mental health (*P* = 0.05). Of the viewers, 57% (*n* = 111) indicated that they actually participated in the exercises (25% of whom did so three times a week and 35% ‘just a few times’).

The NOM-tv viewers gave NOM-tv a 7.4 on a scale from 1–10 (10 = highest level of appreciation). Of the non-active respondents (<action on the State of Change variable) at baseline (*n* = 328), 70 respondents (=21%) were viewers of NOM-tv at follow-up (assuming that all non-respondents at follow-up were also non-viewers). As can be seen from Fig. 3, active people at baseline indicated relatively more NOM-tv participation than do the non-active people (chi-square test = 13.4, *df* = 2, *P* < 0.001).

One of the goals of NOM-tv was to increase viewer knowledge about physical activity and health issues. We did indeed find a link between the level of participation in NOM-tv and increasing means for the knowledge variable at follow-up (one-way ANOVA, *F* = 2.8, *P* = 0.04; knowledge levels at

follow-up: non-viewers *M* = 4.8 (SD 1.6); sometimes *M* = 5.2 (SD 1.1); once or twice a week *M* = 5.2 (SD 1.1); three or more times a week *M* = 5.4 (SD 0.8)). Tuckey post hoc tests showed that the greatest differences were between the non-viewers and participants who watched more than three times a week. As we looked at the differences in knowledge between follow-up and baseline, the group that sometimes and the group that participated once or twice a week had the most knowledge benefits (both groups increased 1.5 points in the mean scores of knowledge).

Table 2 shows the results from the regression model used to determine the most important determinants of the intention to exercise more in general and to participate in NOM-tv exercises. In both models, attitude, social influences and self-efficacy played a significant role, as predicted by the ASE model. Remarkably, the model for the intention to participate in NOM-tv exercises has a much better explained variance than the general model does. This is due to the contribution of age and gender (older people and women had a more pronounced intention to participate in NOM-tv exercises). In the general model, however, the stage of change in exercise behavior played a small but significant role. The lower the stage, the greater the measured intention (this was particularly true of the contemplation phase, in which 63% intended becoming more physically active). If we look at the follow-up, 12.5% of the precontemplators actually became more physically active, as opposed to 24% of the contemplators. In the preparation group, 24% became more active (of whom 6% a lot more); in the action group, 26% became more physically

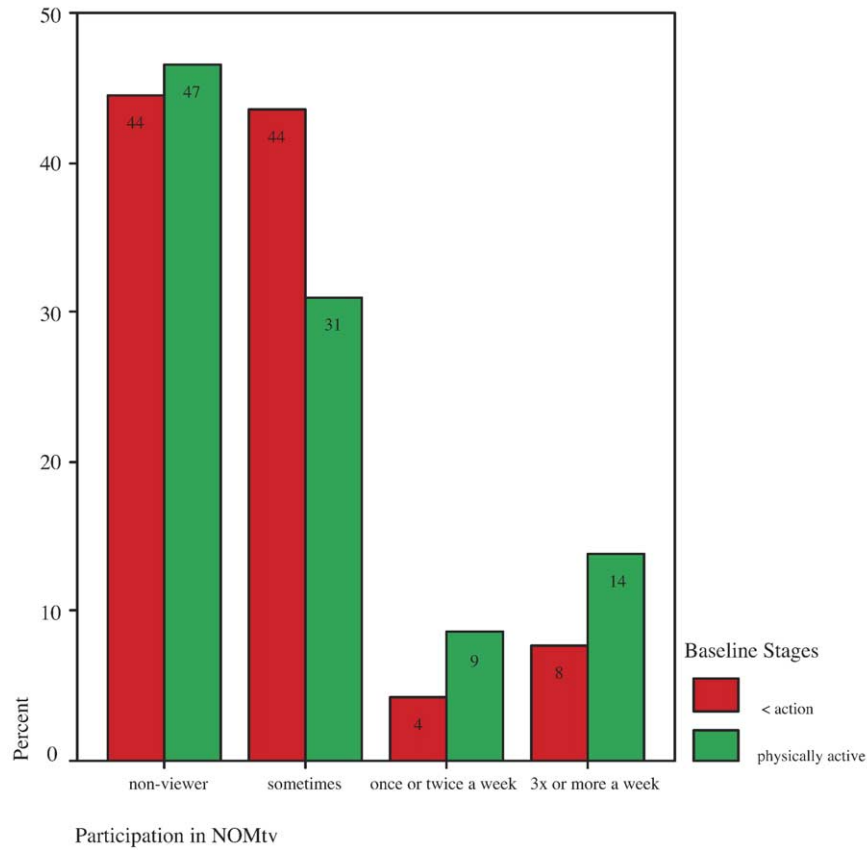


Fig. 3. Participation in NOM-tv, percentages of stage of change ‘active’ (action and maintenance) and ‘inactive’ people (<action) at baseline.

active (of whom 7% a lot more). Finally, in the maintenance group, 14% became a little more active; although 14% of this group also became a lot less active. The same analysis for participating in NOM-tv showed that 0% of the precontemplators participated in the NOM exercises, as opposed to 12% of contemplators, 15% of the preparation group and 24% of the action group. In the maintenance group, nobody participated in the NOM-tv exercises.

In our interview, we also asked if people used to participate in the radio program with gymnastic exercises that was broadcast daily at 7 a.m. More than half (56%) of the radio participants were at baseline interested in participating in NOM-tv, as opposed to 35% of the non-radio participants (chi-square test 29.4; *df* = 3, *P* < 0.00).

Table 3 shows the results for the regression models applied to perceived increase or decrease in physical activity or actual participation in NOM-tv exercising. The percentage of explained variance was much lower than in the intention models for physical activity in general (6% as opposed to 23% for intention; for NOM-tv, 16% as opposed to 47% for intention). A significant contribution to more physical activity in general came from the State of Change variable and from the number of perceived barriers. The best predictors for participation in NOM-tv were age (older), gender (female), knowledge about the health effects of exercising, and the number of perceived barriers. Attitude, social influence and self-efficacy were not important in either model. Because ASE had less influence we looked at what

Table 2  
Determinants of the intention to become more physically active in general, and to participate in NOM-tv exercises at baseline (*N* = 986)

Variables in model (ENTER)	Intention to become more physically active in general		Intention to participate in NOM-tv exercises	
	Partial correlation	<i>t</i> ( <i>P</i> ) value	Partial correlation	<i>t</i> ( <i>P</i> ) value
Attitude	0.17	5.2 ( <b>0.00</b> )	0.39	13.1 ( <b>0.00</b> )
Social influences	0.11	3.3 ( <b>0.001</b> )	0.11	3.5 ( <b>0.01</b> )
Self-efficacy	0.38	12.4 ( <b>0.00</b> )	0.47	16.6 ( <b>0.00</b> )
Age	−0.02	−0.71 (0.48)	0.07	2.2 ( <b>0.03</b> )
Sex	0.06	1.78 (0.07)	0.12	3.9 ( <b>0.00</b> )
Education	0.02	0.60 (0.55)	−0.04	−1.1 (0.25)
Knowledge	0.01	0.43 (0.66)	−0.03	−0.9 (0.32)
Stage of Change	−0.07	−2.2 ( <b>0.03</b> )	−0.03	−0.8 (0.40)
	<i>R</i> <sup>2</sup> = 0.23 (adjusted 0.22)		<i>R</i> <sup>2</sup> = 0.47 (adjusted 0.47)	

Table 3  
Determinants of the perceived increase of physical activity in general, and actual participation in NOM-tv exercises at follow-up ( $N = 349$ )

Variables in model (ENTER)	Perceived increase in physical activity		Actual participation in exercises NOM-tv	
	Partial correlation	$t$ ( $P$ ) value	Partial correlation	$t$ ( $P$ ) value
Attitude	0.003	0.075 (0.94)	0.10	1.89 (0.06)
Social influences	−0.09	−1.66 (0.10)	−0.01	−0.23 (0.82)
Self-efficacy	−0.05	−0.99 (0.32)	0.01	0.21 (0.83)
Age	−0.07	−1.21 (0.23)	0.26	4.97 ( <b>0.00</b> )
Sex	−0.00	−0.06 (0.95)	0.13	2.45 ( <b>0.01</b> )
Education	−0.00	−0.11 (0.91)	0.01	0.21 (0.83)
Knowledge	0.02	0.38 (0.71)	0.16	3.01 ( <b>0.00</b> )
Stage of Change	0.13	2.3 ( <b>0.02</b> )	0.04	0.80 (0.42)
Habits	−0.04	−0.82 (0.41)	0.02	0.33 (0.74)
Barriers	−0.13	−2.41 ( <b>0.02</b> )	−0.23	−4.36 ( <b>0.00</b> )
	$R^2 = 6%$ (adjusted 3%)		$R^2 = 16%$ (adjusted 13%)	

Note 1: adding behavioral intention into the models did not have a significant effect in the general model but increased the explained variance in the NOM-tv model with 7% (partial correlation 0.30,  $P < 0.00$ ).

Note 2: adding intention + listening to the radio program increased the explained variance in the NOM-tv model with 8% (partial correlation radio listening 0.09,  $P = 0.10$ ).

happened if behavioral intention was added to the models. No significant contribution to intention was found if perceived physical activity in general was predicted, but the intention to participate in NOM-tv made a significant contribution to the NOM-tv model (an increase of 7% in the percentage of explained variance; in this last model the variable ‘gender’ lost significance as a determinant). When listening to the radio program was added to the NOM-tv model, explained variance increased by 1%, but this variable did not reach significance.

## Discussion

This study evaluated the role of a daily television program in educating about and increasing physical activity levels in Dutch adults. NOM-tv attracted at least 21% of the physically non-active people at baseline to viewing. As predicted by the extended ASE model, attitude, social influences and self-efficacy were the best determinants of behavioral intention. Interestingly, the stage of change in exercise behavior was an independent determinant of the intention to be more physically active in general, but not for the intention to participate in NOM-tv exercises. For the latter, age and gender were most important (corrected for the contribution of all the other determinants). Analyzing the radio program participation, we found differences between people that were used to exercise while listening to the radio program in the early morning hours and people that were not. The first had more intention to participate in NOM-tv. It is known that the group of radio listeners especially consist of older women. It would therefore seem that the experience of participating in the radio exercises partially explains the results on intention.

Actual behavior was far more difficult to explain than the behavioral intention with the model that was used, as

expressed in a much lower explained variance. Only a very small percentage of the variance was explained by the stage of change and the number of perceived barriers. Actual participation in the NOM-tv exercises was best predicted by the (lower number of) perceived barriers and age and to a lesser extent by gender and knowledge. A history of exercising using broadcast media did not reach significance, but possibly lowered barriers. A problem in the NOM-tv model was that the stage of change variable was not normally distributed. There was an increasing trend for NOM-tv participation through the stage of change at baseline. However, the maintenance group was apparently not at all attracted to the program. This phenomenon made it perhaps more difficult for the stage of change variable to reach significance in the NOM-tv models.

In addition to the exercise component, NOM-tv was also designed as a health education program. Indeed, we found that the program had a small effect in terms of the knowledge of the participants with regard to health and physical activity issues.

We can conclude that the NOM-tv program is particularly appealing to older women with a reasonable knowledge of the benefits of exercising, and with a low level of perceived barriers to participation (perhaps partly attributable to experience of the radio exercise program). The program also attracts people at the lower stage of change levels, and this was an important goal of the program. It is estimated that about 21% of the people who were not physically active (stage of change below action) were reached by NOM-tv. Of this group, the contemplators and preparation groups in particular made the step towards actual participation in the exercises. NOM-tv therefore contributes to the achievement of the physical activity norm by people who are normally difficult to reach [21].

Four years later, NOM-tv is still being broadcast in two morning slots. The 7 a.m. broadcast attracts approximately

30,000 viewers a day, while at 9 a.m. the program has some 90,000 viewers. This makes it the best-viewed daytime television program of the Dutch broadcasting company AVRO. After the success of NOM-tv in the Netherlands, the radio program stopped broadcasting (with the argument that the radio program was not necessary any more).

As far as we know, no other research has been conducted into similar exercise programs on television, so in that sense this study is unique. This is supported by a review by Kahn et al. [22], which identified only a few studies in the area of mass media use [23]. Some studies, like the Australian ones from Booth et al. and from Bauman et al. [6,7], found an increase in the percentage of physically active people after mass media campaigns. If we compare our results with the review by Trost et al. [24] regarding the correlates of physical activities in adults, it is interesting to see that we found a positive relationship with female gender and with knowledge, as opposed to most other studies in this area. Clearly, NOM-tv appealed to an underrepresented group in most research.

One of the problems was the establishment of a representative sample of possible viewers before the program started. We encountered major problems with interviewing because people were difficult to reach and sometimes quickly refused. This could be partly attributed to the aggressive interview techniques of market research organizations that approach people for interviewing. We lost participants at follow-up, and this may have created a bias towards the participation of people with a better attitude to physical activity and exercising. We also enclosed relatively many women in our study sample, this was probably due to the fact that women have less labor force participation in the Netherlands, and are at home during daytime when interviews were conducted. Given all these facts, the results of this study cannot be generalized to the population as a whole, but they offer good insights in the determinants of exercise participation of people that are normally at home during daytime (mostly women) and were interested in study participation.

Given the estimated cost of each broadcast of US\$2200, with an average of 120,000 viewers a day, NOM-tv is a successful and relatively cheap way of getting inactive older people—especially women—to exercise.

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